



WALLBRIDGE & GILBERT
Consulting Engineers

MURRAY BRIDGE WATER INDEPENDENCE SCHEME

RISK MANAGEMENT WORKSHOP SUMMARY



Prepared For
Rural City of Murray Bridge

Job No.: WAD110551

Revision A

NOVEMBER 2011

Document History and Status

Revision	Date	Comment	Signatures		
			Originated by	Checked by	Authorised by
A	21/11/2011	Draft for Comment	MDV	NS	NS

Draft

CONTENTS

1	Introduction	3
2	Workshop Summary	3
3	Workshop Outcomes	5
	<i>APPENDIX A</i>	<i>7</i>
	<i>Workshop Agenda</i>	<i>7</i>
	<i>APPENDIX B</i>	<i>8</i>
	<i>Risk Assessment Tool</i>	<i>8</i>
	<i>APPENDIX C</i>	<i>9</i>
	<i>Risk Register</i>	<i>9</i>

Draft

1 INTRODUCTION

The Rural City of Murray Bridge (Council) Water Independence Scheme proposes to harvest stormwater from the township of Murray Bridge and reticulate it for reuse throughout the township's western region. The stormwater is proposed to be collected from existing stormwater basins and from currently proposed flood mitigation projects within the township and transfer it to Gifford Hill for treatment and storage. The treated stormwater will then be distributed from the storage facility at Gifford Hill to various locations within the township for the irrigation of Council areas, schools, water features and water trucks involved in construction.

The Rural City of Murray Bridge (Council) has nominally committed \$750k per annum for the next five years to deliver stormwater upgrades and provide flood mitigation. The successful implementation of significant stormwater and wastewater harvesting schemes by other Councils within South Australia has highlighted the potential for Council to strengthen its focus on harvesting and re-use and on water sensitive urban design (WSUD).

In partnership with the Murray Bridge Racing Club/Burke Urban Joint Venture Council is proposing to develop an integrated Stormwater Management and Reuse Scheme that encompasses Gifford Hill and the existing Murray Bridge Township. Council is using this Scheme as a basis for securing grant funding contributions from the Commonwealth Government's Water for Future Grant (3rd Round), an initiative of the National Urban Water and Desalination Plan, Stormwater Harvesting and Reuse Projects.

Recycled water destined for reuse must meet the requirements of the Environmental Protection Authority (EPA) South Australia and Department of Health requirements in accordance with the *Environment Protection Act 1993* and *Public and Environmental Health Act 1987* for irrigation purposes and must comply with the standards set out in the following guidelines:

- Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 1) (AGWR 2006)
- Australian Guidelines for Water Recycling: Managing Health and Environmental Risks (Phase 2) Stormwater Harvesting and Reuse (AGWR 2009a)

The following report summarises the outcomes of a preliminary high level Risk Management Workshop during which relevant stakeholders were involved in the risk assessment of the Murray Bridge Water Independence Scheme.

2 WORKSHOP SUMMARY

A Risk Management Workshop was facilitated by Wallbridge & Gilbert (W&G) on the 7th November 2011 at Council's Local Government Centre. The workshop was attended by relevant stakeholders including Council, Burke Urban, Wallbridge & Gilbert (W&G), Chris Kaufmann (Independent Consultant Water Demand), South Australia Murray Darling Basing Natural Resource Management Board,



Environmental Protection Authority (EPA) South Australia, Department of Water, Regional Development Australia Murraylands and Riverland and the Department of Planning, Transport and Infrastructure (DPTI) (see Appendix A for workshop agenda).

The aim of the workshop was to undertake a risk assessment to assess potential risks associated with the following components of the project:

- Water Source Catchment
- Stormwater Treatment
- Distribution and Intended Use
- Entire Scheme.

Risks with the potential to impact the following receptors were considered:

- Environment
- Health and safety
- Timeframe
- Cost
- Project management
- Social/stakeholder
- Governance.

Risk, defined as the chance of something happening that will have an impact is measured in terms of a combination of the consequences and likelihood. The risk assessment adopted the following process for each of the project components:

- Identification and description of hazards associated with the scheme
- Identification and description of the impact of these hazards impacting the scheme
- Analysis of risk in terms of consequence and likelihood to produce an estimated level of risk in the absence of any control measures (“do nothing” scenario)
- Identification of control measures to mitigate identified impacts
- Reanalysis of risks in terms of consequence and likelihood to produce an estimated level of residual risk taking into account the implementation of control measures.

The risk assessment tool use for risk assessment is presented in Appendix B.

3 WORKSHOP OUTCOMES

A total of 90 risks were identified across all the components of the scheme (Table 1). The number of high and extreme risks decreased after the implementation of control measures.

Table 1 Summary of risks identified in the risk assessment of the Murray Bridge Water Independence Scheme pre- and post-implementation of control measures

	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Scheme Component	Low		Moderate		High		Extreme	
Water Source Catchment	2	6	0	13	15	2	4	0
Stormwater Treatment	2	7	7	8	11	7	2	0
Distribution and Intended Use	1	1	2	14	13	3	2	0
Entire Scheme	0	0	0	17	12	11	17	1
Total	5	14	9	52	51	23	25	1

Surrounding existing land uses in the catchment area with the potential to contaminate the catchment include:

- Riddley's Grain Company
- Light industry in town centre
- Chicken farms
- Waste depot in close proximity to catchment
- Greenhouses
- Cemeteries
- Bulky goods
- Council depot
- Freeway
- Railway.

The major risks highlighted in the workshop include the following:

- A governance structure for the scheme needs to be developed to delineate which party will be responsible for the scheme once it is up and running.
- Communication between Council, Burke Urban and regulatory stakeholders is especially important in these early stages.

- The approval processes for all approvals should be started as soon as possible in order to avoid clashes between funding and approvals.
- It is important that the scheme infrastructure be designed so that additional infrastructure can be retrofitted in the future to cater for increasing demands.
- The success of the scheme in the long term ongoing a stage is dependent on Council engaging skilled human resources to manage and maintain the scheme and its components.
- The success of the scheme is also dependent on adequate financial resources being committed to the scheme in the short and long term to ensure that the scheme components can be maintained.

