Appendix C.02 Existing Activities

Rosehill Network Pty Ltd – WICA Application

BACKGROUND OF Rosehill Recycled Water Scheme ('RRWS')

1	Background to RRWS (before late 2005)	 The RRWS was conceived following public and private interest in developing alternative water sources against a backdrop of extreme drought conditions affecting Sydney in the early 2000s In 2004, the NSW Metropolitan Water Plan was released, setting ambitious recycled water targets (supplying 12% or 70GL/year of Sydney's water needs with wastewater by 2015) In 2004-05 the NSW Government undertook a Markets Needs Assessment for recycled water In 2005 AGL approached the NSW Government with an unsolicited proposal to redevelop disused gas mains for recycled water network in Sydney In late 2005, the NSW Government commissioned IPART to investigate how water and wastewater services should be provided in the greater Sydney region
		 Acting on the recommendations from that investigation, the Government developed and enacted the Water Industry Competition Act 2006 ("WIC Act" or "WICA") which enabled for the first time, direct private sector participation in the NSW water industry
2	Sydney Water tender process (late 2005 to mid- 2009)	 In December 2005, Sydney Water initiated a competitive tender public-private partnership ("PPP") process for the Scheme Following three rounds of bidding, AquaNet and Veolia Water Australia Pty Ltd were selected as the successful consortium (announced in October 2007) Commercial model was only finalised by Sydney Water in late 2006 It took around three years to negotiate the PPP contract In August 2008 the Project Agreement was signed between the parties Agreements provided for Veolia Water to construct, maintain and operate an advanced technology water treatment plant at Fairfield to produce up to 20 ML per day of reverse osmosis quality recycled water and for AquaNet to construct, maintain and operate a 20 km recycled water network and associated facilities to deliver recycled water from the treatment plant to the premises of seven Foundation customers The Scheme was the first to be delivered under the WICA licensing scheme
3	Construction / commissioning (late 2009 to late 2011)	 Construction began in November 2009 First water was supplied in October 2011

Appendix C.03

Area of Operations

1-6

Rosehill Network Pty Ltd – WICA Variation Application

The RRWS is located in the local government areas of:

- Fairfield City Council;
- Cumberland Council; and
- Parramatta City Council.

The Fairfield Advanced Water Treatment Plant ('**AWTP**') is located on land owned by the Applicant at 2 East Parade, Fairfield NSW 2165, being lots 7-11 and 12-16 in DP2728.

The Woodville Reservoir is located on land leased by the Applicant at 13 Barbers Road, Guildford NSW 2161, being part of the land marked (A) on lot 1 in DP1181128.

The Rosehill Reservoir is located on land leased by the Applicant at lot 101, Durham Street, Rosehill NSW 2142 being the whole of the land in Title Folio Identifier 101/1168951.



Appendix C.06A

12.6

Water Balance Diagram

Rosehill Network Pty Ltd – WICA Variation Application

RRWS Water Balance

Appendix C.07A

Volumes

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Rosehill Network Pty Ltd – WICA Variation Application

Rosehill Recycled Water Scheme

Volume Details for FY20

(all volumes shown in kilolitres (kL)

	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Total
LAP Flow ¹	193,281.47	187,440.17	175,643.92	191,157.00	215,032.77	231,903.75	196,268.07	175,971.50	183,705.70	169,062.61	178,204.25	169,351.28	2,267,022
Recycled Water ²	124,438.72	119,798.36	111,353.25	122,328.50	138,970.41	152,744.46	126,441.05	111,414.00	116,802.11	106,953.68	113,860.10	107,898.60	1,453,003
Trade Waste ³	68,842.75	67,641.81	64,290.68	68,828.50	76,062.36	79,159.29	69,827.02	64,557.50	66,903.59	62,108.93	64,344.16	61,452.68	814,019

¹ LAP Flow = volume of treated effluent received at the RRWS Plant from the Sydney Water owned and operated Liverpool to Ashfield Pipeline (LAP)

² Recycled Water = volume of recycled water produced at the RRWS Plant and supplied into the RRWS Network

³ Trade Waste = volume of trade waste water (i.e. brine) produced at the RRWS Plant and discharged to the Sydney Water sewerage system

Appendix C.08

1-6

RRWS Risk Assessments

Rosehill Network Pty Ltd – WICA Variation Application

Water Utilities Australia - Rosehill Recycled Water Scheme Risk Assessment											
Risk	Impact	Inherent Risk Assessment (without controls)	Current Controls	(Actual Assess with cor	Risk ment ntrols)					
(condition that could occur (either threat or opportunity))	(What is the likely result, loss, gain)	Likelihood Consequences Risk Level	(Current Controls/Treatments)	Likelihood	Consequences	Risk Level					
Operational Risks											
See joint WUA-Veolia RRWS Operational Risk Assessment											
ancial Risks (accounts receivable, accounts payable, debt facilities)											

Finalicial Risks (accounts receivable, accounts payable, c									
Customers not paying invoices	Loss of revenue, cashflow issues	2	4	8	Contract, strong government counter-party, history of payments being made	1	4	4	4
Increase costs not being passed through	Reduction in margin	2	4	8	O&M agreement with Veolia with fixed fee component.	1	4	4	4
Delays in sending invoices	Cashflow issues	2	3	6	Contract timeframes for preparation of invoice, management oversight	1	3	3	3
IPART price determination lowers Sydney Water Potable price	Reduction in customer price, Loss of Revenue	2	3	6	Nil	2	3	e	6
Errors in accounting	Time to make corrections, incorrect statements	3	3	9	Staff diligence and External Audit.	2	3	e	6
Sydney Water credit rating downgraded	Breach of NAB debt facility	3	4	12	Monitor and keep NAB informed	3	4	1	2
Cancellation of Project Agreement	Loss of revenue, cancellation of O&M Agreement	3	5	15	Management oversight, termination for convenience payment	2	5	1	0
Inability to meet business case	Lower returns, increased executive effort, valuation impacts	3	5	15	SWC relationship, DD, monitoring and executive attention, shareholder communication	3	5	1/	5
Delay in reaching agreement with SWC	Inability to grow at required rate to meet business case	4	4	16	Priority to renegotiate, IC process, director/shareholder communication, maintenance of SWC relationship	3	4	1:	2
Inability to renegotiate Project Agreement	Inability to grow, inability to meet business case, stressed relationship with SWC	3	4	12	Priority to renegotiate, IC process, director/shareholder communication, maintenance of SWC relationship	3	4	12	2
Customer Service / Community Relation Risks (reputation	on)								
Veolia not providing services to required standard	Reputational damage	3	3	9	O&M agreement abatements, Potential impact on Veolia reputation, additional network coordinator employed by Veolia	2	3	6	6
Management systems, protocols not being followed	Time, incorrect information, reputational damage	3	2	6	Communication Protocol, PCG, O&M Agreement	2	2	4	4
Interruption of supply impacting customers	Time and resources, reputational damage, increased scrutiny of regulators	3	3	9	O&M Agreement, Maintenance Program, potable water back-up at customer location Rapid Response and Insurance.	, 2	3	6	6
Deterioration of Sydney Water relationship	Reputational damage, inability to grow business	3	5	15	Regular contact, Management oversight	3	5	1/	5
Human Resources									
Insufficient WUA resources to effectively manage RRWS business	Loss of oversight, Increased costs, undetected non-conformances	3	3	9	PCG process with 2 WUA representatives, Forward planning, executive management oversight	2	3	e	ô
Compliance (Legal, Regulatory, Contractual)									
Not meeting mandatory reporting requirements	Fine from regulator, increased scrutiny from regulator, reputational damage	3	3	9	Management plans, management oversight, O&M Agreement requirements	2	3	e	6
Contractual obligations not met	Breach of contract, stakeholder relationship breakdown, reputational damage	3	4	12	Management oversight	2	4	8	8
Material breach of Project Agreement	Event of default under NAB debt facility, risk of SWC terminating agreement	3	5	15	Management oversight, maintenance of SWC relationship	2	5	1	0
Material breach of WICA licence	Loss of licence, inability to operate	3	5	15	Management plans, O&M Agreement, competent operator, management oversight, maintenance of IPART relationship	2	5	1	0
Loss of land access (i.e. cancelation of lease)	Relocation of assets, increased costs	3	3	9	Long term leases, key site (Fairfield) on owned land	2	3	F	6

	Date: 21 Jan 2020
	Team: Brad Rea, Craig Heidenreich, Graham Dooley, Adam
	Sievens
)	Mitigation Plan
Acceptable Y/N	(Future Controls/Treatments)
X	
Y	
Y	
Y	
Y	
Y	
Y	
N	Negotiate improved contract with SWC to facilitate growth
Y	
Y	
1	
Y	
Y	
Y	
N	Negotiate improved contract with SWC to facilitate growth
N	Planning for NSW regional manager.
N	Preparation of regulatory obligation register
N V	การคลาสแบบ บารบานสนันสารบมเหลมบาการบูรใช้ไ
Y	
·	
Ŷ	

