Preliminary Risk Assessment Summary for Cooranbong

Purpose

The purpose of undertaking the preliminary risk assessment was to:

- Identify potential risks that may impact the safe and reliable operation of the facility (and associated components), specifically focused on risks associated with the following:
  - Potential impacts to public health and/or water quality
  - Environmental impacts including noise, odour and general environmental impacts
  - Operational reliability and process performance
  - Financial viability
  - Customer service
- Identify early, potential risk mitigation/control measures that can be incorporated into the design, construction and operation of the facility to sufficiently mitigate these risks
- Facilitate further dialogue with all key stakeholders to ensure all key risks associate with the project are identified and effectively controlled.

Methodology

A risk assessment was conducted for provision of the following services:

- Sewage
- Recycled water
- Drinking water

The assessment approach adopted for conducting the sewage and recycled water preliminary risk assessments was consistent with the recommendations in the Australian Guidelines for Water Recycling (AGWR). The assessment criteria are provided in Attachment A.

The assessment approach adopted for conducting the drinking water preliminary risk assessment was consistent with the recommendations in the Australian Drinking Water Guidelines (ADWG). The assessment criteria are provided in Attachment B.

Business risks, or risks leading to a loss of service or complaints, were assessed using the Flow assessment criteria provided in Attachment C.

The preliminary risk assessment process included the following activities:

- **Risk Identification** – The identification of a range of risks related to the project (what might happen?)
- **Risk Categorisation** – The categorization of the risks into various types to aid understanding and to provide context.
- **Risk Assessment** – Determination of the likelihood and consequence of the unmitigated/uncontrolled risk (what is the likelihood and impact/consequence?)
- **Managing the Risk/Risk Mitigation** – the identification of appropriate controls to be further developed and implemented as appropriate should the project be approved to process (what can be done to stop it happening?)
- **Post Mitigation Risk Assessment** – the reassessment of the risk following implementation of appropriate controls to ensure that the risk is sufficiently mitigate (how effective do we anticipate the controls to be?)

Controls

Controls modify the likelihood or the impact of the risk (i.e. both the likelihood and consequence of a risk).

- Preventive controls apply at the beginning of a risk's life, at or near the root causes(s). As a device, they often act as a barrier to "nip it (the risk) in the bud". They primarily reduce the likelihood of the risk occurring. Examples are system passwords, locked doors, machinery maintenance etc.
- Detective controls usually apply somewhere in the middle of the risk's life. Detective controls rely on the analysis of information in order to detect that a risk is "in motion". Detective controls that are "early" in the risk's life usually modify likelihood and those that are "late" in the life, usually modify impact. Examples are online monitoring, inspections, complaints and incident monitoring etc.
- Reactive controls (sometimes also called Responsive or Corrective), apply towards the end of a risk's life when the impact is imminent or being felt. They are focused on modifying impact. Examples are plant shutdown, drinking water top up, incident and emergency response processes.

Risk rating before and after controls

The risk rating after controls is a risk assessment with controls in place. As explained above, controls can modify both the likelihood and consequence of a risk.

The qualitative descriptions for consequence or impact contained in the recommendations of the AGWR and ADWG (refer to Attachments A and B), use a combination of the scale of the impact and the size of population or ecosystem affected. If the controls can reduce the scale of the impact or size of the population or ecosystem affected, then the overall risk rating can be reduced.

Examples include:
Drinking water - The risk of a low disinfection residual will lead to lower disinfection, but there will still be a level of disinfection, thereby reducing the scale of the impact and the size of the population affected.
Sewage – The risk of sewage overflow is mitigated by rapid response and isolation reducing the quantity of sewage released, and/or the flows to sensitive receiving environments being diverted, and therefore the scale and size of the ecosystems affected.
Recycled water - The risk of process failure is mitigated by a multi-barrier treatment approach and plant shutdown if critical control points are exceeded.

Outcomes

Sewage Risk Assessment

In undertaking the preliminary risk assessment, risks were identified across the following areas:

Area	Descriptions
The Catchment	Risks associated with the catchment area including consideration of items such as contamination, volume changes, public health incidents, storage requirements, illegal discharge to sewers etc.
The Sewer Network	Risks associate with the network itself including blockages, pipe or equipment failure, loss of power etc.
Management	General operation management issues risks that may impact operational reliability or supply surety.

Risks have been summarise at Attachment D as the detailed preliminary risk assessment contains information that is commercial in confidence.

Recycled Water Risk Assessment

In undertaking the preliminary risk assessment, risks were identified across the following areas:

Area	Descriptions
Local Water Centre	Consideration of the potential risk associated with the operation of the treatment facility including tank and/or equipment failure, odour, noise, process risks, capacity, power failure, telemetry, vandalism, operator error, flooding etc.
Recycled Water Reticulation and Use	Risks associated with the storage and distribution of recycled water to users and considered areas such as equipment failure, demand, unauthorized usage, water quality, security, power failure etc.
Management	General operation management issues risks that may impact operational reliability or supply surety.