Financial resources need to be committed to the project by Council during the initial and long term stages of the scheme. Financial resources need to be committed to the maintenance of the scheme and its components, which was also identified as a major risk to the success of the scheme past the initial phases. Adequate human resources were identified as being pivotal to the long term success of the scheme.

The incorporation of Water Sensitive Urban Design (WSUD) into the project was identified as a potential opportunity, however one which requires further consideration. WSUD has the potential to reduce the amount of water available for capture by the scheme. Council will need to assess whether WSUD is beneficial to the scheme and in what capacity and develop a firm stance on how much WSUD will be incorporated into the project.

It was highlighted that WSUD should be incorporated into Council planning and the details of WSUD should be provided to relevant stakeholders upfront when new developments come up. The Gifford Hill site is to be used as a WSUD test site. Discussions were had regarding policies surrounding WSUD (e.g. rainwater tanks) and the need to determine where water is to be captured and treated.

APPENDIX A

WORKSHOP AGENDA



Murray Bridge Water Independence Scheme
Risk Assessment Workshop

Monday 7 November 2011
9 am to 1 pm

AGENDA

Local Government Centre
2 Seventh Street, Murray Bridge

Agenda	
9:00 – 10:00	Introduction <ul style="list-style-type: none">• Project background• Purpose of the risk assessment workshop
10:00 – 12:30 Approximately 30 minutes for each component	Risk Assessment <ul style="list-style-type: none">• Water Source Catchment• Stormwater Treatment• Distribution• Intended Uses• Entire Scheme <p><i>Risk Categories: Environmental, Health and Safety, Timeframe, Cost, Project Management, Social/Stakeholder, Governance</i></p>
12:30 – 1:00	Closing



WALLBRIDGE & GILBERT
Consulting Engineers

60 Wyatt Street
Adelaide, South Australia 5000
Phone (08) 8223 7433
Facsimile (08) 8232 0967
adelaide@wgeng.com
www.wallbridgeandgilbert.com.au

APPENDIX B
RISK ASSESSMENT TOOL

Risk Assessment Tool

		Consequences				
		1 Insignificant	2 Minor	3 Moderate	4 Major	5 Catastrophic
Likelihood	5 Almost certain	Mod	High	High	Extreme	Extreme
	4 Likely	Mod	High	High	Extreme	Extreme
	3 Possible	Low	Mod	High	Extreme	Extreme
	2 Unlikely	Low	Low	Mod	High	Extreme
	1 Rare	Low	Low	Mod	High	High

Likelihood		Consequence								
Level	Example Description	Level	General	Environmental	Health & Safety	Timeframe	Cost	Project Management	Social/ Stakeholder	Governance
1 Rare	May occur only in exceptional circumstances, every 5 years	1 Insignificant	Undetectable or below guidelines, no disruption to normal operation, no increase in normal operation costs	Insignificant impact to the environment and negligible effect on customers	Insignificant impact to health and safety	Negligible impact in overall delivery of the project	Insignificant loss of assets and resources and insignificant impact on budget	Negligible impact to achieving project activities, outcomes and overall delivery	Insignificant damage to Council and stakeholder perception/ confidence	Changes to political or organisational interests resulting in negligible impact to project scope
2 Unlikely	Could occur at some time, once a year	2 Minor	Some manageable operation disruption, some increase in operating costs	Breach of a control system causing minor environmental impact. Minor effect on customers	Minor impact to health and safety resulting in no injuries	Minor impact on some project outcomes as a result of minor delays to some project activities	Loss of assets and resources. <5% deviation from program budget	Minor impact to achieving project activities	Minor negative perception and short-term damage to confidence to an insignificant audience	Minor changes to political or organisational interests resulting in minor changes to project scope
3 Possible	Might or should occur at some point, once a month	3 Moderate	Significant modification to normal operation but manageable, operation costs increased, increased monitoring	Intermittent non compliance with regulations causing minor impacts to the environment. Moderate effect on customers	Minor impact to health and safety resulting in minor injuries requiring medical assistance	Minor impact on overall project delivery resulting in delays in achieving some project outcomes	Minor loss of assets and resources. 5% deviation from program budget resulting in limiting project scope	Minor impact to achieving project outcomes	Minor negative perception and short-term damage to confidence to a specific audience in Council or stakeholder agencies	Changes to political or organisational interests resulting in major changes to project scope
4 Likely	Probably occur in most circumstances, once a week	4 Major	Systems significantly compromised and abnormal operation if at all, high level of monitoring required	Failure to comply with regulations and causing major environmental harm resulting in temporary shutdown of the project having an adverse effect on customers	Major impact to health and safety resulting in serious injury and hospitalisation	Major impact on overall project delivery resulting in delayed project outcomes	Major loss of assets and resources. 15% deviation from program budget, resulting in possible closure of the project	Major impact to achieving project outcomes resulting in the possible closure of the project	Negative Council and stakeholder perception and short-term damage to Council and stakeholder confidence	Major changes to political or organisational interests resulting in possible project closure
5 Almost certain	Expected to occur in most circumstances, every day	5 Catastrophic	Major impact, complete failure of systems, risk to public health & environment	Sustained non compliance to regulation and causing significant impact to the environment resulting in project closure	Significant impact to health and safety resulting in death	Significant impact on overall project delivery resulting in project closure	Significant loss of assets and resources. 30% deviation from program budget, resulting in closure of the project	Significant impact to achieving project outcomes resulting in closure of the project	Significant impact to Council and stakeholder perception and long term damage to Council and stakeholder confidence	Significant changes to political or organisational interests resulting in project closure