Risk	Register-V	/ater Quali	ty																
Risk Ass Risk Reg	essment Conducted (ister Owner:	n:	26/11/2019 Caitlin Cooper (F	rocess Engineer)	This risk-assessment was conducted for the Rosehill Recycled Water Scheme (RRWS) fro	Important Note m the inlet to the Fairfield Advanced Water Treatment Plant (FAWTP) to the del	very point to customers.		- —] [
Risk Ass	essment Team (inclu	ing job titles):	Veolia - Phil Birkl Norris (Operation Aquanet - Brad F	by (Operations Manager), Violetta Wypych (Business Systems Advisor), Hannah Is Supervisor №a (Risk & Compliance Officer and Company Secretary), Craig Heidenreich (General															
Business Risk Cate	Unit: gory:		Rosehill Recycled Water Quality	Water Scheme (RRWS)															
Last Risk Next Risk	Review Date: Review Date:		26/11/2019 26/11/2020			I													
	Categor		1		RISK IDENTIFICATION				Current Situation (not	lober	ont Risk I evel		RISK ANALYSIS				Mitigated Risk Level		
							Legislative Is the risk	Risk Owner	Previous Incidents No. of incidents						Identified sources of				
Ref No	Assessment Category	Risk Element	Activity/ Task/ Job	What can go wrong? Hazardous Event	Existing Controls Downstream/upstream of Veolia Scope	Risk ImpactiConsequence Describe in detail	linked to a Water/Health legislative requirement? I yes, please name it	Who is the owner of thi risk?	e operation and Lik descrition. Have the existing controls been	elihood Co	nsequence Inh	herent Risk Rating	Existing Controls Describe how existing control activities can mitigate the likelihood or consequence. (NB: More than 1 controls attached to one risk is allowed. Insert new row to separate control activities)	Control Effectiveness	uncertainty (if any) Mandatory for all sites with WICA licence	Likelihood	Consequence	Mitigated Risk Rating	Comments
Com-7	Combination or others	Contaminants introduced at the		Instrument failure at the FAWTP and the network	NIL	Exceedances of contractual parameters for recycled water or recycled water rejected at final control point despite being in specification.		Veolia	effective?	5	5 Extre	reme	Instrument calibration schedule for FAWTP and network Conductivity, pH, turbidity and free chlorine and Ammonia are monitored in at the FAWTP	Very Effective	NL	2	2	Medium	
		FAWTP and/or the Network				Note that it is highly unlikely that out of spec recycled water would reach the customers d to controls within the network. The hazardous event is a contract exceedances at the plant	ie						Conductivity, pH, turbidity and free chlorine are monitored in the network (Ammonia is not) Internal analysis of on-line parameters at the FAWTP Weekly external analysis through third party NXTA laboratory (Weekly at the network) Common calibration methods within loant and network						
													Instruments at plant and network are common type to ensure ease of comparison Cross checking of instrument readings with internal and external lab results Cross checking of instrument readings with internal and external lab results						
													 a very different value to the others and/or fails, this will trigger investigation) A larms at critical control points (CCP) at FAWTP are generated if analyser reads out of spec, which triggers investigation 						
													 Control system for the network generates alarm for out of specification events Note: that it is highly unlikely that out of specification recycled water would reach end users due to instrument failure on site. Conductivity, pH, turbidity and free choine are monitored in the network, while 						
													ammonia, although not monitored, must be within spec in order for the free chlorine residual to be within spec. TOC is therefore the only parameter measured in the final water quality parameters on aits that is no controlled within the network, instruments at plant and network are common type to ensure ease of commains and calibration of induments user common methods.	t					
Com-12	Combination or others	Contaminants coming from feedwater that are not sufficiently		Bio growth/UF fouling on feed and filtrate side of UF system	NL	Recontamination of treated water failing contractual quantity requirements thus, use of top-up or back-up water may be required		Veolia	0	4	5 Extre	teme	 Chloramine (chlorine + ammonia) doaing at the inlet Chloramine (chlorine + ammonia) doaing at the inlet Stall chlorine analyser at inlex to UF Multiple barriers - barriers doanstream of UF (RO and chlorination) are being validated for 5.1 reduction in barderia tames Isotarjeta tames I BV for barberia arrows noise f 5.3. 	Very Effective	NIL	1	2	Low	
		removed											Periodic LIF cleaning (CEBW and CIP) with acid and chlorine. Feed quality monitoring Conservative design flux reduces the likelihood of fouling.						
													 One recumant une jour ouy, one standoy), vide that commonly the standoy unit will also be hun, with all units running al lower fluxes, meaning that is a fouling event, all units are likely to be exposed to the foulant in question. If fouling is found to be a problem in the long-term, the cells are designed with space for additional 						
Com -14	Combination or	Contaminants		Bio growth/UF fouling on feed and filtrate side of UF system due to low flow operating	NIL	Recontamination of treated water		Veolia	0	4	4 Extr	reme	membranes, should his be required. • UF performance monitoring: resistance. TMP and low fibrate flow - slarm system (can manually initiate a clean if necessary) • Coloramie (choirne + armonia) dosing at the inlet	Very Effective	NL	1	2	Low	
	others	coming from feedwater that are not sufficiently		conditions		tailing contractual quantity requirements thus, use of top-up or back-up water may be required							Total chlorine analyses at inlet to UF Multiple barries - barries downstream of UF (RO and chlorination) are being validated for 5.1 reduction in bacteria (target LRV for bacteria across plant 5.3),						
		removed											 Fendula of Useding (USEW and UP) with adulant dimense. Fend quality monitoring Conservative design flux reduces the likelihood of fouling. If souling is found to be a problem in the long-term, the cells are designed with space for additional 						
													membranes, should his be required. • UF performance monitoring: resistance, TMP and on filtrate flow - alarm system (can manually initiate a clean if necessary) • 2018-2019 - Modification to operating protocols to manual rotate between cells on a daily basis to ensure						
													equal operations and refreshing of the value in the cell to avoid biofoxiling build up. Backwashes initiated prior to cell stud down to ensure call is offline full of chiorinated water. • 2018. 2019: Current flow flow operation means that generally only one or two cells are in operation at non-time. This reduces the risk of fullion ensurement from feed water arrows mitheline cells.						
Com -17	Combination or others	Interruption to supply	Not job specific	External party damaging underground assets	NE	Interruption to Recycled Water quality or quantity: Inability to supply Recycled Water to customers Environmental spil Damage to concerts (mode buildings atc)	Yes - WICA licence	Veolia	1 - LAP Sample line damage by NBN contractors (date TBC)	4	4 Extre	сте	Dial B4 You Dig service provider - Mpela. Jemena previously receiving 30-120 DB4YD requests/month Ability to halt production and preservisited RW supply remotely using remote SCADA Dedicated staff and contractor for optimum response time Soarea strong of a contractor for main services.	Very Effective		2	3	Medium	Consequence reduced as the controls allow for rapid response time and reduced impact of any leaks
						Safety risk to public and staff from pressurised water Reputation risk							- Emergency response procedures and notification protocols available - Ability to segregate network and supply customers with potable water Non-foundation customer contracts allow for interruption to supply						
Bio-3	Biological	Contaminants introduced at the		Vermin entry • On storage tanks (Network and FAWTP)	NIL	Recontamination of treated water		Veolia	0	5	2 High	ph.	Emergency contact number available on the network in the plottle birthouty of any leaves Vermin screens on tank overflows and vents minimise the risk of vermin entry Enclosed tanks minimise the risk of vermin entry and algae growth	Very effective	NIL	1	1	Low	
		FAWTP and/or the Network		Birds nesting in degasser or above UF cells in the process building									 Workplace inspections to detect possible vermin entry and algae growth Should water contamination occur, free choiner provides disinfection. Network quality monitoring means that the likelihood of water that is turbid or not adequately disinfected being sent to recycled water customes is reduced further 						
													Enclosed FAWTP process building with proper management procedures Vermin-proof mesh on top of degasser and roof. More clean water is unlikely to attract vermin. Vermin-bird droppings not considered a significant risk in Li	-					
Che-7	Chemical	Contaminants introduced at the EAWTP and/or the		Filter blockage causing lower air flow through degasser	Nil	Outside contractual limit on pH, with possible environmental implications depending on how low the pH is. Overhier catrical contractual limit on conductivity if cruit is dependent in increased.		Veolia	0	5	3 High	p .	cells as they will not significantly change the quality of the secondary effluent in these cells. • Low intel presume switch on the degasser fame. • pH measurment before (IZ units) and at the end of the degasser. • BM-indoxor. • 1 SNIS depresent	Very Effective	NL	2	3	Medium	
		Network				 Country declare contracteur min on contractenty in tecano country of indicated. 							 pH adjustment can be increased to a certain degree to compensate for poor performance (but not lack of performance) of degasser fans pH monitoring at iniet of chlorine detention tank and on final recycled water. 	F					
0. 10					***								• Cpuri probe into resolution name for the volume of the organization of methods with the bigginum characterization of the methods with the second activity limit is not exceeded by excess causatic dowing.	5					
010-10	Circinica.	introduced at the FAWTP and/or the Network		The on-actual cincing (1)							3	-	RO membrane rejects chemicals PH monitoring of RW Recycling the RW from DT to FBT possible	very encone	142				
Com-1	Combination or	Contaminants		Out of spec secondary effluent or unknown contaminants which cannot sufficiently be	SWC effluent from STPs (nutrient removal). Sydney Water has trade waste licences and monitors	Use of top-up or back-up water may be required, which can impact the Recycled Water		Veolia	Regular instances where	3	4 High	њ	 During CPF, NO permeater is calculated black to NO CPF table. RO CPF values on RO trains are indirectly monitored via the RO CIP pressure transmitter; if valves are not correct closed, the pressure transmitter will recort HH starm and trains will shutdown. Monitoring online and offline of secondary effluent feed (conductive), amountain, subsidity, TSS, TOC etc) 	Very Effective	Secondary effluent	1	2	Low	consequence reduced through control measures
	others	coming from feedwater that are not sufficiently removed		removed by the FAWTP leading to out of spec RW water quality (i.e. Turbidity, conductivity, pH, chlorine, iron, etc.)	ther system, which form the source water to the plant. SWC to contact FAWTP if potential out of spec contaminants have been expected.	quality. • Out of spec Recycled Water			online TSS and Turbidity exceeded contractual limits. In all cases, recycled water was				at the plant intake. • Monitoring of Recycled Water online and offline (conductivity, ammonia, turbidity, and chlorine etc.) at the plant outlet. • Contractual provision to shut down production and recirculate out of spec RW if certain parameters have		monitoring may not detect an unknown contaminant.				
									produced in sufficient quantities. The performance of the UF system was monitored				been exceeded. • Multiple barriers (RO, UF and IX) and chlorination makes it unlikely that contamination of secondary effluent can lead to out of spec Recycled Water • Monitorino of individual processes						
Com-2	Combination or others	Contaminants introduced at the		Back-flow from network through pump station to recycled water tank contaminating the recycled water stored in the RW tank	NIL	Possible contamination of recycled water in the Recycled water tank		Veolia	during the events and was not impacted. 0	5	2 High	¢.	Non-return valves (spring loaded) on each pump and one on the common line. High high level alagm og recorded water tank and netion for man-vel en-tot fi hatuaan record-d-minter terminet.	Very Effective	NL	1	2	Low	
		FAWTP and/or the Network		,		Note: Inherent consequence is minor because the volume of recycled water lost is not like to be high (1 ML from Woodville reservoir) and would be kept within the system (worst case goes back to head of works).	y						and pump station. • Network management to drain and refill the storage tanks • Backflow alarm						
Cam-6	Combination or	Contaminants		Mains break (Network):	NL	Contamination (e.g. soll) entering pipework through break;		Veolia	0	2	5 High	¢.	Note: This hazard can only happen when the network RW is contaminated and a backflow occurs. Thus, the likelihood of this insident is very low # Desponse team available 247 to respond to mains breaks	Effective	NL	1	3	Low	
	others	FAWTP and/or the Network		recycled water contamination		 unue mans break is repared, inadequate disintection of network before recommencement of supply 							 monimumg outer pressure at pump station should deted a major mains break Small network means that there is some control over water balance (ability to detect mains break). Construction materials and methods (Main covered very well) Pipeline patrols 						
													 versions is registered as a private main on Sydney Water's GB and Sydney Water will contact AquaNet the public noffies femm of a mains break in that area (or they otherwise identify a mains break in that area) Network has marker identification so that public identifying a break can identify whose network it is. Chlorine residual available for disinfection should any pathogene enter the network via break 	-					
													 Monitoring (on-line chlorine, pH turbitly, TDS and periodic sampling and analysis) at network extermities (Rosehill Reservoir, Smithfeid) and at Fairfield Reservoir. Protocol for how to manage mains breaks and flush line to ensure no end users provided with 						
Che-16	Chemical	Public Health	Connecting new	Incorrect third party connection	NIL	Cross connection (contamination of Potable network)				3	4 High	,	- Dial before you dig - Dial before you dig - Dial before you dig maps	Neutral	Involvement of unknown	2	4	Medium	
Bio-4	Biological	Contaminants coming from	network	Failure of UF as a barrier to virus, protozoa and bacteria (e.g. cut fibre).	NIL	Reduced log removals and bio growth at filtrate side might lead to enhanced passing of parasites through the UF barricade.		Veolia	2 Incidents: 1. 23/07/2013: High PDT	3	3 Med	dium	 Carle on incenses plantaning convacuo. Alterence to standard coloror coding Pressure decay tests every 24 hours of operation with interlock if pressure decay test is failed and alarm for operators. 	Very effective	Variable feed water quality	1	2	Low	
		reedwater that are not sufficiently removed				Note - individual fibre failure is expected and fibres will be routinely pinned as part of maintenance procedures. A number of cut fibres is required for an appreciable effect to be noted on the UF system and even then we will be facing a reduction in LRV for the UF			2. 19/10/2014: High PDT				 Overall surplay monitoring to better any large-scale faulte or the UP system. Other UF monitoring (TMP, resistance, etc.) RO and chilorination ateps. Note: RO and chilorination sarriers provide 5.1 LRV in bacteria. 5.3 LRV is required across plant.RO barrier 	er.					
						system, not a loss of the entire LRV.			measurement caused critical CCP on UF cell 4. This incident was caused by a wrong valve				still intact, providing up to 2 log reductions for protozoa. RO barrier still intact, providing 1.1 log reductions for viruses. Chlorine barrier still intact, providing 4 log reductions for viruses						
									adjustment, which had no impact on the filtrate quality, but on the PDT measurement										
									3. 2016-2017 saw a downward trend in PDT in										
									exposure to chlorine causing wear on the membranes. The										
									monitoring on the cell ensured no breaches of CCP occurred. Membranes were										
Bio-5	Biological	Contaminants coming from		Underdosing of chlorine	NL	Low free chlorine in recycled water (outside of contractual limits for this parameter) Inadequate disinfection reducing barrier to bacteria and viruses (log reduction reduced)		Veolia	replaced in 2018 in all cells 0	4	2 Med	dium	 Several hours' storage is available in the Fairfield Recycled Water storage tank alone. Note: The high target level of chlorine residual (1.8 mg/L) compared with the chlorine residual required to 	Very effective	NL	1	2	Low	
		teedwater that are not sufficiently removed				Note: Inherent risk is insignificant provided chlorine dose does not drop below 0.22 mg/L, which is the limit to claim 4 LRV credit based on 1 hour detention time, baffling factor of 0.2 and temperature of 15 degrees C.							claim 4 LWY for bacteria and viruses (0.22 mgL) makes 8 unikely that with controls in place the chlorine residual will drop to a point where there is any impact on health. Moreover, although a one hour detention time is claimed (for the chlorine detention tank), in reality, the chlorine detention time between the dosing point and the end user is far higher, increasing the actual CT.						
													 A three chlorine analyzer for chlorine dosing control is backed up by a free chlorine analyzer at the final quality analysis point. Calibration procedures on the instruments and grab samples to verify on-line readings reduce the ikelihood that the chlorine instruments are not reading correctly. 						
													 Dutylstandby chlorine doxing pumps reduce the likelihood of a doxing pump being unavailable. Flow measurement on the chlorine doxing line check that the regulared chlorine vulume is being dosed. Dilution in chlorine detention tank and recycled water tank minimises the impact for short-term underdose. 						
													Controls include operational procedures and training, and SCADA alerts and alarms. Provision to recycle from chlorine detention tank to feed tank.						