Risks have been summarise at Attachment E as the detailed preliminary risk assessment contains information that is commercial in confidence.

Drinking Water Risk Assessment

In undertaking the preliminary risk assessment, risks were identified across the following areas:

Area	Descriptions

Supply	Consideration of the potential risk associated with the supply of drinking water from a public water authority
Potable Water Reticulation and Use	Risks associated with the storage and distribution of drinking water to users and considered areas such as equipment failure, demand, unauthorized usage, water quality, security, power failure etc.
Management	General operation management issues risks that may impact operational reliability or supply surety.

Risks have been summarise at Attachment F as the detailed preliminary risk assessment contains information that is commercial in confidence.

Attachment A Qualitative Risk Assessment Criteria as per the AGWR

Risk Matrix – Australian Guidelines for Water Recycling

Likelihood							
	A Almost certain		Low	Moderate	High	Very High	Very High
	B Likely		Low	Moderate	High	Very High	Very High
	C Possible		Low	Moderate	High	Very High	Very High
	D Unlikely		Low	Low	Moderate	High	Very High
	E Rare		Low	Low	Low	High	High
			Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
			Consequence				

Likelihood (qualitative measures)

Level	Descriptor	Example description
A	**Almost certain**	Is expected to occur, with probability of multiple occurrences within a year.
B	**Likely**	Will probably occur within a 1-5 year period.
C	**Possible**	Might occur or should be expected to occur within 5-10 year period.
D	**Unlikley**	Could occur within 20 years or in unusual circumstances.
E	**Rare**	May occur in exceptional circumstances; may occur once in 100 years.

Consequence or impact (qualitative measures)

Level	Descriptor	Example description
1	**Insignificant**	Insignificant impact or not detectable.
2	**Minor**	Health - minor impact for small population Environment - potentially harmful to local ecosystem with local impacts contained to site.
3	**Moderate**	Health - minor impact for large population Environment - potentially harmful to regional ecosystem with local impacts primarily contained on site.
4	**Major**	Health - major impact for small population Environment - potentially lethal to local ecosystem. Predominantly local, but potential for off-site impacts.
5	**Catastrophic**	Health - major impact for large population Environment - potentially lethal to regional ecosystem or threatened specias. Widespread on-site and off-site impacts.

Note:
1. The levels used for "Likelihood" have been changed to be the same as the ADWG i.e. A = Almost certain. In the AGWR A = Rare.

Attachment B Qualitative Risk Assessment Criteria as per the ADWG

Risk Matrix – Australian Drinking Water Guidelines

Likelihood							
	A Almost certain		Moderate	High	Very High	Very High	Very High
	B Likely		Moderate	High	High	Very High	Very High
	C Possible		Low	Moderate	High	Very High	Very High
	D Unlikely		Low	Low	Moderate	High	Very High
	E Rare		Low	Low	Moderate	High	High
			Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
			Consequence				

Likelihood (qualitative measures)

Level	Descriptor	Example description
A	**Almost certain**	Is expected to occur in most circumstances.
B	**Likely**	Will probably occu in most circumstances.
C	**Possible**	Might occur or should occur at some time.
D	**Unlikley**	Could occur at some time.
E	**Rare**	May occur only in exceptional circumstances.

Consequence or impact (qualitative measures)

Level	Descriptor	Example description
1	**Insignificant**	Insignificant impact, little disruption to normal operation, low increase in normal operation costs.
2	**Minor**	Minor impact for small population, some maneagable operation design interuption, some increase in operating costs.
3	**Moderate**	Minor impact for large population, signicificant modificaiton to nornal operation but manageable, operation costs increased, increased monitoring.
4	**Major**	Major impact for small population, systems significantly compromised and abnormal operation if at all, high level of monitoring required.
5	**Catastrophic**	Major impact for large population, complete failure of system.

Attachment C Flow's Qualitative Risk Assessment Criteria

Risk Matrix – Flow Systems

Likelihood							
	A Almost certain		Low	Medium	High	Very High	Very High
	B Likely		Low	Medium	High	Very High	Very High
	C Possible		Minimal	Low	Medium	High	Very High
	D Unlikely		Minimal	Minimal	Low	Medium	High
	E Rare		Minimal	Minimal	Low	Medium	High
			Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
			Consequence				

Attachment C Flow's Qualitative Risk Assessment Criteria *cont.*

Likelihood (qualitative measures)