APPENDIX C
RISK REGISTER

Murray Bridge Water Independence Scheme

Risk Management Workshop 7 November 2011

RISK REGISTER

Risk #	Scheme Component	Hazard	Event	Consequence Impact	"DO NOTHING"			Description of Control Measures/Actions/Comments	RESIDUAL		
					Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
1	Water Source Catchment	Land uses in the catchment which produce pathogens such as <i>E. coli</i> (e.g. livestock, septic tanks, sewer mains)	Catchment water contaminated with pathogens caused by runoff from surrounding land uses	Water quality not fit for intended use with the potential to cause harm to health and safety	4	4	H	Treatment and disinfection, water monitoring, design allowing capability of cutting off intake water supply (pump shut down), back up water source, communication between Council and land users in the catchment, EPA licensing process	3	3	M
2	Water Source Catchment	Land uses in the catchment involving nutrients such as N, P and K compounds (e.g. livestock, septic tanks, sewer mains)	Catchment water contaminated with nutrients caused by runoff from surrounding land uses	Water quality not fit for intended use with the potential to cause harm to the environment	4	4	H	Treatment and disinfection, water monitoring, design allowing capability of cutting off main water supply (pump shut down, isolation systems), communication between Council and land users in the catchment, investigate the plausibility of removing stock from catchment waterways, results of soil testing undertaken by Burke Urban, EPA licensing process	3	3	M
3	Water Source Catchment	Septic tanks (e.g. pathogens and nutrients)	Catchment water contaminated with pathogens caused by runoff from septic tank leaks and spills	Water quality not fit for intended use with the potential to cause harm to health and safety	4	4	H	Treatment and disinfection, water monitoring, design allowing capability of cutting off main water supply (pump shut down, isolation systems), back up water source, communication between Council and septic tank owners to ensure septic tanks are being regularly cleaned and maintained	3	3	M
4	Water Source Catchment	Sewer mains (e.g. pathogens, nutrients, organic chemicals)	Catchment water contaminated with pathogens caused by runoff from sewer main leaks and spills	Water quality not fit for intended use with the potential to cause harm to health and safety	4	4	H	Treatment and disinfection, water monitoring, design allowing capability of cutting off main water supply (pump shut down, isolation systems), back up water source, review communication lines between agencies including EPA, SA Water, MFS and CFS to ensure incidents of sewer overflows are dealt with in an efficient manner	3	3	M
5	Water Source Catchment	Equestrian activities in the catchment (e.g. proposed Equine Living development, horse paddocks, existing racecourse)	Catchment water contaminated with nutrients caused by runoff from surrounding land uses	Water quality not fit for intended use with the potential to cause harm to the environment	4	4	H	Perched pond will prevent direct runoff from equine living, Gifford Hill looking at developing own WWTP, all stables will have own traps and treatment connected to sewer, Burke Urban have a biosecurity document, potential development of code of practice for equine industry, EPA licensing process	2	3	M
6	Water Source Catchment	Land uses in the catchment which use inorganic chemicals such as metals (e.g. industry, manufacturing)	Catchment water contaminated with inorganic chemicals caused by runoff from surrounding land uses, chemical spills in the catchment	Water quality not fit for intended use with the potential to cause harm to the environment	4	4	H	Treatment and disinfection, water monitoring, design allowing capability of cutting off main water supply (pump shut down, isolation systems), back up water source, review communication lines between agencies including EPA, SA Water, MFS and CFS to ensure incidents of chemical spills are dealt with in an efficient manner, communication between Council and land users in the catchment, EPA licensing process	3	3	M

Risk #	Scheme Component	Hazard	Event	Consequence Impact	"DO NOTHING"			Description of Control Measures/Actions/Comments	RESIDUAL		
					Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
7	Water Source Catchment	Land uses in the catchment which produce organic chemicals such as pesticides, herbicides, oil, grease, fuels (e.g. service stations, stormwater GPTs, roads, railway, greenhouses)	Catchment water contaminated with organic chemicals caused by runoff from surrounding land uses	Water quality not fit for intended use with the potential to cause harm to the environment	4	4	H	Treatment and disinfection, water monitoring, design allowing capability of cutting off main water supply (pump shut down, isolation systems), back up water source, review communication lines between agencies including EPA, SA Water, MFS and CFS to ensure incidents of chemical spills are dealt with in an efficient manner, Council maintenance programs, EPA licensing process	3	3	M
8	Water Source Catchment	Land uses in the catchment which have the potential to increase turbidity (e.g. construction, cement production)	Catchment water turbidity increases caused by runoff from surrounding land uses	Water quality not fit for intended use with the potential to cause harm to the environment	4	4	H	Treatment and disinfection, water monitoring, design allowing capability of cutting off main water supply (pump shut down, isolation systems), back up water source, review communication lines between agencies including EPA, SA Water, MFS and CFS to ensure incidents of chemical spills are dealt with in an efficient manner, EPA licensing process	3	3	M
9	Water Source Catchment	Saline groundwater	Catchment water salinity increases caused by runoff from surrounding land uses	Water quality not fit for intended use with the potential to cause harm to the environment	2	2	L	No control measures necessary as low risk	2	2	L
10	Water Source Catchment	Historical waste disposal or contaminated sites (e.g. landfill dumps, railway yards)	Leaching from historical sites and contamination of the catchment	Water quality not fit for intended use with the potential to cause harm to the environment	4	4	H	Review Council's register of landfills/dumps and past land use records, review the register of contaminated lands held by the EPA, treatment and disinfection, water monitoring, design allowing capability of cutting off main water supply (pump shut down, isolation systems), back up water source, review communication lines between agencies including EPA, SA Water	3	3	M
11	Water Source Catchment	Limited water quality data for the catchment	Catchment water contaminated by surrounding land uses but contamination not captured due to limited water quality data	Water quality not fit for intended use with the potential to cause harm to the environment	4	4	H	Conduct a review on water quality testing in the catchment. Water Data Services have a years worth of data for the Narooma Catchment for which Council has permission to access, review data collected during the cleaning of GPT's	2	2	L
12	Water Source Catchment	Limited flow data for the catchment	Water availability lower than predicted and unable to meet the supply demands	Browning off of irrigation sites, impacts to achieving project outcomes, loss of stakeholder confidence	4	4	H	Conduct a review on flow data for the catchment	2	2	L
14	Water Source Catchment	Council maintenance activities (e.g. slashing and mowing)	Catchment water turbidity increases caused by runoff from surrounding land uses	Water quality not fit for intended use with the potential to cause harm to the environment	4	3	H	Coordination between verge mowing and street sweeping, observations and notification response	2	2	L
15	Water Source Catchment	Council maintenance activities such as spraying involving herbicides, pesticides, fertilisers)	Catchment water contaminated with organic chemicals and nutrients caused by runoff from surrounding land uses	Water quality not fit for intended use with the potential to cause harm to the environment	4	3	H	Council do not spray, design (kerbing), observations and notification response, response procedures, irrigation management plan (IMP), Council maintenance management, monitoring	2	2	L