	0:0	B	10 · · · ·	1		1.02			la				F 1 1 1						
	Bio-6	Biological	Contaminants introduced at the FAWTP and/or the Network		Biolouling in water storage tanks at the FAWTP and network	NL	Recontamination of treated water	Veolia	0	4	2	Medium	 Enclosed lanks Feed is chiorated at the FAWTP intake to form monochloramine Workplace inspections, e.g. regular tank inspections by ROV Biological contamination of RW is consequence reduced through downstream chlorination in case of a 	Very effective	Retention time in network	1	2	Low	
													contamination - Should water contamination occur, free chlorine provides disinfection. • Network quality monitoring means that the likelihood of water that is turbid or not adequately disinfected being sent to recycled water customers is reduced further - Bink refiling / draining protocol in place						
	Bio-7	Biological	Contaminants introduced at the		Biofouling/contamination of FAWTP and network storage tanks due to • Short and	NIL	Regrowth of pathogens in an unchlorinated tank due to long and short term shutdown	Veolia	0	3	2	Medium	Regular process monitoring, chemical cleans and dowing to protect membranes and processes against <u>biofeculing damage</u> Low pH water in RO permease tank (~ 4.5) not conducive to big growth/fouling Low putrition level in RW not conducive to big growth/fouling	Effective	Duration of shutdown	1	2	Low	Consequence reduced after controls because effect is reduced due to controls
			FAWTP and/or the Network		Long-term shutdown								 Target chlorine concentration (1.7 mg/L) will prevent Biofouling and growth of microorganism for a certain period of time Re-start and shutdown procedures developed including tank draining and flushing, chemical cleans for 15 Ensite and (DieRhurhine Kor Dhe. 	1					
													Ability to bypass Rosehill Reservoir during periods of low flow to reduce stagnant water in tank Wioodville drain down procedures currently in place for daily turnover of tank Network choine online analyses to monitor deterioration indicating contamination						
No. No. <td></td> <td>Note: Bio growth in the UF feed and filtrate tank during a long-term shutdown is inevitable. However, the strict procedures in place will prevent that water from these tanks can enter the recycled water tank without monoporties therefored.</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>													Note: Bio growth in the UF feed and filtrate tank during a long-term shutdown is inevitable. However, the strict procedures in place will prevent that water from these tanks can enter the recycled water tank without monoporties therefored.						
No. N	Bio-8	Biological	Contaminants introduced at the FAWTP and/or the		Stagnant sections of line from main to customer tap that aren't used for a long period of time (during shutdown or, for Rosehill Raceccurse, if dam is full due to rain). This applies to anyone who is at the end of a leg. With current customers, this is Rosehill Raceccurse, Boral	High chlorine residual (current target 1.7 - 1.8 mg/L, minimum 0.7 mg/L) in low chlorine demand water. Water quality monitoring of ammonia, conductivity, pH and chlorine prior delivery to the Delivery	Not meeting contractual parameters for chlorine in recycled water Regrowth of pathogens in an stagnant section	Veolia	0	4	2	Medium	adotocinate relatively. Chlorine residual is likely to be maintained in the network for at least a period of several days. • Chlorine monitoring at VISPY and Boral can detect whether chlorine residual has decayed at that location. (No direct monitoring at RoseMin Racecourse)	Effective	Retention time in network	3	2	Medium	Consequence after mitigation reduced due to level of treatment - surely reducing significantly the contaminant level in RW if not totally.
No. N			Network		and VISY. Long retention time in the network causing a loss of chlorine residual.	Point							Chlorine monitoring at the recycled water tank at the FAWTP AquaNet has a tank refilling / draining protocol in place to avoid a significant reduction in chlorine concentration Chlorine dram and of protocol at the area and the has a set.						
No. No. <td></td> <td>Clinician contains or recycles water is supported to be very low: Plastic pipes in the network reduces degradiation of chicine in the network. Storages on Network managed to reduce amount of time water is stored in the reservoirrs to limit chicine degreedation</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>													Clinician contains or recycles water is supported to be very low: Plastic pipes in the network reduces degradiation of chicine in the network. Storages on Network managed to reduce amount of time water is stored in the reservoirrs to limit chicine degreedation						
No. No. <td></td> <td>Communications protocols with Veolia to adjust chlorine residual out of plant if chlorine loss through network is increased (due to temperatures, low flows etc) Routine sampling and analysis through a third-party NATA-accredited laboratory at network extremities Routine sampling and analysis through a third-party NATA-accredited laboratory at network extremities Rorabil Deveropin[®] Centified(a) and a fair/sided Deveropin[®]</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>													Communications protocols with Veolia to adjust chlorine residual out of plant if chlorine loss through network is increased (due to temperatures, low flows etc) Routine sampling and analysis through a third-party NATA-accredited laboratory at network extremities Routine sampling and analysis through a third-party NATA-accredited laboratory at network extremities Rorabil Deveropin [®] Centified(a) and a fair/sided Deveropin [®]						
	Che-1	Chemical	Contaminants introduced at the		High ammonia and/or low pH of feed water due to IX regen waste recycle (likely to occur if increased IX regen frequency is required or regens during plant shutdown or low production).	NIL	Exceeding contract parameters for recycled water and trade waste. If limited by trade waste, plant throughput may be impacted (also refer to environmental	Veolia	0	2	3	Medium	P - Flushing of the standard part is minute include reader on	Effective	NL	2	2	Medium	Note - this is an Aquanet risk which can impact Vedia operation requirements. It is not a Vedia specific risk.
No. No. <td></td> <td></td> <td>FAWTP and/or the Network</td> <td></td> <td></td> <td></td> <td>nsk assessment)</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>amount of ammonia is disposed but less concentrated. This must be managed within the flow restrictions on the trade wates stream, however given that problems of high ammonia concentration are more likely to occur during low plant flow events, the likelihood of being restricted on trade waste volume is reduced. • Monitorin the of H on tade waste, and feed balance tank.</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>			FAWTP and/or the Network				nsk assessment)						amount of ammonia is disposed but less concentrated. This must be managed within the flow restrictions on the trade wates stream, however given that problems of high ammonia concentration are more likely to occur during low plant flow events, the likelihood of being restricted on trade waste volume is reduced. • Monitorin the of H on tade waste, and feed balance tank.						
Image: Mode with the second													 Provision to add caustic to trade waste stream (neutralisation) Interlock preventing discharge of TW if not within specs. The amount of reuzed regeneration waste can be adjusted and is limited by design 						
Image: Solution of the second seco	Che-2	Chemical	Contaminants coming from		Contamination of secondary treated effluent feed (LAP), for example:	Trade waste licences (SWC) for entities discharging into Liverpool and Glenfield catchment areas; and SWC monitoring the licences. Sydney Water has some control over the products entering the	Increased amounts of contaminants might pass the treatment process, thus, leading to out of see: recycled water	Veolia / Svdnev Water	1 Incident: 27/09/2013: Ammonia in	3	3	Medium	Note: Neter to risk related to high ammonia in effluent. • Provision to recycle from chlorine detention tank to feed tank when Recycled water is out of spec • Provision to stop accession Feed water if the water is out of spec. (Table A)	Very Effective	Not everything that is in the feed water is	1	2	Low	consequence reduced through control measures
Image: Solution of the second seco			feedwater that are not sufficiently removed		high ammonia radiological parameters, nutrients and/or	sewage system, through trade waste licences and monitoring. Nutrient monitoring at Liverpool and Glenfield STPs. Operations protocols for SWC to communicate if high nutrient levels are known to be present in			LAP was above 33.0 mg/L				On-line monitoring for ammonia, pH, TOC, TSS, ORP and conductivity at the plant linet. Weskly grab samples at LAP and Recycled Water for Total P, TOC, BOD and ammonia. Multiple barriers for contaminants such as UF; RO and IX process. These processes are monitored		measured. Not all trace contaminants can be removed by UF, RO and				
Image: Solution of the second of the seco					other toxic chemicals	secondary effluent. Report prepared by a third party as to suitability of recycled water for irrigation use at Rosehill Racecourse. Report found that based on modelling, the recycled water would cause no nutrient leaching up to year 20 and the ceneral trends indicated that there would be no leaching for many							Recycled Water provides alarm to operators if water is out of spec. For conductivity, IOC, pH, ammonia and chlorine Automatic Interlocks in plant: for instance high ammonia in feed stops recycle of high ammonia IX regen wate: high high ammonia in feed causes olden to stor: high high ammonia tade waste causes trade		chlorination, however the combination of these processes provide a very efficient protection against				
No. No. <td></td> <td></td> <td></td> <td></td> <td></td> <td>more years, if at all. SWC has demonstrated that their STPs are able to better control the effluent quality. Ammonia and TSS monitoring at Liverpool and Glenfield STPs.</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>waste discharge to stop • Recycled Water ammonia. Ion exchange unit specifically designed to remove ammonia and can also remove other cations which could have passed the RO unit.</td> <td></td> <td>out of spec feed water</td> <td></td> <td></td> <td></td> <td></td>						more years, if at all. SWC has demonstrated that their STPs are able to better control the effluent quality. Ammonia and TSS monitoring at Liverpool and Glenfield STPs.							waste discharge to stop • Recycled Water ammonia. Ion exchange unit specifically designed to remove ammonia and can also remove other cations which could have passed the RO unit.		out of spec feed water				
No. No. <td></td> <td>Cinchination to the PVM would inter than intergrading both multiany relieves available anniholina to rouni choloramines. Tinice yearly external analysis of PhACs, etc. Possibility to contact SW to save Diverso diffuent to Gienfield effluent and vice versa (Gienfield</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>													Cinchination to the PVM would inter than intergrading both multiany relieves available anniholina to rouni choloramines. Tinice yearly external analysis of PhACs, etc. Possibility to contact SW to save Diverso diffuent to Gienfield effluent and vice versa (Gienfield						
Image: Solution in the second seco	Che-3	Chemical	RW not meeting the quality		Overdosing of chlorine	NIL	High chlorine in recycled water (exceeding contractual parameter for recycled water) Environmental impact of high chlorine, primarily for irripation at Sydney Turf Club or to	Veolia	0	2	3	Medium	typically has higher amonia levels) • Operational set points are well below maximum contractual level of 5 mg/L. • Controls include coerational procedures and training, and SCADA alerts and alarms.	Very effective	NL	1	3	Low	
Image: Section			specifications/expeci ations	2			aquatic life in Sydney Turf Club. • Operational: corrosive for end users and possible damage to liner of chlorine detention tank						 A free chlorine analyser for chlorine dosing control is backed up by a free chlorine analyser at the final quality analysis point. Calibration procedures on the instruments and grab samples to verify on-line readings reduce the 						
No. No. <td></td> <td>likelihood that the chiorne instruments are not reading correctly. Flow measurement on the chiorne donsing incic checks that the required chiorne volume is being dosed. • Difution in chiorne detention tank and recycled water tank minimises the impact for short-term overdose. • Provision to recycle from chiorne detention tank to feed tank.</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>													likelihood that the chiorne instruments are not reading correctly. Flow measurement on the chiorne donsing incic checks that the required chiorne volume is being dosed. • Difution in chiorne detention tank and recycled water tank minimises the impact for short-term overdose. • Provision to recycle from chiorne detention tank to feed tank.						
Image: Solution in the standard													 Monthly chemical stocktake would indicate excessive use of chlorine Note: Likelihood of exceeding the limit of 5 mg/L free chlorine when operating to a target of 1.7mg/L free 						
XI XII XIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII													chlorne is inherently very low, bearing in mind maintenance and calibration procedures on instruments, udoplication of instruments (monitoring free chlorine inio and out of chlorine detention tank) and ability for verification in on-site lab. It is only really feasible if operating in manual.						
No. No. <td>Che-4</td> <td>Chemical</td> <td>RW not meeting the quality</td> <td></td> <td>Higher than usual removal of salts by reverse osmosis process e.g. by fouling.</td> <td>NIL</td> <td>Low salinity may cause problems for irrigation customers + damage to equipment</td> <td>Veolia</td> <td>0</td> <td>2</td> <td>2</td> <td>Medium</td> <td>On-line monitoring of conductivity out of RO to ensure that RO barrier is in place reduces the likelihood further</td> <td>Very effective</td> <td>NL</td> <td>1</td> <td>2</td> <td>Low</td> <td></td>	Che-4	Chemical	RW not meeting the quality		Higher than usual removal of salts by reverse osmosis process e.g. by fouling.	NIL	Low salinity may cause problems for irrigation customers + damage to equipment	Veolia	0	2	2	Medium	On-line monitoring of conductivity out of RO to ensure that RO barrier is in place reduces the likelihood further	Very effective	NL	1	2	Low	
M M <td></td> <td></td> <td>ations</td> <td><u>~</u></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Downiscealli Colluctority instituting airo sampling Periodic RO performance monitoring (water quality and maintenance, profiling, etc.) Chemical cleaning can remove membrane fouling Caustis coda dosino on eremente increases conductivity</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>			ations	<u>~</u>									Downiscealli Colluctority instituting airo sampling Periodic RO performance monitoring (water quality and maintenance, profiling, etc.) Chemical cleaning can remove membrane fouling Caustis coda dosino on eremente increases conductivity						
Normal Normal <td>Che-5</td> <td>Chemical</td> <td>RW not meeting the quality specifications/expect</td> <td>t.</td> <td>Over and underdosing of NaOH (pH correction)</td> <td>NIL</td> <td> Out of spec Recycled Water pH Environmental hazard (unbuffered)pH 4.5 prior to caustic dosing, see environmental risk assessment) Opacification publication for and usare. </td> <td>Veolia</td> <td>0</td> <td>2</td> <td>2</td> <td>Medium</td> <td> pH analyser (for caustic dozing control) after caustic dozing point pH analyser at final quality analysis point (CCP) Dilution in chlorine detention tank and recycled water tank minimises impact for short-term over and underdoze </td> <td>Very effective</td> <td>NL</td> <td>1</td> <td>2</td> <td>Low</td> <td></td>	Che-5	Chemical	RW not meeting the quality specifications/expect	t.	Over and underdosing of NaOH (pH correction)	NIL	 Out of spec Recycled Water pH Environmental hazard (unbuffered)pH 4.5 prior to caustic dosing, see environmental risk assessment) Opacification publication for and usare. 	Veolia	0	2	2	Medium	 pH analyser (for caustic dozing control) after caustic dozing point pH analyser at final quality analysis point (CCP) Dilution in chlorine detention tank and recycled water tank minimises impact for short-term over and underdoze 	Very effective	NL	1	2	Low	