Level	Descriptor	Example description (Flow)
A	**Almost certain**	Expected to occur in most circumstances. Greater than 90% chance of occurrence. More than once per year.
B	**Likely**	Will probably occur in most circumstances. 65%-90% chance of occurrence Once in 1-2 years
C	**Possible**	Might occur or should occur at some time. 35%-65% chance of occurrence Once in 2-5 years
D	**Unlikley**	Could occur in unusual circumstances. 10%-35% chance of occurrence. Once in 5- 20 years.
E	**Rare**	May occur only in exceptional circumstances. Less than 10% chance of occurrence. Once in 20 years

Consequence or impact (qualitative measures)

Level	Descriptor	Example description
1	**Insignificant**	No material financial consequence to Flow Cost <$10k 1-2 customers impacted. Little disruption to normal operation, low increase in normal operation costs.
2	**Minor**	Some financial consequences to Flow Cost $10k-100k. 2-10 customers or a whole street impacted. May require notification but no other extraordinary activities. Some manageable operation disruption, some increase in operating costs.
3	**Moderate**	Considerable financial consequences to Flow. Cost $100k-$250k. Subdivision of community or whole development stage impacted. Significant negative consequences requiring additional actions to rectify. Negative client / customer reaction but temporary. Significant modification to normal operation but manageable, operation costs increased, increased monitoring.
4	**Major**	Material financial consequences to Flow Cost $250k-$1 million. Whole community impacted. High likelihood of adverse client/ customer reaction (e.g. lawsuits). May lose some clients / customers permanently. Systems significantly compromised and abnormal operation if at all, high level of monitoring required.
5	**Catastrophic**	Such significant financial consequences to Flow that its ability to operate is threatened. Cost > $1 million. More than one community impacted. Adverse client / customer reaction (e.g. lawsuits). Permanent loss of multiple clients / customers. Flow's key point of contact with IPART in the short term. Complete failure of systems.

Attachment D – Preliminary Risk Assessment Summary - Sewage

Risk ID	Component	Potential Risk	Pre-mitigation Risk	Controls	Post-mitigation Risk (or residual risk)
SW 1.1	Whole of system	Failure of overarching sewer management plan	**Very High**	• Additional controls as listed for each individual risk below. • **Preventive:** • Business Management System (BMS) independently verified to the International Standards ISO 9001 for quality management, ISO 14001 for environmental management and ISO 45001 for safety management. • Regular audits by auditors from the regulator's (IPART) independent panel of auditors. • Regular internal process and compliance audits are a component of the Flow BMS. • Review of resource requirements as part of Flow's business planning and budgeting process. • Annual review of BMS and water quality management plans. • Regulator oversight and enforcement action. • Skilled and trained operators. • Competency based training system. • **Detective:** • Consumer complaints. • Operator inspections. • **Reactive:** • Incident & Emergency Management Plan and associated processes to ensure a rapid and effective incident response and to prevent incident escalation. • Incident Notification Protocol with NSW Health to ensure risks to public health are controlled quickly. • Qualified contractors engaged to provide rapid response to faults and emergencies including sewage overflows • Pollution incident notification as per POEO Act requirements. •	**Low**
SDW 1.1	Delivery of developer works	Delays in construction and delivery of infrastructure by developer	**Very High**	• Compliance Certificate only issued when developer completes works • If works delayed, developer pays bond to Flow and Flow will deliver infrastructure • ISO 9001 certified project management processes including project meetings, program updates, and reporting. • Generators if delay related to connection to power. • Other reactive contingency measures dependent on service i.e. : sewage tankering, drinking water tankering, deployment of extra pumps	**Low**
SDW 1.2	Delivery of Local Water Centre	Delays in construction and delivery of Local Water Centre by Flow	**Very High**	• ISO 9001 certified project management processes to ensure timely delivery of infrastructure • Early identification of contingency measures through modelling. • Project management processes including project meetings, program updates, and reporting. • Sewage tankering • Provision of drinking water through recycled water network.	**Low**
SC 1.1 SC 1.2	Collection System (On-lot)	Overflow from on-lot infrastructure	**Very High**	• NSW Office of Fair Trading inspections during installation to mitigate illegal sewer connections	**Low**

