Preliminary Risk Assessment Summary for GSTC

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:

- Storm water
- Recycled water

The assessment approach adopted for conducting the 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.

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

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, 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:
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

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 summarized at Attachment C and D 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 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 B 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 C – Preliminary Risk Assessment Summary – Stormwater

Risk ID	Component	Potential Risk	Pre-mitigation Risk (or	Controls	Post-mitigation Risk (or residual risk)
STC 1.1 STC 1.7	Stormwater Network (collection and treatment)	Process performance outside operational parameters	**Very High**	• Monitoring and sampling program • Dilution of spills during rain events • Pretreatment of stormwater using gross-pollutant traps • Multiple treatment barrier design • Incident notification protocol • Drinking water top up available • Skilled operators • Alarms and automatic shut down controls	**Low**
STC 1.2 STC 1.3 STC 1.5	Stormwater Network (collection and treatment)	Equipment failure	**High**	• Continual monitoring • Potable top up to recycled water storage tanks to ensure supply to essential services is maintained • Skilled and trained personnel • Design, construction, commissioning, operation and maintenance to follow Australian Standards • Incident notification protocol • Inspection and maintenance of equipment	**Low**
STC 1.4	Stormwater Network (collection and treatment)	Power failure	**Very High**	• UPS system installed to ensure control and access to the plant is still maintained • Ability to source a back up generator	**Minimal**
STC 1.6	Stormwater Network (collection and treatment)	Limited base flow	**High**	• Potable top-up to recycled water storage tanks to ensure supply to essential services is maintained • Established relationship and reporting procedure in place with local authorities	**Minimal**

Attachment D – 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**	• 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.	**Low**

				• 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. • Pollution incident notification as per POEO Act requirements	**Low**
RL 1.1	Local Water Centre	Process equipment damage / failure	**High**	• Duty / standby of equipment • 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.	
RL 1. 4 RL 1. 9 RL 1.10 RL 1.12	Local Water Centre	Process performance outside operational parameters	**Very High**	• Duty / standby of equipment • Multi-barrier treatment process • 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 • Drinking water top up • Tankering company on emergency callout contract.	**Low**
RL 1.15	Local Water Centre	Chemical spill	**Very High**	• 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	**Low**
RL 1.16	Local Water Centre	Incorrect chemical delivery	**Very High**	• Operators on site and supervise chemical deliveries • Chemical supply agreements and operational procedures • Chemical delivery procedures including signage and labelling • Trained and inducted delivery drivers • Tankering company on emergency callout contract • Incident and Emergency Management Plan and processes • Spill response procedure.	**Low**
RL 1.17 RL 1.18 RL 1.19 RL 1.20	Local Water Centre	Disaster Emergency such as fire, lightning, vandalism, theft, power failure	**Very High**	• 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 • UPS system installed to ensure control and access to the plant is still maintained. • Top-up with drinking water • Firefighting system for the LWC • Incident and Emergency Management Plan and processes	**Low**
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. • All odour generating equipment has been fitted with covers and odour treatment as required.	**Minimal**

			Very High	• 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. • Incident and Emergency Management Plan and processes	
RL 1.25	Local Water Centre	PLC / SCADA failure		• 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 • Plumbing inspections triggered by DA process • OFT inspection and Flow's cross-connection plumbing check • 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 recycled water usage to identify anomalous use	
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 change of ownership. These information packs will clearly define the authorised uses for the recycled water. • Community education on recycled water / website • Signage on recycled water taps • Monitoring of recycled water usage to identify anomalous use	**Low**
RD 1.6	Recycled Water Distribution	Process equipment damage / failure	**Moderate**	• Pumps are installed duty / standby with automatic changeover.	**Minimal**

			Moderate	• 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. • Preventive maintenance on pumps • Reticulation pipe work will be provided with a number of valves enabling isolation of parts of the network • Incident and Emergency Management Plan and processes.	
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	**Low**
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 • Information packs and community education • Incident and Emergency Management Plan and processes	**Low**
RD 1.13	Recycled Water Distribution	Health impact to animals/insects entering water	**High**	• Sealed system with protective coverings to prevent ingress • Circulation to prevent stagnation of water • Incident and Emergency Management Plan and processes • Multi-barrier treatment process	**Low**
RD 1.14	Recycled Water Distribution	Contamination of recycled water after handover point by client	**High**	• Operations & Communications Protocol to communicate risks and controls provided with connection certificate • Notifications • Customer complaints • Incident and Emergency Management Plan and processes • Verification monitoring at each bulk water meter for each building	**Moderate**