Image: state with the state with t			aucits				Operational problemmazaro no eno users						Calibrations procedures for instruments and grab samples to verify on-line reading.						
No. No. <td>Chaß</td> <td>Chamical</td> <td>Contaminante</td> <td></td> <td>Proc operation of IV unit</td> <td>MI</td> <td>Excepting contractual symposis and/or low pbl limits on second water</td> <td>Vacin</td> <td>1 Incident</td> <td></td> <td></td> <td>Marium</td> <td>Heat tracing and dilution to prevent freezing of dosing lines End of network monitoring and further dilution in the network Monithly chemical stocktate Dollan astronomical and old meanuments on previoled value stream. The latter bar AM, and AM L time after</td> <td>Effective</td> <td>NI</td> <td></td> <td></td> <td>Madium</td> <td></td>	Chaß	Chamical	Contaminante		Proc operation of IV unit	MI	Excepting contractual symposis and/or low pbl limits on second water	Vacin	1 Incident			Marium	Heat tracing and dilution to prevent freezing of dosing lines End of network monitoring and further dilution in the network Monithly chemical stocktate Dollan astronomical and old meanuments on previoled value stream. The latter bar AM, and AM L time after	Effective	NI			Madium	
Image: Section of the section of t	0.10-0	Children	coming from feedwater that are not sufficiently		 De operation or moval due to exhausted resin or old resin Manual bypass valve around ion exchange vessels left open. Valves 810.05 or 6110.04 passing when another cation unit is being regenerated, thus 		 High ammonia can lead to not meeting contractual fee chlorine limit on recycled water flux, possible health impacts due to lack of chlorine residual. 	-cone	28/10/2013: Contamination o RW by regen waste due to cation	-	3		exhibit a winkful water pri finazzation to topycor which alkalin results are not result of the output and exhication unit to stop the flow entering the RO permedie collection tank. • pH and conductivity at end of degas tower and downstream pH monitoring and correction (caustic dowing) although too much caustic dowing will cause a breach in recycled water quality on conductivity or conductivity.		142	-	-		
Image: Solution of the second of the seco			removed		decreasing pH of Recycled water (FROM HUZOP). • Contamination of RW by regen waste				shutdown caused by power failure				(conductivity monitored online). • Downstream chlorine dosing can also correct pH and can remove small amounts of ammonia, however, contractual free chlorine level will not be achievable if there is ammonia present in recycled water. • pH measurement no IX outliet indicates when regeneration is required prior ammonia leakage.						
Image: Section of the section of t													Redundancy: 3 x 50% units, Total capacity designed for 25 MLD. Regen triggered on: throughput, pH, cation load - whichever occurs first. Ability to track time between regen as a function of conductivity x volume through vessels to monitor						
No. No. <td></td> <td>regeneration insquency: = Pressure indicator on ion exchange product stream should identify if pressure directly from RO permeate is sensed due to manual valve open. = Provision to recycle from chilorine detention tank to feed tank when low pH or high ammonia content has</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>													regeneration insquency: = Pressure indicator on ion exchange product stream should identify if pressure directly from RO permeate is sensed due to manual valve open. = Provision to recycle from chilorine detention tank to feed tank when low pH or high ammonia content has						
No. No. <td></td> <td>been detected • New calico valves and actuators installed in 2019 • 2019 • Code implemented to manually flush to waste on start up following a regeneration, or after 24 bours of dardwing mode . In created low of M water from feeding to the RD Permete tank</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>													been detected • New calico valves and actuators installed in 2019 • 2019 • Code implemented to manually flush to waste on start up following a regeneration, or after 24 bours of dardwing mode . In created low of M water from feeding to the RD Permete tank						
Image: Properties of the second sec	Che-9	Chemical	Contaminants introduced at the		Under and overdozing of chemicals prior RO for example:	Nel	Uncontrolled constituents that may enter the recycled water or trade waste (breach of trade waste license or out of spec Recycled Water).	Veolia	0	4	2	Medium	Potential removal by UF, RO and Ion exchange Online monitoring of water quality within the plant and the network Unimed within the plant and the network	Very Effective	Chemical composition at the containment level	2	2	Medium	
Image: Section of the section of t			Network		Ammonia (LAP) Hypochiotic (LAP) Sulphuric acid (RO)								 Limite dosing by design Chemicals are supplied from reputable and certified suppliers, the quality specifications are defined in the supplier agreements (corporate) 						
NAI Mark					Contaminants in bulk chemicals for example: • mercury in sulphuric acid or iron in sodium hypochlorite • contaminants may also expect through a delivery tarker that is not adequately cleaned														
Image: Solution in the second seco	Che-10	Chemical	Contaminants voluntarily		between deliveries Contamination of the recycled water system through unauthorised entry to recycled water tanks at the network and FAWTP. Public interference with network assets causing damage to	Ni	Unknown contaminant entering recycled water system.	Veolia / AquaNet	0	1	4	Medium	Locked gates maintained, fences and ground regularly checked for integrity, Aiam call out to SCADA on specific asset locks (pump station doors, electrical cabinets)	Effective	NL	1	2	Low	Consequence reduced as the controls allow for reduced interruption to supply
Image: Note of the state of			introduced by others	s	assets								Petable water backup available to supply customers Non-foundation customer contracts allow for interruption to supply Ianks covered and fenced. Tank hatches are looked						
Image: And the second secon													 On-line water quality monitoring (chlorine, pH, turbidly and TDS) and periodic sampling and analysis at the network externities (Rosebill Reservois: mithfeld and at Fairfield Reservoir) and throughout the FAWTP to detect any changes to water quality in network. EAWTD at averagenoninger due to market watermented hus ensurity. 						
No. No. <td>Che-11</td> <td>Chemical</td> <td>Contaminants introduced at the FAWTP and/or the</td> <td></td> <td>Water quality changing through the network (excluding changes to chlorine residual, which is considered elsewhere).</td> <td>Ne</td> <td>Interruption to Recycled Water quality or quantity: • Out of specification water deliver to customers • Contamination of network storages</td> <td>Veolia/Aquane t</td> <td>0</td> <td>3</td> <td>3</td> <td>Medium</td> <td>Appropriate selection of pipe materials to prevent changes to water quality Routine sampling and analysis through a hird-party NATA-accredited laboratory at network extremities Roschill Reservoir. Smithfield and a Fartfield Reservoir</td> <td>Effective</td> <td>NIL</td> <td>1</td> <td>2</td> <td>Low</td> <td></td>	Che-11	Chemical	Contaminants introduced at the FAWTP and/or the		Water quality changing through the network (excluding changes to chlorine residual, which is considered elsewhere).	Ne	Interruption to Recycled Water quality or quantity: • Out of specification water deliver to customers • Contamination of network storages	Veolia/Aquane t	0	3	3	Medium	Appropriate selection of pipe materials to prevent changes to water quality Routine sampling and analysis through a hird-party NATA-accredited laboratory at network extremities Roschill Reservoir. Smithfield and a Fartfield Reservoir	Effective	NIL	1	2	Low	
No. No. <td></td> <td></td> <td>Network</td> <td></td> <td></td> <td></td> <td>Financial impact from SWG penalties</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>• versus at Fairtield to monitor quality delivered to head of network. • Monitoring and interlocks on network to prevent out of spec discharge • Ability to hait supply remotely using remote SCADA Network analyses calibrated regularly</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>			Network				Financial impact from SWG penalties						• versus at Fairtield to monitor quality delivered to head of network. • Monitoring and interlocks on network to prevent out of spec discharge • Ability to hait supply remotely using remote SCADA Network analyses calibrated regularly						
Image Margin					F. S. (PA)								Ability to blend out of spec storages with in spec RW Ability to drain out of spec storages to wasteristormwater On call system 24/7						
Image:	Com-3	Combination or others	Contaminants coming from feedwater that are not sufficiently		Failure of KO separation process (e.g. due to leaking brine seal) tor	Available data for boron in sewage catchment indicates very low levels (=0.1 mg/L) STP treatment and quality monitoring. Notlication protocol to warn VW. SWC monitoring Trade waste licensees to monitor discharge of hazardous substances.	 Reduced log reduction through system. Note: Due to multiple barriers, health incident for end users is highly unlikely unless another barrier has also failed. Also, Exposure to RW is limited (see other risks above for reference): e Recycled Water out of spec 	Veolia	0	3	3	Medium	 Multiple barner (UF and disinfection barriers likely still inbat together these provide log reduction of 8, 4 and 5.1 for bacteria, protozoa and virus respectively. Note: TargetLRV for bacteria, protozoa and virus is 51, 5.1 and 5.5, respectively. Conductivity monitoring at the RD process with alarms and interlocks for off-spec water 	Very Effective	Feed water quality variations	2	3	Medium	
Image: Note:			removed		other hazardous dissolved substances								Faulty RO train will automatic shut down and redundant unit will start up (seven duty, one standby) Periodic RO performance monitoring (rejection) including sulphate, boron and ammonia. RW quality monitoring						
Chi Main Main <													Citrovialation downstream to process UF would have removed some of the contaminants, in particular bio organisms. IX barrier downstream to remove ammonia and other cations. IX is monitored through pH, plus downstream to conductive vitalite decasser.						
Image: Normal Signed	Com-4	Combination or others	Contaminants coming from feedwater that are not sufficiently		RO Membrane fouling causes increased passage of contaminants and or bio growth on permeate side of RO and contaminates the permeate	SWC effluent from STPs (nutrient removal). Sydney Water has trade waste licences and monitors their system, which from the source water to the plant. SWC has a notification protocol in place to inform VW in case of issues with the secondary treated effluent.	 Use of top-up or back-up water may be required in case of limited production. Bio growth on permeate side might contaminate permeate water with bacteria. Thus, possible health impacts for end users. 	Veolia	0	3	3	Medium	Likelhood of fouling are minimised by • RO fouling is reduced by feed monitoring to the plant and RO feed monitoring. • Dosphillity to devide in turn the night off if acceptable levels are exceeded.	Neutral	Feed Water	2	3	Medium	
n n			removed										 Ohloramine and antiscalant doxing minimizes risk of biofouling and scaling, respectively. Periodic CIPs. CIP system allowing for standard caustic and acid cleans plus addition of non-standard chemicals to manage difficult foulants 						
Image: Note: Note													 -recurses, permeare runs (once a cay during shutdown) minimises biofouling during shutdowns, which are risk periods for bio growth Feed monitoring to the plant and RO feed monitoring. 						
A Contrast Co													Consequences of fouling are minimised by: • One redundant unit (seven duty, one standby)						
Image: Notice and an experimentation operation operati	Com-5	Combination or others	Contaminants introduced at the		Contamination of Recycled Water by the degasser due to: • bicfouling on packing and/or	NIL.	Contamination of treated water such as bacteria	Veolia	0	2	3	Medium	Alarms on GP and permetel low and feed oresets to identify fouling. Drying degasser by leaving degasser fan on for 30 minutes after shuldown will significantly reduce the risk of biofolding.	Very Effective	NL	2	1	Low	
other producted at the producted at the producted at the contaminants, do for tarks, larger rems such as load, and contaminants, do for tarks, larger rems such as load, and contaminants, do for tarks, larger rems such as load, and contaminants, do for tarks, larger rems such as load, and contaminants, do for tarks, larger rems such as load, and contaminants, do for tarks, larger rems such as load, and contaminants, do for tarks, larger rems such as load, and contaminants, do for tarks, larger rems such as load, and contaminants, do for tarks, larger rems such as load, and contaminants, do for tarks, larger rems such as load, and contaminants, do for tarks, larger rems such as load, and contaminants, do for tarks, larger rems such as load, and contaminants, do for tarks, larger rems such as load, and contaminants, do for tarks, larger rems such as load, and contaminants, larger rems such as lo	Com-R	Combination or	FAWTP and/or the Network		usage of contaminated air Contaminants entering tanks and pipes during maintenance activities (e.g. oils and newsee	NL	Contaminants (e.g. paints, oils and greases, chemicals or other unknown	Veolia	0	3	3	Medium		Effective	NL	2	3	Medium	
Image: Note:		others	introduced at the FAWTP and/or the Network		particles, paints, dirt, other contaminants; also for tanks, larger items such as tools and equipment)		contaminants) entering the recycled water network. • Quality and possible health and /or environmental impacts. Note: Impacts are likely to be sprail injunction the volume of environmental impacts						Staff training. Communications with stakeholders - they are to notify us if any issues are identified. Plant materials and network are suitable for end use. Use of encidened and antibionomous house in a suitable for end use.						
overs Products as the products as the product of the postball Vocal Vocal Products as the products as the product of the postball Products as the product of the postball Product of the postball Product	Com-10	Combination or	Contaminants		Cross-connections between network and Sydney Water sewage or potable water system	NIL	plantinetwork and the likely quantity of contaminants entering, as well as the environmental and human exosure to recycled water. • Cross-contamination of the recycled water network.	AquaNet /	0	1	4	Medium	Recycled water line purple to identify it as recycled water.	Neutral	NL	1	4	Medium	
Outrie wardinizing of the extensities of the recycled water system that would dentify turbidityTDS/Hee clother wardinizing and the state of the recycled water system that would dentify turbidityTDS/Hee clother and turbidity and the state of the recycled water system that would dentify turbidityTDS/Hee clother and turbidity and turbidityTDS/Hee clother and turbidity and turbidityTDS/Hee clother and clother and turbidityTDS/Hee		others	Introduced at the FAWTP and/or the Network		(includes also end user connections)		Lross-contamination of the potable water network. Note: Reputation is a more substantial risk in case of cross-contamination of the potable water network than actual health risk due to the good quality of the recycled water	veolia / Sydney Water					retenons are in data before you dig. Both networks are on Sydney Water's GIS system Sydney Water has existing procedures re connections to mains supply Repair create training by Jenema and Sydney Water						
order, minutiding are propriorate table based manufactory. Mare and additional are non-standard but a order, minutiding are additional are provided to a standard but and additional are additionare are additionare are additional are additional ar							, mggan						Online monitoring of the extremities of the recycled water system that would identify turbidity/TDS/free chlorine watations. Most connections (excluse) are to be carried out in accordance with standard plumbing and drainage Most connection (excluse).						
													substantial risk assessment was carried out by Sylney Water and additional controls (e.g. increased monitoring of RPZs, additional RPZs) in place and this has been approved by Sylney Water.						