Risk #	Scheme Component	Hazard	Event	Consequence Impact	"DO NOTHING"			Description of Control Measures/Actions/Comments	RESIDUAL				
					Likelihood	Consequence	Risk		Likelihood	Consequence	Risk		
16	Water Source Catchment	Industrial growth in the northwest catchments and a corresponding increase in the use of inorganic chemicals such as metals	Catchment water contaminated with inorganic chemicals caused by runoff from surrounding land uses	Water quality not fit for intended use with the potential to cause harm to the environment	5	5	E	Incorporate future projections into Council planning, incorporate into budget, allow for modifications in scheme infrastructure to accommodate additional treatment processes	2	5	H		
17	Water Source Catchment	Lack of curbing along roads	Contamination of the catchment caused by runoff from roads	Water quality not fit for intended use with the potential to cause harm to the environment	4	4	H	Ensure kerbing in included in Council's scheduled works for the catchment	3	2	M		
18	Water Source Catchment	Capture of environmental flows from the catchment	Environmental flows significantly reduced	Ecological communities relying on dependent in environmental flows harmed	1	3	L	Rocky Gully relies on environmental flows but is outside of catchment, no control measures necessary as low risk	1	3	L		
19	Water Source Catchment	Reliance on environmental flows and rainfall	Lower than anticipated water availability and unable to meet the supply demands	Browning off of irrigation sites, impacts to achieving project outcomes, loss of stakeholder confidence	5	5	E	Modelling, SKM data (climate change scenario modelling), increases in stormwater linkages increasing yield, regional stormwater plan, Council's road and stormwater upgrade plan, Council management strategy for irrigation taking into account the low yields in the initial phases of the project, back up supplies, allow for future covering of storages to avoid evaporation , look at multiple sources for non potable sources	3	3	M		
20	Water Source Catchment	Climate change (e.g. changes in rainfall, flash flooding)	Water yields either higher or lower than anticipated. Infrastructure may not be capable of coping with increased flows. Supply demands might not be met	Browning off of irrigation sites, impacts to achieving project outcomes	5	5	E	Modelling, SKM data (climate change scenario modelling), increases in stormwater linkages increasing yield, regional stormwater plan, Council's road and stormwater upgrade plan, Council management strategy for irrigation taking into account the low yields in the initial phases of the project	4	3	H		
21	Water Source Catchment	Bushfires	Catchment water contaminated	Water quality not fit for intended use with the potential to cause harm to the environment	2	5	H	Review communication lines between agencies including EPA, SA Water, MFS and CFS, response plan, back up water source, design allowing capability of cutting off main water supply (pump shut down, isolation systems).	2	4	M		
22	Water Source Catchment	Construction activities in the catchment	Catchment water contamination from construction (e.g. high silt loads)	Water quality not fit for intended use with the potential to cause harm to the environment	5	4	E	EPA Guideline for Construction and Environmental Management, Council can ensure contractors are following this, consider early in the process, Construction Environmental Management Plan, construction audits, silt fences, sand bags, hay bales	3	3	M		
Water Source Catchment Summary				Number of Extreme Risks			4				0		
				Number of High Risks			15						2
				Number of Moderate Risks			0						13
				Number of Low Risks			2						6
23	Stormwater Treatment	European Carp in the catchment or close to the catchment	European Carp entering the wetland and causing increases in turbidity and damage to plants	Water quality not fit for intended use with the potential to cause harm to the environment	4	4	H	Wetland Management (e.g. drying out of wetland), fish and water quality monitoring, system design to allow for draining and removal of adult carp, communication and education with the public about putting carp into the wetland, system design (e.g. rock walls)	4	3	H		

Risk #	Scheme Component	Hazard	Event	Consequence Impact	"DO NOTHING"			Description of Control Measures/Actions/Comments	RESIDUAL		
					Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
24	Stormwater Treatment	Presence of grazers in wetlands (e.g. ducks and other birds)	Damage to wetland vegetation during establishment	Water quality not fit for intended use with the potential to cause harm to the environment	4	4	H	Water quality monitoring, netting plants, bird repellent paint on plants, growing spare plants, size of plants during planting, contractual arrangement with plant contractor to transfer risk, implement longer defect liability period (of 24 months)	4	3	H
25	Stormwater Treatment	Presence of grazers in wetlands (e.g. ducks, seagulls and other birds)	Wetland water contaminated nutrients from faeces and organic matter	Water quality not fit for intended use with the potential to cause harm to the environment	4	4	H	Cover of much of the water with vegetation as possible (about 20% of open water only) to reduce evaporation, monitoring, netting plants, bird repellent paint on plants, reduce food and waste, communication and education with the public about feeding ducks, signs, have a back up supply or source of wetland plants, disinfection will remove <i>E. coli</i>	4	3	H
26	Stormwater Treatment	Pest plants (e.g. typha, phragmites)	Introduced into wetlands and competing with wetland vegetation	Wetland might not function effectively and water quality might not be fit for intended use with the potential to cause harm to the environment	4	4	H	Monitoring, wetland design, maintenance (removing bulk of biomass), weeding, allow resources to undertake the work	5	1	M
27	Stormwater Treatment	Presence of algal blooms and toxic algae in wetlands contaminating water	Catchment water contaminated with toxic algae	Water quality not fit for intended use with the potential to cause harm to health and safety	4	4	H	Monitoring, wetland design, maintenance (removing bulk of biomass), chlorine disinfection which will break apart algae cells and slightly reduce toxins, design allowing capability of cutting off main water supply (pump shut down, isolation systems), develop a management plan	4	3	H
28	Stormwater Treatment	Changes in water quality throughout the year increasing the abundance of algae	Increased maintenance required to existing infrastructure to control algae	Deviation from project budget, issue with staffing resources to perform maintenance	4	4	H	Monitoring, wetland design, maintenance (removing bulk of biomass), chlorine disinfection which will break apart algae cells and slightly reduce toxins, design allowing capability of cutting off main water supply (pump shut down, isolation systems), management of staff resources committed to project	4	3	H
29	Stormwater Treatment	Evaporation from wetland	Significant evaporation causing water to stagnate resulting in management issues with wetland (e.g. drying out, dust, plant issues, mosquitoes)	Negative community perception and lack of community support for the project	5	2	H	Ongoing wetland management and maintenance, Council to develop communication management plan	4	2	M
30	Stormwater Treatment	Wetland leakages through permeable clay liner	Leakage into groundwater from wetland	Environmental harm to aquifer	3	3	M	Bring in Blanchetown Clay (impermeable), geotechnical testing, buffers between wetlands and infrastructure, prevent big trees growing close to wetland, building and development controls, standing water level of the wetland, shallow monitoring wells (to detect any leakage before it causes damage), design, emergency response plan, communication, control system, level sensor, methods for early investigation, Council to develop a Communication Management Plan for the project	2	2	L
31	Stormwater Treatment	Habitat created by wetland	Increases in feral animals (e.g. cats, rats, foxes)	Negative community perception and lack of community support for the project	3	3	M	Ongoing management and maintenance	2	3	M