				• Monitoring of pump operation, sewage level and pumped volumes through telemetry and data collection to identify outliers in operations. • • Power to pressure sewer pumps designed with easy connection to generator • Lower water usage in power outages • At least 48 hours capacity of tanks • Alarms linked through telemetry • Ability to isolate mains • Customer complaints • Customer updates via SMS • Qualified contractors to manage wastewater spills	
SC 1.1b	Collection system (On-lot)	Builders allow occupancy before contacting Cooranbong Water to connect sewer	**Very High**	• Builder workshops • Home owner education • Messaging with DA Plan review • Tag on tank • Social media reminders • Regular inspection of house building progress • Qualified contractors to manage wastewater spills	**Low**
SC 1.3	Collection system (Sewer main)	Sewage escape from sewer main due to third party damage	**Very High**	• Dial Before You Dig (DBYD) • Pre-qualified licensed contractor responsible for maintenance • 48 hour storage in wastewater collection tanks • Pressure monitoring and alarms of network • Isolation of valves on reticulation to allow isolation of sections • Incident and Emergency Management Plan and associated processes to ensure rapid response and mitigation.	**Low**
SC 1.4	Collection system (from customer connection to LWC)	Sewage leak or overflow	**High**	• Dial Before You Dig (DBYD) • Isolation, bunding, and flushing of sewage spills • Approved contractor responsible for maintenance and management of spills • Isolation valves on reticulation to allow isolation of sections • Telemetered on lot equipment • Customer and community complaints and response process • Ad hoc operator drive bys • Customer communications via SMS • Incident notification protocols with Public Health Unit and communication to determine appropriate public health response.	
SC 1.5	Collection system (Sewer main)	Odour from low flows at beginning (in initial stages of development)	**High**	• Regular flushing during early connection phase • Design of air valve • Odour scrubbing on system • Sampling and validation of sewage influent quality • Customer complaints program and customer updates via SMS	**Minimal**
SL 1.6 SL 1.10	Local Water Centre (Flow Balance Tank)	Overflow from tank	**High**	• Design, production, installation and testing by qualified contractors and quality assurance to AS3735 Water Retaining Structures. • Monitoring and alarm systems • Incident and Emergency Management Plan and associated processes to ensure rapid response and mitigation.	**Low**
SL 1.8	Local Water Centre (Flow Balance Tank)	Operational failure	**Very High**	• Standard equipment type so spares easily available on short lead times • Duty / standby of equipment	**Low**

SL 1.9 SL 1.10				• Inlet and product water buffer storage • Spares of critical equipment on site • Monitoring, alarmsand controls • Proactive maintenance regime • Experienced operators • Operator inspections • Incident and Emergency Management Plan and associated processes to ensure rapid response and mitigation. • Tankering company on emergency callout contract. • Generator back-up • Additional network storage in on-lot wastewater collection tanks	
SL 1.11	Local Water Centre	Inability to service customers	**Very High**	• Standard equipment type so spares easily available on short lead times • Duty / standby of equipment • Inlet and product water buffer storage • Spares of critical equipment on site • Monitoring and controls • • Experienced operators • Incident and Emergency Management Plan and associated processes to ensure rapid response and mitigation. • Tankering company on emergency callout contract • Generator back-up • Additional network storage in on-lot wastewater collection tanks • Drinking water top up to recycled water tanks	**Low**

Attachment E – Preliminary Risk Assessment Summary – Recycled Water

Risk ID	Component	Potential Risk	Pre-mitigation Risk (or	Controls	Post-mitigation Risk (or residual risk)
RW 1.1	Whole of system	Failure of overarching recycled water quality plan	**Very High**	• Refer to SW1.1	**Low**
RDW 1.1	Delivery of developer works	Delays in construction and delivery of infrastructure by developer	**Very High**	• Compliance Certificate only issued when developer completes works • If works delayed, developer pays bond to Flow and Flow will deliver infrastructure • ISO 9001 certified project management processes including project meetings, program updates, and reporting • Generators if delay related to connection to power • Other reactive contingency measures dependent on service i.e. : sewage tankering, drinking water tankering, deployment of extra pumps	**Low**
RDW 1.2	Delivery of Local Water Centre	Delays in construction and delivery of Local Water Centre by Flow	**Very High**	• ISO 9001 certified project management processes to ensure timely delivery of infrastructure • Early identification of contingency measures through modelling. • Sewage tankering • Provision of drinking water through recycled water network.	**Low**
RC 1.1 RC 1.2 RC 1.3	Collection System	Raw sewage characteristics are outside of design influent parameters	**Very High**	• Design influent parameters based on industry guidelines for water efficient homes. • Treatment process log reduction is greater than the minimum for required uses. • Community education i.e. new owner information packs, newsletters, school experience programmes etc. used to inform the public on what can be disposed of down the sewer. • Trade Waste Agreements with retail and commercial users • Multiple treatment barrier approach • Automatic plant shutdown when critical control points are breached. • Key process parameters are monitored and alarms generated should these indicate a toxic event.	**Low**
RL 1.1 RL 1.6 RL 1.8 RL 1.13	Local Water Centre	Process equipment damage / failure	**Very High**	• Duty / standby of equipment • Inlet and product water buffer storage • Spares of critical equipment on site • Monitoring and controls • Proactive maintenance regime • Experienced operators • Incident and Emergency Management Plan and associated processes to ensure rapid response and mitigation. • Tankering company on emergency callout contract • Site security	**Low**
RL 1.2 RL 1. 4 RL 1. 7 RL 1. 9 RL 1.12	Local Water Centre	Process performance outside operational parameters	**Very High**	• Duty / standby of equipment • Inlet and product water buffer storage • Spares of critical equipment on site • Monitoring and controls • Proactive maintenance regime • Experienced operators • Incident and Emergency Management Plan and associated processes to ensure rapid response and mitigation.	**Low**