Com-	11 Combination or	Contaminants		Peaks in demand or loss of production at plant lead to the requirement to use potable water	NL	 Top-up water will have higher TDS and alkalinity than recycled water, leading to 	AquaNet	0	2 4	Medium	. End users have contracts with Sydney Water that note that changes to water quality may occur from tim	e Effective	NL	1	2	Low	consequence reduced after controls because effect is reduced due to controls
	others	introduced at the FAWTP and/or the Network		top-up, which has a different water quality to the recycled water.		exceedances on contractual limits at end users. • There will be an impact on end users, who require very low TDS water for their end uses. • End users will need to further track the recurded water if out of smar. In order their					to time and that polable water may be provided to them from time to time. • Monitoring and intentional additional of potable top-up will ensure that AquaNet is aware of water quality chances that will be availabled by customer.	ty					
		NEWOR				 End users will need to relate a beat the recycled water in dut of specific meet their requirements. 					Communications protocols to notify customers that quality will change so that they can consider the						
											operational implications. • Monitoring of recycled water at extremities of the petwork and at Fairfield reservoir.						
											Addition of potable water top-up to the storages requires operator intervention and will require an accrowal step						
Com-	13 Combination or others	Contaminants		Failure of strainer to remove particles in secondary treated effluent	Sydney Water treatment and quality monitoring	Physical damage to UF integrity leading to a reduction in the log removal provided by UF.	Veolia	0	2 4	Medium	dP monitoring across the strainers : low level should transman inspection	Very Effective	Feed water quality	1	2	Low	
	outers	feedwater that are			Notification producer to waith you'll issues are known	Note. Por all assessment of this lisk, see thidel OP - nature of ballier.					 - Idwievel should argget all inspection - high level indicate blockages. Will also automatically start a BW of the strainers 		wanaboris				
		not sufficiently removed									Periodic inspection of the strainers as per CMMS (WO) Unlikely that a failure of the strainer has an impact on water quality due to multiple barriers in the						
											process: UF, RO and IX						
Com	15 Combination or	Contaminants	Not job specific	Public interference with network assets causing damage to assets	NIL	Interruption to water supply or deliberate contamination	Yes - WICA licence Veolia	No	1 4	Medium	Locked gates maintained, fences and ground regularly checked for integrity,	Effective		1	2	Low	Consequence reduced as the controls allow for reduced interruption to supply
	others	introduced at the EAWTP and/or the									Aarm call out to SCADA on specific asset locks (pump station doors, electrical cabinets) Potable water backup available to supply customers						
	10 0 11 F	Network		A & A & A & A & A & A & A & A & A & A &	A 108		N HALF				- Non-foundation customer contracts allow for interruption to supply						
Lom	others	supply	Not job specific	Network pipeline failure stopping or reducing ability to supply to customers	NL	Inability to supply Recycled Water to customers	tes - witLA licence veolia/Aqui	ne >2, <10 (from 2011-2019		Wealum	A preventative maintenance and monitoring schedule managed in VAWS Ability to halt production and pressurised RW supply remotely using remote SCADA	Effective		2	2	Medium	Consequence reduced as the controls allow for rapid response time and reduced impact of any leaks
						Environmental spill Damage to property (marke buildings, etc.)					Dedicated staff and contractor for optimum response time Sources stored at contractor for rand response						
						Safety risk to public and staff from pressurised water					Emergency response procedures and notification protocols available						
						- Reputation risk					 Ability to segregate network and supply customers with potable water Non-foundation customer contracts allow for interruption to supply 						
Com	18 Combination or	Internuction to	Not job macific	Natural above around area! failure, an number above around nineworke	NII	Internation to Decarled Water quality or quantity-	Verlin	TRC		Martium	Emergency contact number available on the network for the public to notify of any leaks Verial Preventative Maintenance carried out to schedule	Effective			2	Medium	Consequence reduced as the controls allow for rapid response time and reduced impact of any leaks
Com	others	supply	Not job specific	retwork above ground asset failure: eg pumps, above ground pipeworks	rviL	Inability to supply Recycled Water to customers	vena	100		Mediali	PM schedule determined via Asset team workshop and submitted to Aquanet for approval	Ellective		2	2	Medialli	Consequence reduced as the controls allow for rapid response time and reduced impact of any reaks
						Environmental spil Damage to property (roads, buildings, etc.)					Condition assessments conducted by Asset team Ability to balt production and pressurised RW supply remotely using remote SCADA						
						Safety risk to public and staff from pressurised water					Dedicated staff and contractor for optimum response time						
						- Reputation risk					Spares stored at contractor for rapid response Emergency response procedures and notification protocols available						
											Ability to segregate network and supply customers with potable water						
											Emergency contact number available on the network for the public to notify of any leaks						
Com	-19 Combination or others	Interruption to	Not job specific	Tank failure (Woodville and Rosehill)	NIL	Interruption to Recycled Water quality or quantity:	Veolia		2 4	Medium	Veolia Preventative Maintenance carried out to schedule DM schedule determined via Asset team workshop and submitted to Assume for anomal	Effective		1	4	Medium	
	Guidia	adobia				Environmental spil					Condition assessments conducted by Asset team						
						Damage to property (roads, buildings, etc) Safety risk to public and staff from head and volume of water					Online monitoring of tank levels and level alarms Ability to halt production and pressurised RW supply remotely using remote SCADA						
						- Reputation risk					Dedicated staff and contractor for optimum response time						
											 Emergency response procedures and notification protocols available Ability to segregate network and supply customers with potable water 						
											 Non-foundation customer contracts allow for interruption to supply Emergency contract number available on the network for the public to polify of any leafer. 						
Che-1	14 Chemical	Contaminants	Not job specific	Water quality deterioration in the Network eg. low flows, infiltration of solids etc	NIL	Interruption to Recycled Water quality or quantity:	Veolia		3 3	Medium	Wetrack at Fairfield to monitor quality delivered to head of network.	Effective		1	2	Low	
		introduced at the FAWTP and/or the				Out of specification water deliver to customers Contamination of network storages					Monitoring and interlocks on network to prevent out of spec discharge Ability to halt supply remotely using remote SCADA						
		Network				- Financial impact from SWC penalties					Network analysers calibrated regularly						
											Ability to blend out of spec storages with in spec RW Ability to drain out of spec storages to waste/stormwater						
Che-1	15 Chemical	Contaminants	Maintenance / not	Incorrect use of potable water valves at reservoirs	NIL	Cross connection (contamination of RW Network) resulting in out of spec water	Aquanet /		2 3	Medium	- On call system 24/7 - Training & procedures	Effective		1	2	Low	
		introduced at the EAWTP and/or the	job specific	Failure of the potable water valves			Veolia				Interlocks and SCADA alarms Veolia Preventative Maintenance carried out to schedule						
		Network									PM schedule determined via Asset team workshop and submitted to Aquanet for approval						
											Condition assessments conducted by Asset team Online monitoring of tank levels and level alarms						
											Ability to halt production and pressurised RW supply remotely using remote SCADA						
											Emergency response procedures and notification protocols available						
											Non-foundation customer contracts allow for interruption to supply Education of new customers (under the Retail Licence)						
C	20 Cambinatian as	Dublic Marship	Nation exercitor	Descent considerably comparison under without collision it is president under	ARE	Marth internation to protocol a second sublic				Martine	- Colour coding of piping	Manufacel	Involvement of unbrown			Madium	
Com	others	Public Health	Not job specific	Person accounting consuming water wisitout rearising it is recycled water	rviL	Reputation risk				Mediali	Signage	recora	third party	2	3	Medialli	
											Locked gates Fducation of customers						
											- Colour of pipes						
Bio-1	Biological	contaminants coming from		Higher than design bacterial, virus and protozoa count in secondary effluent in LAP.	SWC monitoring process performance and effluent quality as part of their own requirements. SWC Pandemic Response Procedure Developed.	High bacterial count into plant may cause higher bacterial count out of treatment plant, leading to infection(s) in the community.	Veolia	0	1 3	Low	 Weekly grab samples for faecal coliforms from LAP. On-line monitoring for TOC and TSS which provide an indicator of STP performance. 	Very effective	Variable feed water quality	1	2	Low	Consequence reduced due to controls limiting number of treatment process effected by any contamination
		feedwater that are			The degree of infection in the community required to increase pathogen levels by an order of	Also higher risk to operators. Note: See also OHS risk assessment					Can decide to turn the plant off if acceptable levels are exceeded. Minimum architecture (MC (compliance exceeded)) of any levels are below with LAD efficient.						
		removed			Veolia would not be aware that such an event was occurring. A pandemic response procedure sets	water quarry out of spec					High removal rate of individual processes (i.e. UF, RO, chlorination)						
	1		1		out how such an event should be dealt with.						CCP response in case one or more separation processes fail Quarterly external testing for viruses/bacteria/barasites (RW)						
Bio-2	Biological	Contaminants		Parasites entering the chlorine detention tank from the overflow line to the feed tank.	nil	Recycled Water out of spec	Veolia	0	1 3	Low	 The overflow line is designed (air gap) to constantly maintain a water seal, which makes it impossible for overarises to travel to the DT tank. 	r Very effective	NIL	1	2	Low	Consequence reduced after controls because effect is reduced due to controls.
	1	FAWTP and/or the	1								This tank is chlorinated to a chlorine residual of at least 0.7 mg/L, providing disinfection for any viruses	or					
	1	Network	1								bacteria that enter this tank. This will also prevent the contamination of the DT tank by fouled air by the FBT tank in case the water seal would not be in place.						
Ch 1	Chaminal	DM and months		I some these design under local in the detection task (without only senter).	A61	 Out of some second of units 	10.00			1	The overflow lines is flushed in case of plant recirculation, which happens periodically	Manufact	5.00			1	
Une-l	Chemical	quality		Note, Minimum possible detention time (due to location of overflow pipe) is ~45 minutes at 25	PNE	Out of specificity and Water	Veolia	°		LOW	Leven monutor and stantistic control outlet valve from chlorine detention tank Additional contact time available in recycled water tank, network and network storages	recutral	Per.	1	3	LOW	
	1	specifications/expect ations	z.	ML/d = -55 minutes at 20 ML/d		Note: The CT time for 45 minutes contact time at 0.7 mg/L chlorine (the lowest contractually acceptable residual) and a haffling factor of 0.3 is 9.45. This is still more than sufficient to	1				Lowest possible level is overflow level (45 mins time at 25 MLD)						
	1		1			claim 4 log reduction in bacteria and viruses, which is what is being claimed for this scheme.											
Che-'	12 Chemical	RW not meeting the	1	Formation of disinfection by-products	Nil	Recycled water containing unacceptable disinfection by-products	Veolia	0	3 1	Low	Control of the disinfectant dosing.	Effective	NIL	2	1	Low	Consequence after mitigation reduced due to level of treatment - surely reducing significantly the
	1	quality				Note: The Australian Drinking Water Guidelines set a very conservative guideline of 0.25					Water quality monitoring by both VW (monthly THM test) and AquaNet						contaminant level in RW if not totally.
	1	ations	-			consumption of 2 L of drinking water per day. The highest level of exposure identified in the					controls are in place to control the uses of recycled water (non-drinking uses). For the purposes of this ris	k.					
	1		1			exposure assessment carried out for this project was 1L/annum. The recycled water would therefore need to contain around 180 mg/L of THM to cause the same exposure as 0.25					t is considered inherent that the recycled water is not for drinking use. The possibility of recycled water being used for non-approved uses is assessed elsewhere.						
	1		1			mg/L in drinking water. This is completely beyond the realms of possibility for the recycled											
	1					water, which will have a total dissolved solids concentration or < ou molt.			·								
_																	