Risk #	Scheme Component	Hazard	Event	Consequence Impact	"DO NOTHING"			Description of Control Measures/Actions/Comments	RESIDUAL		
					Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
32	Stormwater Treatment	Habitat created by wetland	Increases in snakes	Negative community perception and lack of community support for the project, perceived risk to health and safety	3	3	M	Ongoing management and maintenance	2	3	M
33	Stormwater Treatment	Treatment ineffectiveness	Anticipated water quality not achieved by treatment	Water quality not fit for intended use with the potential to cause harm to the environment , moderate effects on customers in the case of interruptions to irrigation and minor impacts to the environment, major impact to achieving project outcomes resulting in the possible closure of the project	4	4	H	Allow for further treatment with regards to infrastructure (e.g. chlorine disinfection), retrofit sand filter, water supply agreement, back up water supply, monitoring, back up mains water, sufficient treatment, investigate having filtration at each irrigation site, don't supply straight out of wetlands.	4	2	M
34	Stormwater Treatment	Exposure to wind	Increases in turbidity from wind	Wetland might not function effectively and water quality might not be fit for intended use with the potential to cause harm to the environment	1	3	L	No control measures necessary as low risk	1	3	L
36	Stormwater Treatment	Perched storage pond	Wall failure	Construction costs incurred and deviation from project budget, possible delay to project activities	2	3	M	Ongoing management and maintenance, design integrity, geotechnical testing, financial resources committed to repairs as well as maintenance	1	3	L
37	Stormwater Treatment	Water storage capacity during periods of high rainfall and flows in the catchment	Flooding due to storage capacity incapable of coping with increased rainfall	Impacts to health and safety, impacts to infrastructure	1	4	M	Design integrity, flood mitigation program, modelling, SKM data (climate change scenario modelling), increases in stormwater linkages increasing yield, regional stormwater plan, Council's road and stormwater upgrade plan	1	3	L
38	Stormwater Treatment	Uncapped wells in the golf course	Recycled water flowing into the aquifer through the uncapped wells	Environmental harm to the aquifer	3	2	M	Need to identify uncapped wells	1	2	L
39	Stormwater Treatment	High concentrations of contaminants in the first flush	A high concentration of contaminants may enter the wetland system from the first flush of the catchment	Wetland might not function effectively and water quality might not be fit for intended use with the potential to cause harm to the environment	1	3	L	Will actually take a while to get to the wetland so the initial impact is low, initial capture will be in other ponds. No control measures necessary as low risk	1	3	L
40	Stormwater Treatment	Wetland aesthetics (e.g. levy bank slumping and temporary drying of wetlands)	Aesthetics of wetlands based on levy bank slumping	Negative community perception and lack of community support for the project, community resistance to the project	4	3	H	Communication and education with the public regarding the benefits of wetlands, Council to develop a Communication Management Plan for the project	3	2	M

Risk #	Scheme Component	Hazard	Event	Consequence Impact	"DO NOTHING"			Description of Control Measures/Actions/Comments	RESIDUAL		
					Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
41	Stormwater Treatment	Conflicts between developers and treatment requirements (e.g. 80% versus 20% open water, respectively)	Wetland might contain more water than is required for effective treatment	Wetland might not function effectively and water quality might not be fit for intended use with the potential to cause harm to the environment	3	3	M	Ongoing communication with developers, communication and education with public about the way wetlands work and why there is only about 20% of open water	1	3	L
42	Stormwater Treatment	Wetland located in public space	Vandalism (e.g. dumping cars) and contaminating water quality, damaging and removing vegetation	Wetland might not function effectively and water quality might not be fit for intended use with the potential to cause harm to the environment	4	3	H	Education, design, enclosed in vandal resistant structures, surveillance system, avoid having accessible rocks close by, design of systems to prevent effects of vandalism, preventative measures, including fencing to important areas, signage, education, barriers, design, landscaping, shallow vegetated batters, ongoing maintenance and management, Council need to commit resources to repairs	3	3	M
43	Stormwater Treatment	Wetland located in public space	Public accessing wetland (e.g. swimming)	Impact to health and safety	4	5	E	Signage, education, barriers, design, landscaping, shallow vegetated batters, vertical edges	2	5	H
44	Stormwater Treatment	Non trafficable cover on the storage pond	Public walking on cover and cover collapsing	Impact to health and safety	4	5	E	Signage, fencing, design (e.g. don't cover all the way to the edge)	2	5	H
45	Stormwater Treatment	Availability of space for project components	Insufficient amount of space for project components	Impacts to achieving project outcomes	3	4	H	Preliminary investigations, surveys, site assessments, Golf Course Integrated Management Plan on the table (e.g. space available on the golf course)	1	4	M
Distribution and Intended Use Summary					Number of Extreme Risks			2	0		
					Number of High Risks			11	7		
					Number of Moderate Risks			7	8		
					Number of Low Risks			2	7		
46	Distribution and Intended Use	Two types of water used in close proximity (e.g. Scheme's water and SA Water mains water)	Cross contamination - non potable water into potable water (e.g. basins, showers)	Water quality not fit for intended use with the potential to cause harm to health and safety	4	5	E	Backflow prevention, auditing, Irrigation Management Plan (IMP), staff training, pipe identification, pressure differentials between recycled water and mains pressures, pipe identification (e.g. labelling, purple pipe), purple taps, marker posts, signage	2	5	H
47	Distribution and Intended Use	Different operating pressures for different water sources and infrastructure for these water sources in close proximity	Damaged caused by different operating pressures in the event of cross contamination between water sources	Damage to infrastructure, deviation from project budget, impact to achieving some project activities	3	3	M	Understanding what pressure is required	2	3	M
48	Distribution and Intended Use	River Murray water used as a back up in the event catchment water is unavailable and River Murray water running through scheme's pipelines	River Murray water may not meet the water quality requirements for irrigation and pipes and infrastructure may be considered contaminated	Impacts to delivery of project	3	3	M	Discuss with the Department of Health and EPA	3	3	M