			Very High	• Tankering company on emergency callout contract.	**Low**
RL 1.3 RL 1.5	Local Water Centre	Tank failure		• Design, production, installation and testing by qualified contractors and quality assurance to AS3735 Water Retaining Structures. • Incident and Emergency Management Plan and associated processes to ensure rapid response and mitigation.	
RL 1.11 RL 1. 14	Local Water Centre	Supply of chemicals is exhausted or degraded/poor quality		• Tanks sized for adequate storage but with regular ordering of small volumes due to degradation over time • Recycled water production will cease if chemicals are not available. • Chemical supply contract with minimum and emergency supply provisions. • Skilled operators with documented operational procedure. • Chemical storage tanks are fitted with level devices to ensure levels are continuously monitored.	
RL 1.15	Local Water Centre	Chemical spill		• Chemicals stored within weatherproof, bunded area as per Australian standards • Chemical loading area within bunded area • Chemical delivery procedures • Trained and inducted delivery drivers • Operator inspections • Spill response procedure • Tankering company on emergency callout contract • Incident and Emergency Management Plan and processes	
RL 1.16	Local Water Centre	Incorrect chemical delivery		• Chemical supply agreements and operational procedures • Chemical delivery procedures • Trained and inducted delivery drivers • Tankering company on emergency callout contract • Incident and Emergency Management Plan and processes • Monitoring of treatment processes	
RL 1.17 RL 1.18 RL 1.19 RL 1.20 RL 1.21	Local Water Centre	Disaster Emergency such as fire, lightning, vandalism, theft, power failure and heat		• Restricted access to LWC with security system and alarm • In the event of power failure onsite back-up generator used to maintain key process units. • Regular maintenance of back up generator • Ability to source an offsite generator as a backup • Incident notification protocol with the public health unit • UPS system installed to ensure control and access to the plant is still maintained • Top-up with drinking water • Electrical equipment in temperature controlled room with sufficient insulation • Firefighting system for the LWC from both potable and recycled water system • Critical spares will maintained to allow quick turnaround in the event of a failure • Incident and Emergency Management Plan and processes	
RL 1.23 RL 1.24	Local Water Centre	Poor aesthetics / Noise	**Very High**	• Local Water Centre has been designed to blend in with the local environment whilst not hiding its core activity. • Building layout has been designed to facilitate scheduled visits from interested stakeholders.	**Minimal**

				• All odour generating equipment has been fitted with covers and odour treatment as required. • Odour modelling has been undertaken to confirm that expected impact on surrounding stakeholders is negligible. • All noise generating equipment has been fitted with acoustic covers. Further acoustic treatment has been provided on the Local Water Centre building. • Noise modelling has been used to confirm that expected impact on surrounding stakeholders is negligible. • Customer Complaints Program	
RL 1.25	Local Water Centre	PLC / SCADA failure	**Very High**	• Local Water Centre can continue operation in the event telemetry is lost. • Automatic LWC shutdown on PLC failure • Operating procedure to respond to PLC failure • Data capture will continue on the local SCADA and PLC. • Plant would shut down if parameters were out of specification. • Top up with drinking water • Software and hardware back up • Supply agreement with telemetry with emergency response provision	**Low**
RD 1.1 RD 1.2	Recycled Water Distribution	Tank overflow / failure	**Low**	• Design, production, installation and testing by qualified contractors and quality assurance • Incident and Emergency Management Plan and associated processes to ensure rapid response and mitigation • Tankering company on emergency callout contract	**Low**
RD 1.3 RD 1.4	Recycled Water Distribution	Cross connection	**Very High**	• Recycled water kept at lower pressure than drinking water thereby mitigating recycled water entering the system • Colour coded, different materials, labelled pipes and marker tape • QA inspections of house plumbing by NSW Office of Trading prior to handover / operation • Risk assessment during design • Plumbing inspections triggered by DA process • OFT inspection and Flow's cross-connection plumbing check pre-conditions to Flow's connection of sewerage • QA checks on reticulation installation prior to handover to Flow (and Flow's issue of Certificate of Compliance) • Home builder education (website, Builders Guide) • Customer education (website, home owners guide, including translated services) • Backflow prevention at each house connection • Telemetry monitoring of drinking and recycled water usage to identify anomalous use • Incident notification protocols • Incident and Emergency Management Plan and processes • High quality recycled water has low risk of health impact.	**Low**
RD 1.5	Recycled Water Distribution	Recycled water is used for unauthorized purposes	**Very High**	• Colour coded, different materials, labelled pipes and marker tape • Information packs will be supplied to householders on initial connection or with	**Low**