nswfai Risk	nn ed RWP Register - E	nvironmen	ntal										
Risk As: Risk Rei	sessment Conduct aister Owner:	d On:	26/11/2019 Phil Birkby (Operations Manager)	Important Note This risk-assessment was conducted for the Rosehill Recycled Water Scheme (RRWS) from the inlet to the Fairfield Advanced Wate Versioned Refer (CMMTR) to the device under the superscript to a superscript.	r								
Risk As	sessment Team (in	luding job titles):	c Veola - Phil Birkby (Operations Manager), Violeta Wypich (Business Systems Advisor), Hannah Norris (Operations Supervisor) Average - Paid Day (Risk & Campings Officerand Company)	I reatment Plant (PAW IP) to the delivery point to customers.									
Busines Rick Cal	s Unit:		Rosehill Recycled Water Scheme (RRWS)										
Last Ris Next Rev	k Review Date: riew Date		26/11/2019 26/11/2020										
	Environmenta	Aspects	F	RISK IDENTIFICATION Risk Description	Current Situation (not	Inherent Rick evel	RISK ANALYSIS Controls		Residual Risk Level	RISK EVALUATION RISK TREATMENT	Re	RISK TARGET	nt .
R Bus ef Cat	iness Bus egory Aspect	ness Activi Hazard Task	ity/ Risk/Opportunity Description k/ (What can go wrong or what opportunities does Veolia have	e) (What happens if the risk occurs) Owner	Previous Incidents Likelihood and lessons learnt?	Consequence Inherent Risk Inherent Signif Level Risk Rating aspe	cant Existing Controls I ct? What existing controls are in place?	Heirachy Control Supporting Documents Li of Effectiv and records	kelihood Consequence Residual Risk Residual Level Ratin	IRisk Acceptable High or Risk to be Risk Further Mitigation	Action Owner Actio Action Like	elihood Consequence Projected Projected Risk Level Rating	lisk Comments
N 0.		Jot	b			= Likelihood x Yesi Consequence	No	Control eness	= Likelhood x Consequence	(YIN) Rink the (Active Jutifical Corporate or Rink Refired) Register (YIN)	Date and Progres S	= Likelihood x Consequenc e	
1 Envir	onment Air	Feed balanc tank	Poor quality effluent from Sydney Water treatment plants entering to raw water tank	the Generation of offensive adours Pear. Department of Planning approval Manager	3	3 9 Medum No	On-Ine monitoring of raw water quality and ability to stop accepting raw water if of very poor quality. Chioraminatinon Covered tank with ventilation	Effectiv e	2 3 6 Medum	Y IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII		0 Low	
2 Envir	onment Air	Feed balanc tank	Long retention time in feed balance tank leading to degradation of plant feed (eg.during shutdown)	Generation of offensive oxfours Plant, Department of Planning approval Manager PGE0 Act	3	3 9 Medum No	Ability to slowly drain freed balance tank to wastewater pit and send to trade waste. Ability to disubge tank. Side tank accesses for tank cleaning and roof inspection hatches Ability to recirculate tank through UF freed pumps Ability to shock dose with chlorine.	e	2 3 6 Medium			0 Low	
3 Envir	onment Air	UF systen	Aerated backwash of UF cells giving rise to contaminated mists/vapours	Generation of offensive odours Peter Chuse 2.2 Department of Planning approval Manager Section 129 of POEO Act	3	3 9 Medum No	Don't accept poor quality water into plant. Dosing chievamines Regular CEWs and backwashes maintaining quality of membranes and preventing poor quality backwash water. UF utils are indoors.	Effectiv e	2 3 6 Medlum	Y IIIIII		0 Low	
4 Envir	onment Air	UF CI system	P Chlorinated UF CIP in open tanks	Generation of childrine furmes Plant Department of Planning approval Manager POEO Act	3	2 6 Medium No	Staging of CEB system to avoid aeration during chlorine soak (which would increase chlorine fumes) CEWB scheduled to only clean one cell at a time to limit chlorine vacours	Effectiv e	2 2 4 Medum	×		0 Low	
5 Envir	onment Air	Chemi deliver	ical Minor releases of chemicals ries	Generation of chemical odours outside plant boundary Plant Clause 2.8 Department of Planning approval Manager Section 129 of POEO Act	3	3 9 Medium No	Design of chemical unloading facilities to minimise chemical releases Chemical facility on southern boundary where there are less potential impacts to neighbours	e Effectiv	2 3 6 Medum	×		0 Low	
6 500		Draw	nie Rudaniae aminina of CAN by the desease	Providence are relation Plant N/PDP			Chemical uncaring procedures developed to minimise chemical releases and odours Ammonia vacours cachared in a vacour trae (durino delivery or pressure release) No avection, de oriente la device of la cardi COC	No				0	
7 Envir	onment Air	a Degas	sser Misting from degasser tower.	Localsed miss of unchlorinated, low pH recycled water. Plant Department of Planning approval Manager Plant Department of Planning approval Mercycled water. Plant Department of Planning approval	4	2 8 Medum No	Screening around top of degasser to minimise misling.	control Effectiv	2 2 4 Medum	· · · · · · · · · · · · · · · · · · ·		0 Low	
8 Envir	onment Air	Neutra	alis Non-compatible chemicals entering the neutralisation pit	Generation of noxicus fumes (e.g. chlorine or ammonia) Plant Department of Planning approval Messager PDFC Act	5	4 20 Extreme Yes	Tower board of an idde of site, furtherst from plant boundaries. Control philosophy prevents non-compatible chemicals from entering the net traitsation nit (interfocts on moressess motivition mon-compatible chemicals)	Effectiv	2 4 8 Medium	v l l l		0 Low	Consequence reduced due to lower volumes of fume-generating chemicals exteriors the perit rit
							Analysers on neutralisation system to determine the current content of the neutral Valve on chemical unloading bay drains preventing unexpected discharge.						
9 Envir # Envir	onment RETIRED	Operai al equipn t	tion Excessive noise generated from operational equipment. Largest drives outside building are degasser fan and UF feed pumps. Insid men buildings are Aqualket pumps (pump station), RO feed pumps, UF filtrate and backwash pumps, blowers and compressors. Large	e Noise nuisance Part Nanager Clause 2.5 of Department of Planning approva	4	3 12 High Yes	Noise survey conducted before and after implementation of noise barriers. Survey showed barriers adequately reduced the noise to an acceptable level No noise compains ince implementation. Landscaping - trees along boundary	Effectiv e	0 Low 2 2 4 Medum	Y I I I I		0 Low 0 Low	Consequence reduced due to implemented noise barriers
# Envir	onment Noise	Deliver	values opening and snamp (eg mer value, values a dound mer anix rile Excessive noise generated from truck deliveries	Noise nuisance Plant Clause 2.5 of Department of Planning approval Namager PCEO Act	4	3 12 High Yes	Collisator Inaligencia: 2019 - registement of FBT LCV which was contributing to noise levels at the UF feed ourses due to cavitation. New valve sicnificantiv caler in coentation Deliveries exclusively accepted during business hours WMA monitor contractors and noise generation Tracks are required to combywith RMS frequestors.	Very Effectiv e	1 3 3 Low	¥		0 Low	
# Envir	onment Stormwater	Storm	wat Stormwater contamination due to burst, leaks or overflows of any pipe or vessel containing untreated or partially treated water, treate	Degradation of quality in receiving surface waters Plant POEO Act Manager	2 Incidents - 4 12/07/2013: Release of small	4 16 Extreme Yes	Delivery on the opposite side of the plant compared to the residence Delivery trucks do not use the engine for delivery (They use the power from the chard) Overflow lines from process tanks are directed to the wastewater pit, which is discharged to tradewaste. (Exception: the detertion tank overflows at high level to	Effectiv	2 3 6 Medium	×		0 Low	
			water (note: chlorinated), neutralisation waste or wastewater.		volume of RW by an pressure relife valve		the recycled water tank and at high high level to the feed tank, the recycled water tank has no overflow line and will overflow back to the feed tank, via the detention tank).						
					permeate due to failed gasket		High area in waste pri intates part snutown. High and high high level alams on all tank - interlocks shutting down relevent processes on high tank level. Cover in process controls will excite in identifying nine hunte.						
					liner was not as specified - the liner developed cracks, leading to significant leaks.		OSD basin outlet valve normally closed to prevent uncontrolled discharge (manually opened to allow controlled discharge) Routline maintenance to maintain integrity of plant assets.						
					Following initial spill, area was bunded and continued leak was captured and pumped to		Availability of spill capture equipment eg, sand bags, diaphragm pumps, spill socks etc to capture and send to Waste Water pit						
# Envir	onment Stormwater	Storm	wat Stormwater contamination due to site activities (e.g. oils and greas	ses Degradation of quality in receiving surface waters Plant POEO Act	waste water pit. 3	3 9 Medium No	Spill kits on site and operators trained in their use.	Effectiv	1 3 3 Low	Y		0 Low	
		er	from maintenance activities)	Manager			Stormader Drains are labeled No large quantities used on site Contractors management (induction, permit to work, JSEA, etc.)	e					
# Envir	onment Stormwater	Storm	wat Stormwater contamination from site storages (e.g. oils, greases, paints)	Degradation of quality in receiving surface waters Plant POEO Act Manager	3	4 12 High Yes	Monitorina of adormwater prior release Flammable/grease/paints cabinets are internally bunded Spill kits on site and operators trained in their use.	Effectiv e	1 3 3 Low	Y IIII		0 Low	
							Stormaster Drains are labeled No large quantities stored on site (no oil storage >155L) Contractors management (induction, permit to work, JSEA, etc) Monitories of anisympton paracetoria						