Risk #	Scheme Component	Hazard	Event	Consequence Impact	"DO NOTHING"			Description of Control Measures/Actions/Comments	RESIDUAL		
					Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
49	Distribution and Intended Use	Supply demands during peak demand periods (e.g. summer)	Higher than anticipated supply demand during periods of peak demand (e.g. summer) and Council unable to meet these demands	Browning off of irrigation sites, impacts to achieving project outcomes	4	3	H	Irrigation Management Plans (IMP), irrigation scheduling, water balances, need to determine the allocation among irrigation sites, do not overestimate water supply, take into account periods of low flow and water availability, design, back up water supply, contingency plans, multiple water sources	2	3	M
50	Distribution and Intended Use	System failure (e.g.. pump failure)	Water unable to be supplied to users or supplied at lower than required yields	Browning off of irrigation sites, impacts to achieving project outcomes, customer/stakeholder dissatisfaction and confidence	3	4	H	Design, back up water supply, contingency plans, multiple water sources, consider redundancy in design	2	3	M
51	Distribution and Intended Use	Pipe burst from vandalism, damage to pipes, excavation damage	Lower than anticipated yields and unable to meet supply demands, surface runoff of recycled water	Impact on customers, temporary interruptions to irrigation and minor environmental impact, damage to private and public property	4	4	H	Education, design, enclosed in vandal resistant structures, surveillance system, decreases access to rocks, design of systems to prevent effects of vandalism, preventative measures, including fencing to important areas, signage, education, barriers, design, landscaping, shallow vegetated batters, ongoing maintenance and management, Council need to commit resources to repairs	3	3	M
52	Distribution and Intended Use	Pipe burst from wear and tear)	Lower than anticipated yields and unable to meet supply demands, surface runoff of recycled water	Impact on customers, temporary interruptions to irrigation and minor environmental impact, damage to private and public property	4	4	H	Council registering pipe network with dial before you dig, as constructed drawings, indicator tape, isolation valves, looping of mains, document control and upkeep of documents	2	3	M
53	Distribution and Intended Use	Irrigation using recycled water on the floodplain of the River Murray	Leaching of salinity and runoff of saline water into the River Murray	Water quality not fit for intended use with the potential to cause harm to the River Murray	1	1	L	The floodplain in the catchment is a low risk area based on the SAMDBNRM Board's salinity impacting zoning maps, areas to be irrigated are already being irrigation, scheme is actually beneficial as taking water out of the system and stopping water from going into bores	1	1	L
54	Distribution and Intended Use	Pressure failure	Failure to maintain pressure resulting in lower than anticipated supply	Browning off of irrigation sites, impacts to achieving project outcomes, unable to meet supply demands	3	4	H	Irrigation Management Plans (IMP), irrigation scheduling, water balances, need to determine the allocation among irrigation sites, do not overestimate water supply, take into account periods of low flow and water availability, design, back up water supply, contingency plans, multiple water sources, design integrity	2	3	M
55	Distribution and Intended Use	Storage and distribution network is located in a public space	Vandalism and damage to the storage and distribution network	Resulting in decreases in water quality and yield and causing health risks to the community and surrounding environment, increased operation and maintenance costs	4	3	H	Education, design, enclosed in vandal resistant structures, surveillance system, decreases access to rocks, design of systems to prevent effects of vandalism, preventative measures, including fencing to important areas, signage, education, barriers, design, landscaping, ongoing maintenance and management, Council need to commit resources to repairs	3	3	M