				change of ownership. These information packs will clearly define the authorised uses for the recycled water. • Factsheets will be sent with billing information to householders reinforcing the authorised uses for the recycled water. • Community education on recycled water / website • Signage on recycled water taps • Telemetry monitoring of drinking and recycled water usage to identify anomalous use	
RD 1.6	Recycled Water Distribution	Process equipment damage / failure	**High**	• Pumps are installed duty / standby with automatic changeover. • Maintenance contractor to be engaged under standard protocols to investigate cause of pump failure. • Maintenance contractor to be engaged under emergency protocols to repair pump(s) or install temporary pump or repair leak. • Standard equipment type so spares easily available on short lead times • Spares of critical equipment on site • Where possible, recycled water storage located at high elevation to allow gravity feed • Preventive maintenance on pumps • Reticulation pipe work will be provided with a number of valves enabling isolation of parts of the network.	**Low**
RD 1.7	Recycled Water Distribution	Main break leading to discharge of recycled water	**Moderate**	• Reticulation pipe work will be provided with a number of valves enabling isolation of parts of the network. • Maintenance contractor to be engaged under emergency protocols to repair leak. • High quality recycled water • Dial Before You Dig (DBYD) • Automatic shut down on high flow* • Looped reticulation design and construction • Highlighting of single supply mains as high priority on DBYD where looping not possible • Pressure monitoring of the network for early alert of leaks • Mechanical vehicle protection on storage tanks (height restrictions, bollards) • Detectable marker tape over all mains	
RD 1.9	Recycled Water Distribution	Demand exceeds supply	**Moderate**	• Recycled water storage sized at >5 days of average production • Drinking water used to maintain supply if the recycled water storage tank drops below a minimum level • Membrane tank over-sized to allow for the option of stormwater harvesting to supplement the source water supply	**Minimal**
RD 1.10	Recycled Water Distribution	Health impact from exposure to water features	**Very High**	• Signage indicating use of recycled water in water features and proper use • High quality recycled water has low risk of health impact. • Colour coded, different materials, labelled pipes and marker tape • Community education on recycled water / website	**Low**
RD 1.11	Recycled Water Distribution	Supply exceeds demand	**Very High**	• Implement Integrated Water Cycle Management (IWCM) Policy and regularly review scheme specific IWCM Plan. • Seek additional recycled water customers. • Monitor volumes, demands and trends and adjust operations to suit	**Low**

				• Identify properties with higher than average sewer consumers and target for illegal connection studies. • Tankering • Construct additional storage	**Low**
RI 1.1 RI 1.2 RI 1.3 RI 1.4 RI 1.5 RI 1.6 RI 1.10 RI 1.11	Recycled Water Irrigation (by Flow)	Irrigation affecting receiving environments (water, land)	**Moderate**	• Flow operates to ISO 14001 certified Environmental Management System • Recycled Water Irrigation Management Plan (RWIMP), irrigation policies, procedures and systems implemented by trained and skilled staff • High quality recycled water treated for licensed end-use • Irrigation not applied to buffer area around waterways • Water quality and soil monitoring in accordance with Flow Monitoring and Sampling Plan/Program • Remote and in person monitoring of irrigation areas • Visual inspection of irrigation areas and irrigation infrastructure	
RI 1.7 RI 1.7a	Recycled Water Irrigation (by Flow)	Poor irrigation practices	**High**	• Flow operates to ISO 14001 certified Environmental Management System • Recycled Water Irrigation Management Plan (RWIMP), irrigation policies, procedures and systems implemented by trained and skilled staff • Irrigation site selection criteria • Seasonal irrigation to meet water balance requirements • High quality recycled water treated for licensed end-use • Water quality and soil monitoring in accordance with Flow Monitoring and Sampling Plan/ProgramRemote and in person monitoring of irrigation areas • Visual inspection of irrigation areas and irrigation infrastructure	
RI 1.8	Recycled Water Irrigation (by Flow)	Water not suitable for irrigation	**Moderate**	• Flow operates to ISO 14001 certified Environmental Management System • Recycled Water Irrigation Management Plan (RWIMP), irrigation policies, procedures and systems implemented by trained and skilled staff • High quality recycled water treated for licensed end-use • Controls as listed above related to performance • Water quality monitoring	**Low**
RI 1.9	Recycled Water Irrigation (by Flow)	Salinity increase in soils, groundwater and surface water	**Moderate**	• Flow operates to ISO 14001 certified Environmental Management System • Recycled Water Irrigation Management Plan (RWIMP), irrigation policies, procedures and systems implemented by trained and skilled staff • Water quality and soil monitoring in accordance with Flow Monitoring and Sampling Plan/Program • High quality recycled water treated for licensed end-use • Controls as listed above related to performance • Appropriate site selection • Vegetation selection and maintenance • Receiving environment monitoring - water and soil quality • Gypsum application	**Low**