# Envir	onment Stormwater	Storm	wat Volume of stormwater exceeds system design	Localsed flooding Plant Department of Planning approval (clause 2.23) Manager	Jan 2019 - overflow of 1 stormwater basin due to back up of creek water in storm	3 3 Low No	Booling as accurate provide the relative Weather station and CCTV-monitoring See comments for plant desian for filodina. Plant desian considered to be inherent.	Neutral	1 2 2 Low	A. A		0 Low	Flood studies carried out during plant design; Plant layout designed for carrying of flood water through site ring-road. Consecuence reduced.
# Envir	onment Waste	Waste	ewa Generation of waste and disposal of trade waste not in accordance	e Breach of trade waste discharge consent, thus leading to indirect impact Plant Trade waste discharge consent	event 4	3 12 Hah Yes	Rainwater captured during rain periods Monitoring of tradewaste discharge (online and through autosampling) to ensure	Effectiv	1 33 Low	Y		Low	
		ter pit	with the trade waste discharge consent	onto the sewage treatment plant process Manager Possibly resulting in SW discharging downstream unacceptable water			that it is within specification; Monthly reporting to SWC. Provision of caustic dosing for pH correction at wastewater pit;	e					
				quality			Chemical waste neutralised prior to being sent to wastewater pit; Provision to recycle from wastewater pit to neut pit if further neutralisation is required;						
							If out of specification raw water is the cause of out of specification trade waste, provision to not accept out-of-specification feed from SWC; Provision to turn down plant production If required to meet trade waste specification.						
# Envir	onment Waste	Staff	Deterioration of waste bins and or bin filling up with water during rai	in Loss of rubbish containment - polution Plant	3	2 6 Medum No	Plant can be shut down (exemptions can be sought from SWC) Bins covered and regularly emptied. Dive down as bins to be sought to be sou	Very	1 2 2 Low	v l		Low	
# Envir	onment Waste	Staff amenit	Inappropriate disposal of toner and printer cartridges ties	Waste to landfill increasing our ecological footprint and wasteful use of Plant reveable resources Manager Man	3	2 6 Medum No	Declarated bin to collect and dispose of toners/cartridges Declarated bin to collect and dispose of toners/cartridges Declarated bin to collect and dispose of specialty and an advantation	Very effectiv	1 2 2 Low	Y		Low	
# Envir	onment Waste	amenit	Inappropriate disposal of vaste oils and creases	Viewal to man increasing our occupier roughin and marked allocation Manager Contamistion of domestic seasone trade waste or stormalter with oils. Plant	4	3.12 Hab 201	declarated on a concern support on recyclicate and cominged mane Waste separation on site Waste separation cant of the induction Contractors are resonable for discosion of the waste they may have neverated	effectiv e	1 33	· · · · · · · · · · · · · · · · · · ·		Low	
		operat s		and grazes. Manager			Oligrease wate containers available on site Degreaser walkable in the workshop JSEA - permit to work - procedures, etc Retention at the stormwater pit and monitoring of stormwater	effectiv e					
# Envir	onment Chemical	Storag	ical Spill or leak of chemical from pipes, tanks, or tank collapse. Inappropriate tank liner or tank material resulting in tank leak/faiture/collapse	Contamination of stormwater/land Plant Dangerous Goods Act Flooding Manager POEO Act	12 Incidents : 4 14/12/2014: A leak in the neutralization pit pipework	5 20 Extreme Yes	Bunding on all bulk chemical storage tanks able to hold 110% of tank volume and designed to AS3780. No drainage from chemical bunds - manual pump-out. Collapse is unlikely in the case of material issues (e.g. linerimaterial) - leak rather designed in the case of material issues (e.g. linerimaterial) - leak rather designed in the case of material issues (e.g. linerimaterial) - leak rather designed in the case of material issues (e.g. linerimaterial) - leak rather designed in the case of material issues (e.g. linerimaterial) - leak rather designed in the case of material issues (e.g. linerimaterial) - leak rather designed in the case of material issues (e.g. linerimaterial) - leak rather designed issues (e.g. linerimaterial issues (e.g. linerimaterial) - leak rather designed (e.g. linerimaterial issues (e.g.	e	3 2 6 Medum	×		Low	Likelyhood reduced through the selection of better piping material (neut pit). Consequence reduced because the volume of the spill would be reduced through posterior and posterior divible the facility.
					approximately 150 L water with a low acido pH (pH 4-6). 26 June 2013 11 June 2013 19 June 2013		Spill and chemical handling procedures developed. Spill kits available and staff trained to use them Chemical chemes way is converted (rain proof).						enough componingascies and consamed worth the raciny
					/2013 / 07/1/2014 / 7/6/2014 / 16/7/2015: Leak in VP1 hypo dose line		Regular inspections and maintenance of pipes Tank inspections and integrity tests Some chemicale difficulty fests						
					26/10/2012: Failure of the sodium hypochlorite dosing line at the LAP sample coarse		Desing control Selected chemicals used only Staff trained in chemical handling						
					filter 14/12/2015: leak in the ammonia line located in the		SCADA alarms indicating potential loss of chemicals. Chemical bunds have level sensors which would trigger alarm.						
					ammonia bund. 17/02/2015: The pipework of the sodium bisufite (SBS)								
					dosing system was accidentally damaged by an contractor.								
					15/01/2015: Minor spill ammonia contained to the bund during maintenance								
					repairs 25/10/2012: The Ion exchange regeneration pump								
. Carlo		Chara	in President self during technic ortenting as increased unabelian	Contraction of alternative local	was leaking acid solution		Technologia dan berstende bedant at lin ida bernatik denkar atandar ber	Citer to					Concernation of boundary discussion of the cold second second
# 2100	onneni Chemicai	deliver	ry	Contamination of sournwater/saind Plain Darigetous Goods Act. Manager POEO Act.	13/11/2013: The lock ring on the sodium hypochlorite		Tarker unloading buy soper to unext an equits to specified anker discaring buy drains. Tarker unloading buy drains sent to neut pit, with valve to allow control of discharge from threads unloading how to neut it.	e	3 39 Medum			LOW	through control measures
					failed during a chemical transfer delivery.		Unloading points located inside bund. Unloading procedure (and staff training) including: Brivation through of chemical lines.						
							Hose-out procedures for unloading bay; Spill procedures for unloading bay; Spill kits;						
							Drivers supervised at the start and end of procedure (currently throughout entire delivery). Chemical delivery induction.						
# Envir	onment Chemical	Labora y	ator Inappropriate disposal of reagents down laboratory drains	Contamination of domestic sewage or trade waste with unacceptable Process Trade waste discharge consent Chemicals	5	2 10 High No	Lab drains all go to next pit. One drain has acid trap. Spectropholometry test cells content is returned to supplier (that represents the buk of the chemical waste in the lab)	effectiv	3 1 3 Low	Y I I I		Low	Consequence reduced because the volume of the spill would be reduced through control measures
# Envir	onment Chemical	Chemi	ical Excessive chemical usage (more than required to meet performan	ce Increased load on receiving environment and increased carbon footprint Process	3	2 6 Medum No	Other hazardous chemicals are collected and regulariey send out for disposal Staff trained to secarate and discose chemicals accrooniately Flow-controlled chemical doxing systems and on-line analyzers	Effectiv	2 2 4 Medium	v		Low	
		usage	: wigos)	Ergineer			www.why cnemical consumption reporting Dedicated process engineer for site - job description includes process optimisation. Continuous improvement procedure	e					
# Envir	onment Resource r	anagement Water use	r Leakage of water from pipes, taps and fittings	Contaminant entering receiving environment Plant Manager	1 Incident: 4 2018-2019: Recycled Water Isoking from - Income inc	2 8 Medum No	Some of the service water comes from rain water to reduce use of potable water resource Provide instructions - look provide and and and a	Neutral	3 2 6 Medium	Y		Low	
					eaking from unknown pipe (either RW tank inlet or Pumping stations' outlet (PWV). Source of the het '		Crigonig inspections - leak monitoring and capture						
# Envir	onment Resource r	anagement Water	r Use of excessive water around site and in the administration building	ing Wastage of resources Plant	(rwy)- source of the leak is being identified 3	2 6 Medium No	Toilet flushing system uses rain water to reduce use of potable water resource Some of the sension water convertions rais water to reduce a distribution	Effectiv	2 2 4 Medium	Y		Low	
		use		The second secon			resource Dual flush system in place Native plants and turf chosen to minimise irrication use on othe						
# Envir	onment Resource r	anagement Plant	Inefficient operations of the plant, leading to intake of greater	Depletion of a resource that could be used for further recycling. Plant Contractual maximum raw water intake of 32 M	LIG 4	1 4 Medium No	Drip inigation system Overall ootable water consumption monitoring monthly Plant optimisation	Effectiv	2 1 2 Low	Y		Low	Currently no other users for this water source. If additional users
# Envir	onment Resource r	feed water anagement Plant	volumes of raw water than necessary to produce recycled water. Waste through sample panels, excessive backwashing etc. Energy inefficient equipment in the water recycling process or not	Manager (also trade waste discharge limit) Depletion of non-renewable resources and generation of greenhouse Plant NGERS	4	3 12 High Mes	Plant performance monitoring (reports, etc) Plant performance monitoring	e Effectiv	3 2 6 Medum	Y		Low	identified, consequences of this risk may need to be reviewed.
		operat s	tion operating equipment at its most energy-efficient point	gazes Manager			Plant optimisation - membrane cleaning, etc Maintenance (preventative) Plant designed to reduce power usage	e					
							VISUS on pumps Power usage displayed on SCADA Review of power consumption overall (invoice) Powerer Benott						
							Plant Efficiency decreases with low flows and optimisations utilised to adapt to flow conditions						
<u> </u>		1	•	· · · ·	· · · · · ·			· · 1					