Risk #	Scheme Component	Hazard	Event	Consequence Impact	"DO NOTHING"			Description of Control Measures/Actions/Comments	RESIDUAL		
					Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
56	Distribution and Intended Use	Access to recycled water in public spaces	Public exposure to recycled water and accidental drinking	Impacts to health and safety, negative community perception of scheme and lack of public support	4	5	E	Signage, education, barriers, irrigation management plans (IMP), irrigation infrastructure and disinfection	2	5	H
57	Distribution and Intended Use	People sleeping in parks at night during irrigation events	Public exposure to recycled water and accidental drinking	Impacts to health and safety, negative community perception of scheme and lack of public support, infringement of license conditions	3	5	H	Signage, education, barriers, irrigation management plans (IMP), irrigation infrastructure and disinfection	2	5	H
58	Distribution and Intended Use	Future supply of water to industry	Not being aware that additional forms of treatment and monitoring will be required	Impacts to delivery of project, lack of Council staffing resources for approval process, delays to project activities and supply of water	4	4	H	Allow for further treatment with regards to infrastructure, incorporate potential future demands in planning process, don't agree to supply in initial stages until the system operation can be understood	2	4	M
59	Distribution and Intended Use	Carting recycled water with water trucks	Not being aware that there are requirements associated with recycled water and water trucks	Impacts to delivery of project, lack of Council staffing resources for approval process, delays to project activities and supply of water	4	4	H	Signage, water trucks can not be used for potable water once used for stormwater, communicate with the Department of Health	2	4	M
60	Distribution and Intended Use	Future selling of water to users other than Council (e.g. Council becoming a water supplier)	Future customer management issues (e.g. demands for flow, demands for water of a higher water quality)	Impacts to delivery of project	4	4	H	Not supplying water to third users at the moment, Ensure intended uses are within the scope of the scheme to avoid issues with increased treatment	2	3	M
61	Distribution and Intended Use	Supplying water to schools (in particular public schools)	Not anticipating the need to acquire approval from the Department of Education and Children's Services (DECS)	Impacts to delivery of project, lack of Council staffing resources for approval process, delays to project activities and supply of water	4	4	H	Start the approval's process early, maintain regular communication with DECS and the Department of Health, protocols for approval processes	2	3	M
62	Distribution and Intended Use	Existing infrastructure was not contracted to comply with standards for stormwater reuse	Existing infrastructure does not comply with standards for stormwater reuse	Impact to overall delivery of the project outcomes, deviation from project budget, infringement of approval conditions	4	4	H	Low pressure pumping is going to be used, financial commitment from Council to expand the network	2	4	M
63	Distribution and Intended Use	Capability of the existing infrastructure to cope with future capacity	Existing infrastructure not suitable to cope with future capacity	Impact to overall delivery of the project outcomes, deviation from project budget	4	4	H	Modelling, pipe selection, contingencies in infrastructure	2	4	M
Distribution and Intended Use Summary				Number of Extreme Risks			2				0
				Number of High Risks			13				3
				Number of Moderate Risks			2				14
				Number of Low Risks			1				1
64	Funding	Commonwealth funding timeframes	Council is unable to meet Commonwealth funding timeframes for project as infrastructure needs to be completed by 30 June 2013	Reduced revenue will impact the project delivery, the scope of the project and potentially the viability of the project	4	5	E	Establish good and accurate communication with referral funding to provide early warning regarding the staged program. Contractual controls and effective management of the contract, due diligence in the selection of the contractor, financial leverage in the contract (security and staged payment), project management advice, advisory and monitoring structure linked to funding bodies	3	3	M

Risk #	Scheme Component	Hazard	Event	Consequence Impact	"DO NOTHING"			Description of Control Measures/Actions/Comments	RESIDUAL		
					Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
65	Funding	Approval timeframes	Delays in approvals (Department of Water, EPA, Redevelopment Assessment Commission)	Impacts on the delivery of the project and delays in project activities	4	5	E	Start the approval processes early, Council Communication Management Plan, develop protocols for communication process	3	3	M
66	Funding	Financial commitment from Council	Council fail to commit to the project	Potential project failure and redefining of scope	4	5	E	Need financial commitment from Council	3	3	M
67	Funding	Carbon offset requirement of Commonwealth Funding	Failure to meet the carbon offset requirement of the Commonwealth Funding agreement	Closure of the project	4	5	E	Council need to commitment to buying green energy, review the MDB Carbon Report by Andrew Nance, investigate the ability to use a total Council carbon offset towards this project. Investigate fallback positions	3	4	H
68	Funding	Failure to meet funding obligations	Government funding default under funding obligation	Financial viability of the scheme put at risk	4	5	E	Management plan with milestones, individual phases of the project quarantined in terms of funding,	4	4	H
69	Funding	Failure to secure Commonwealth funding in Water for Future (3rd Round)	Failure in Commonwealth funding round	Potential project failure and redefining of scope	4	5	E	Alternative sources of funding, develop a comprehensive application	4	5	E
70	Funding	Depreciation of Council assets (e.g. components)	Failure of Council to acknowledge Council's assets will decrease to take into account depreciation and charge themselves a price for the water	Loss of revenue, deviation from project budget	4	4	H	Council have to take into account depreciation of their assets and charge themselves a price for the water	3	3	M
71	Funding	Private funding agreements (e.g. developers)	Developer withdraws funding	Full project scope may fail to be delivered	4	5	E	Memorandum of Understanding between Burke Urban and Council, develop an infrastructure cost sharing deed (milestones) and manage the deed.	3	4	H
72	Funding	Funding split arrangement between Gifford Hill and Council	Private contributions negatively influence the success of the Commonwealth grant	Financial viability of the scheme put at risk	4	5	E	Undertake sufficient research regarding the most suitable funding model to submit with the application, communicate with Councils who run similar schemes and learn from their experience	3	4	H
73	Funding	Changes in governments view for charging for surface water resources	Government decides to stop charging for surface water resources and there is not demand for the water	Closure of the project	4	5	E	Market water actively, monitor	3	4	H
74	Funding	Demand for water	Demand for water is not as great as anticipated (e.g. River Murray water is too cheap)	Reduced revenue, impacts to project viability and impacts the delivery of the project	4	5	E	Market water actively, monitor	3	4	H
75	Scheme Operation	Council's commitment to the entire length of the Commonwealth funding agreement	Council pulling out of Commonwealth funding agreement before 4 years	Failure of the scheme, costs incurred, may need to pay money back to the Commonwealth	4	5	E	Council's report committing to the project for 4 years	3	4	H