Attachment F – Preliminary Risk Assessment Summary – Drinking Water

Risk ID	Component	Potential Risk	Pre-mitigation Risk (or	Controls	Post-mitigation Risk (or residual risk)
DW 1.1	Whole of system	Failure of overarching drinking water quality plan	**Very High**	• Additional controls as listed for each individual risk below. • **Preventive:** • Business Management System (BMS) independently verified to the International Standards ISO 9001 for quality management, ISO 14001 for environmental management and ISO 45001 for safety management • Regular audits by auditors from the regulator's (IPART) independent panel of auditors. • Regular internal process and compliance audits are a component of the Flow BMS. • Review of resource requirements as part of Flow's business planning and budgeting process. • Annual review of BMS and water quality management plans. • Regulator oversight and enforcement action. • Skilled and trained operators. • Competency based training system. • **Detective:** • Consumer complaints • Operator inspections • **Reactive:** • Incident & Emergency Management Plan and associated processes to ensure a rapid and effective incident response and to prevent incident escalation. • Incident Notification Protocol with NSW Health to ensure risks to public health are controlled quickly • Qualified contractors engaged to provide rapid response to faults and emergencies including sewage overflows. • Pollution incident notification as per POEO Act requirements • Water Industry Competition Act's Operator of Last Resort provisions and step in rights	**Low**
DDW 1.1	Delivery of developer works	Delays in construction and delivery of infrastructure by developer	**Very High**	• Compliance Certificate only issued when developer completes works • If works delayed, developer pays bond to Flow and Flow will deliver infrastructure • ISO 9001 certified project management processes including project meetings, program updates, and reporting. • Generators if delay related to connection to power. • Early identification of contingency measures through modelling • Other reactive contingency measures dependent on service i.e. : sewage tankering, drinking water tankering, deployment of extra pumps	**Low**
DC 1.1 DC 1.2	Catchment (Connection to Public Water Utility)	Out of specification drinking water quality supplied by Public Water Utility	**Very High**	• Utility Services Agreement with supplying water authority obliging the need to meet ADWG in supply water • Agreed communications protocols between local water utility and supplying water authority forming part of the USA • Accredited laboratory water quality testing by Flow Systems (quarterly grab samples and upon incident notification) • Incident and Emergency Management Plan and processes	**Low**

				• Incident notification protocols with Public Health Unit and determine appropriate public health response	
DC 1.4	Catchment (Connection to Public Water Utility)	Interruption to supply	**Moderate**	• Utility Services Agreement between local water utility and supplying water authority • Agreed communications protocols between local water utility supplying water authority forming part of the USA • Pressure monitoring at or near the bulk supply points • Provide tankered / bottled water • Incident and Emergency Management Plan and processes	**Low**
DD 1.1 DD 1.2	Drinking Water Distribution	Main break	**Very High**	• Dial Before You Dig (DBYD) • Mechanical vehicle protection on storage tanks (height restrictions, bollards) • Detectable marker tape over all mains • Spare repair fittings kept on site • As recycled water is supplied for up to 60% of home water demand, the consequence is already mitigated • Isolation valves on reticulation to allow isolation of sections	**Low**
DD 1.3 DD 1.4	Drinking Water Distribution	Recycled water cross connection	**Very High**	• Recycled water kept at lower pressure than drinking water thereby mitigating recycled water entering the system • Colour coded, different materials, labelled pipes and marker tape • QA inspections of house plumbing by NSW Office of Trading prior to handover / operation • Plumbing inspections triggered by DA process • OFT inspection and Flow's cross-connection plumbing check pre-conditions to Flow's connection of sewerage • QA checks on reticulation installation prior to handover to Flow (and Flow's issue of Certificate of Compliance) • Home builder education (website, Builders Guide) • Customer education (website, home owners guide, including translated services) • Backflow prevention at each house connection • Telemetry monitoring of drinking and recycled water usage to identify anomalous use	**Low**
DD 1.5	Drinking Water Distribution	Loss of supply / pressure	**High**	• Spare pumps kept locally • Pump provided in duty / standby • Supply recycled water to non-potable use (reduced impact on potable use) • Tankered / bottled water • Continuous pressure monitoring	**Low**
DD 1.6 DD 1.7	Drinking Water Distribution	Chemical leaching into supply	**Very High**	• New system, new materials, PVC pipework • Pipework designed to Australian Standards AS4020:2005 • Commissioning testing • Asset management and 6 monthly maintenance inspections • Accredited laboratory water quality testing by Flow Systems (grab samples and upon incident notification)	**Low**
DS 1.1	Drinking Water Storage	Contamination of drinking water storage	**Very High**	• Enclosed storage to ADWG standard • Security including fencing, CCTV, anti-climb measures, locked tank hatches and telemetry notification immediately • Routine inspection of storage	**Low**