Risk #	Scheme Component	Hazard	Event	Consequence Impact	"DO NOTHING"			Description of Control Measures/Actions/Comments	RESIDUAL		
					Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
76	Scheme Operation	Working together with other developments (e.g. Gifford Hill) to achieve construction timeframes	Meeting construction timeframes and working in with other developments	Reduced revenue will impact the project delivery, the scope of the project and potentially the viability of the project	4	5	E	Develop an agreement with the developers of the Gifford Hill project to clarify respective roles and responsibilities regarding Council expanding the geographic scope of stormwater management infrastructure and planning	3	3	M
77	Scheme Operation	Gifford Hill project and Burke Urban	Failure to develop an agreement with the developers of the Gifford Hill project to clarify respective roles and responsibilities regarding Council expanding the geographic scope of stormwater management infrastructure and planning	Impact to achieving project outcomes	4	4	H	Maintain regular communication between Council and Burke Urban, establish an agreement between Burke Urban and Council, implement communication strategies between parties, Council to develop a Communication Management Plan	3	3	M
78	Scheme Operation	Poor management and maintenance of scheme components	Management and maintenance of scheme components proceeds too slowly, does not manage to maintain the scheme components	Damage to infrastructure, water treatment process might not work effectively, water quality not fit for intended use with the potential to cause harm to the environment, aesthetics of scheme components (e.g. wetland) may suffer, delays to the delivery of the project, negative support from the public and stakeholders, infringement of approval conditions	4	4	H	Ongoing maintenance and management, Council's commitment to maintenance and management, Council to develop a Communication Management Plan, financial commitment to ongoing management and maintenance, staff resources	3	3	M
79	Scheme Operation	Slow management of the project	Project milestones not being met	Delays to time and potential cost over runs	4	4	H	Develop an overriding master program in conjunction with all stakeholders. Ongoing maintenance of the master program to ensure it incorporates the latest information. Need to include all stakeholders outcomes, adequate resources for ensuring the delivery of the project	3	3	M
80	Scheme Operation	Poor management system	Council and stakeholders do not have an effective management system, documents are lost overtime	Delays to time, potential run off costs, impacts to delivery of project outcomes, failure of the scheme	4	5	E	Management Systems - guidelines, management plans, procurement plans,	3	3	M
81	Scheme Operation	Failure to take into account ongoing governance of the scheme	The scheme is left ungoverned once the initial stage of the project are complete	Failure of the scheme	4	5	E	Governance of the project in the initial stages and ongoing needs to be clearly defined who is going to manage the project and operate the scheme, if Council then need to cover off on approval in application, commitment from Council and demonstration of management strategy	3	4	H
82	Scheme Operation	Poor governance of the project	Council and stakeholders do not have a coordinated governance of the project	Delays to time, potential run off costs, impacts to delivery of project outcomes	4	4	H	Governance of the project in the initial stages and ongoing needs to be clearly defined who is going to manage the project and operate the scheme, if Council then need to cover off on approval in application, commitment from Council and demonstration of management strategy	3	3	M

Risk #	Scheme Component	Hazard	Event	Consequence Impact	"DO NOTHING"			Description of Control Measures/Actions/Comments	RESIDUAL		
					Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
83	Scheme Operation	Costed concept to detailed design - conflicts in costing	Costs overrun during detailed design	Funding in not sufficient to complete the project, additional funding needs to be sought or scope reduced	4	4	H	Include gateway system into design where costs are rechecked at certain points during design, ongoing communication between stakeholders	3	3	M
84	Scheme Operation	Limited availability of demands and inputs to feed into design	Design is not sufficiently developed	Decisions cannot be made or based on accurate information regarding the cost of the project	4	4	H	Early communication with key functional users, allow a sufficient amount of time to undertake the functional design	3	3	M
85	Scheme Operation	Cost/benefit analysis not undertaken	Long term operating financial estimates fail	Deviation from project budget and possible project failure	4	5	E	Has been done for Council (Council not committing any additional funds in the short term), need to consider the long term and ongoing maintenance, capital intensive, need to operate long term for project to be beneficial	3	3	M
86	Scheme Operation	Poor project stakeholder management	Stakeholder acceptance reduces	Resistance to project proceeding, delays in delivery of the project, low opinion of the project, low public opinion of the project	4	4	H	Letters of support from government agencies (DW, EPA, NRM, DTEI, Developer)	3	3	M
87	Scheme Operation	Community acceptance	Community acceptance reduces	Resistance to project proceeding	4	4	H	Imagine 2020, Council's Communication Plan	3	3	M
88	Scheme Operation	Shortage in skills and resources during the initial and ongoing stages of the scheme	There will be ne in-house skills and resources to develop and manage the scheme	Delays in launching project and managing the project, expenses occurred in locating suitable resources	4	5	E	Communicate with Councils who run similar schemes and learn from their experience, employ via secondment and develop in house skills or contract out operation. Budget for maintenance needs to commence at appropriate time, need to confirm requirements	4	4	H
89	Scheme Operation	Future Water Allocation Plans (WAP)	Scheme extraction allocation less than anticipated in future WAP	Unable to meet supply demands and significant impact to achieving project outcomes resulting in closure of the project	3	5	H	Communicate regularly with the Department of Water	3	3	M
90	Scheme Operation	Presence of rock (e.g. constructability of the substrate)	Constructability of the substrate difficult due to the presence of rock	Impacts to delivery of project, deviations from project budget as excavation works will be more time and cost intensive, extra requirement may need to be brought in, there may be time delays if other locations have to be found	4	5	E	Build contingency into areas with rock deposits, need to look at soil maps, need to take into account for the location of pipe networks, early contractor involvement	2	3	M
91	Scheme Operation	Condition of Sturt reserve (failing embankments, contamination from landfill)	Scheme water is contaminated by the Sturt Reserve, embankments fail	Water quality not fit for intended use with the potential to cause harm to the environment, damage to scheme components resulting in time delays and financial costs associated with repair	4	4	H	Consider the possibility of removing the Sturt Reserve from the project, communication between Council and land users in the catchment, Council to develop a Communication Management Plan for the project	4	4	H
92	Scheme Operation	Aboriginal heritage and native title sites occur in the catchment	Native title and aboriginal heritage sites may occur in locations which are land marked for scheme components	Changes to the scope of the project, time delays, financial costs	3	4	H	Analysis undertaken prior to funding application submission. Gifford Hill and Old Racecourse does not contain any sites of significance	3	4	H

Risk #	Scheme Component	Hazard	Event	Consequence Impact	"DO NOTHING"			Description of Control Measures/Actions/Comments	RESIDUAL		
					Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Funding and Scheme Operation Summary				Number of Extreme Risks			17				1
				Number of High Risks			12				11
				Number of Moderate Risks			0				17
				Number of Low Risks			0				0
Overall Summary				Total Number of Extreme Risks			25				1
				Total Number of High Risks			51				23
				Total Number of Moderate Risks			9				52
				Total Number of Low Risks			5				14
				TOTAL NUMBER OF RISKS			90				90