				• Water quality monitoring • Online analysing and automatic top up of chlorine residual	
DS 1.2 DS 1.3	Drinking Water Storage	Chlorine dosing duty and standby pump fail and chlorine for residual can not be dosed	**Very High**	• Chlorine dosing for disinfection pumps are installed duty / standby. If duty pump fails then standby pump will automatically start. • Key spare parts kept on site to facilitate local / rapid repair. • Manually dose until pumps repaired • Online monitoring of chlorine residual	**Low**
DS 1.4 DS 1.5	Drinking Water Storage	Supply of chemicals is exhausted or degraded/poor quality	**Very High**	• Tanks sized for adequate storage but with regular ordering of small volumes due to degradation over time • Chemical supply contract with minimum and emergency supply provisions. • Skilled operators with documented operational procedure. • Chemical storage tanks are fitted with level devices to ensure levels are continuously monitored.	**Low**
DS 1.6	Drinking Water Storage	Incorrect chemical delivery and out of specification chemicals	**Very High**	• Colour coded and labelled intake nozzles for chemical tanks • Chemical supply agreements and operational procedures • Chemical delivery procedures • Trained and inducted delivery drivers • Tankering company on emergency callout contract • Incident and Emergency Management Plan and processes	**Low**

flow

Infrastructure Operating Plan (IOP)

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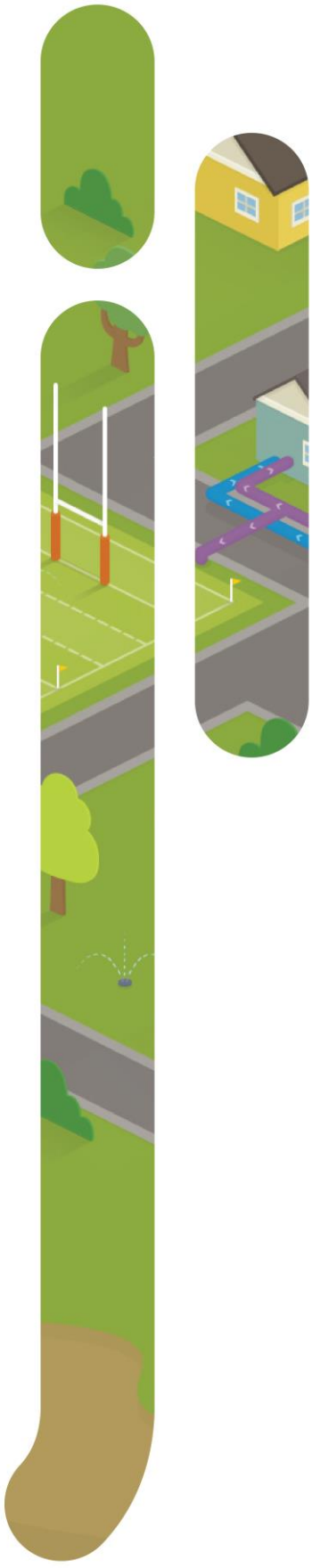
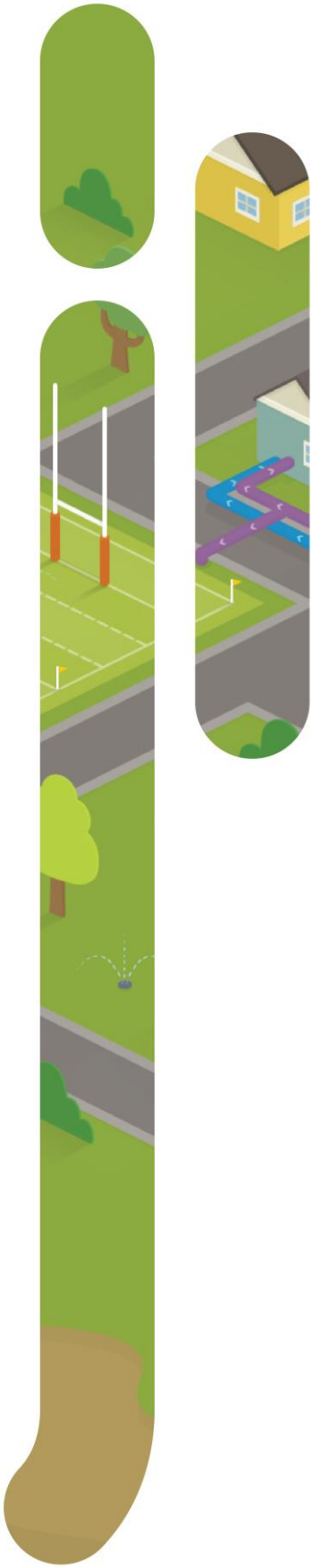
Incident Management Plan **(IMP)**



Contents

Retail Supply Management Plan



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