# Environment Resource management	General site and office	Energy inefficient appliances in the admin building and inefficient use of site lighting	 Depletion of non-renewable resources and generation of greenhouse gases 	Plant Manager	NGERS		4	28	Me	sdium	No	Site lighting was redexigned to allow individual switching of the street lights Most of the lab exignment is turned off at night Printer automatically shuts down when not used for x hrs Programmable lighting system allowing you to put lights on timers, sensors etc Toletis have sensor lights	4	e e	3	26	Medium	Y		
# Environment Resource management	Site air conditioni ng	Unnecessary or excessive air conditioning or forced ventilation in process building (store-room and workshop) and admin building.	Depletion of non-renewable resources and generation of greenhouse gases	Plant Manager	NGERS		4	28	Me	dum	No	Zoned air conditioning and admin building separate from process building Preventative maintenance - servicing BMS (Building Mc System) monitoring the temperature (AIC) and regulating	0 Q	Effectiv	3	26	Medium	Y		
# Environment Resource management	office administr ation	Excessive paper use and waste	Depletion of non-renewable resources; excessive volumes of waste sent to landfil	Plant Manager			4	28	Me	dium	No	Printers set to default to double-sided printing Use of recycled paper Staff awareness Access to documentation on-line (BMS)	9 W	e	3	2 6	Medium	Y		
# Environment Resource management	Plant operation s	Excessive resource use and wastage	Depletion of non-renewable resources; excessive volumes of waste sent to landfil	Plant Manager			4	28	Me	dium	No	Staff awareness Refurbishing/recycling of equipment whenever possible	4	e	3	13	Low	Y		
# Environment Resource management	Procurem ent	Inappropriate vehicle or mobile equipment choice/use or inefficient maintenance	Increased resource/fuel use and increased greenhouse gas emissions	Plant Manager	NGERs		4	28	Me	dum	No	Gas forklift Electrically powered tools (rather than fuel generators) Tool inspections imaintenance Vehicle semicing Fuel consumation recording		e	3	26	Medium	Y		
# Environment Landscape/Vegetation	Landscap	Uncontrolled weed and grass	Deterioration of vegetation on-site Visual pollution (amenity) for the nearby residents and staff/visitors	Plant Manager			5	2 10	Hig	3h	Yes	Gravel areas have a hard base underneath (compacted) to mininise weed growth. Preventative maintenance conducted fortnightly by landscaping contractor Landscaping designed to be environmentally friendly (selection of vegetation + milch)	6	e	2	12	Low	¥		
# Environment Landscape/Vegetation	Pesticide/ herbicide/ fertiliser applicatio	Overuse of pesticides, herbicides or fertilisers	Runoff to stormwater, contamination of groundwater, deterioration of soils destruction of fitra Visual pollution (amenity) for the nearby residents and staff/visitors	s, Plant Manager			5	2 10	Hig	ph	Yes	Contractors are responsible for managing the pesticide/chemicals usage Monitoring and reporting of pesticide usage Stormwater relation on site Stormwater quality monitoring program		e e	2	1 2	Low	Y		
# Environment Landscape/Vegetation	Stormwat er basin	Deterioration of vegetation lining system within OSD basin	Erosion and potential contamination of stormwater (off-site to waterways) Visual pollution (amenity) for the nearby residents and staff/visitors	Plant Manager	Landcom stormwater guidelines		2	36	Me	sdium	No	OSD basin lining design and selection of lining vegetation Preventative maintenance Erosion repairs when required Routine insections		Effectiv e	2	2 4	Medium	Y		
# Environment Landscape/Vegetation	Landscap	Clearance of vegetation	Disturbance of vegetation, loss of biodiversity, deterioration of visual amenity of plant and noise buffering provided by vegetation.	Plant Manager	Fairfield city council, dpt Planning		4	3 12	Hig	≱h	No	Landscaping management plan in place (incorporated in the EMP)		Effectiv	1	2 2	Low	Y		
# Endroment Premises	Site	Accidental file	Detected of building and ration explosion (the water database to environment constrained with advectorer Enters to local community Enter to local community Price spreading to local building	Plant Manager	POED As	1 Indiant: 1002013: Fee starting to spread on garden had (dty contractors discarding a contractors discarding a cigarette but	2	5 10	Hg	gh	Yes	Fire decides system including similarity to the trigule Fire adoptation on the Fire adoptations on the Comparison of the comparison of the trigule DSS analable on the more deviced stratege to DSS analable on the more deviced stratege to Fire Biggian visited for for familiariation Fire Biggian visited for the deviced calabrets Fire Biggian visited for the deviced for the deviced calabrets Fire Biggian visited for the deviced for the deviced calabrets Fire Biggian visited for the deviced for the deviced calabrets Fire Biggian visited for the deviced for the deviced calabrets Fire Biggian visited for the deviced for the deviced calabrets Fire Biggian visited for the deviced for the deviced for the deviced calabrets Fire Biggian visited for the deviced f			1	4 4	Medum	Y		
# Environment Premises	Site	Pest infestation in buildings and surroundings	Waste generation Impact on flora and fauna	Plant Manager			4	28	Me	dium	No	Vermin proofing on building Regular bailingipest control program General housekeeping	4	e e	3	13	Low	Ŷ		
# Environment Premises	Pest	Excessive use of baits or traps not laid correctly	Risk to native fauna	Plant			з	3 9	Me	dum	No	Bait stations are purposefully designed and regularly serviced	8	Effectiv	2	2 4	Medium	Y		
# Environment Premises	Access to	Vandalism/graffiti Litter thrown over the fence	Visual pollution	Plant Manager			4	28	Me	dum	Yes	Site security: fences, security system (CCTV), plant lighting, security patrols, etc Screening on windows of admin building Concision space of each of dominion	1	Very effectiv	2	2 4	Medium	Y		
# Environment Premises	Access	Intrusion on set leading to potential discharge of untreated water to	Degradation of land and water quality/ visual pollution	Plant			3	3 9	Me	dum	Yes	Notifier inspections and clean co- Site security: fences, security system (CCTV), plant lighting, security patrols, etc.		e Very	1	3 3	Low	Y		
# Environment Land	Site	Any digging coulte	Contact with and possible liberation of contaminated land (aubestos)	Plant Manager			5	5 25	Ea	teme	Yes	Determined on the other state to the state of the state o	0	e e	1	4 4	Medum	Y		
# Environment Networks	Site - Network	Lank of Recycled Water from pipes, tanks, values	Discharge to environment (mexik, parks, receiving wellers)	Plant Manager	PGEO As		3	39	Me	dun	No	High quality recycled water with research anivometic containments or QCOTOCo.click.gl to those and to advalled up ad fact care exercise Regular provide mailterman. Expections and choice carried of an all assess. Regular provide mailterman, paped on and choice carried of an all assess. Regular provide mailterman, paped on and choice carried of an assess. Regular provide mailterman, paped on and choice and choice and mainterman. Regular provide mail the face is some control result. Regular paths. Regul	2	Nestral	2	36	Medum	Y		

'	
, ,	
' '	Wastage volume reduced through awareness (consequence reduced)
, ,	
,	Reduced volume of damage through controls (consequence reduced)
,	Reduced volume of damage through controls (consequence reduced)
, ,	Appropriate vegetation has been selected to minimise likelihood of erosion
·	Reduced volume of damage through controls (consequence reduced)
	Consigures induced transits to control measures reaking the fre impact allogather (early intervention, etc.)
'	consequence reduced because volume reduced through control measures
·	consequence reduced because volume reduced through control measures
'	
'	
	Remediation work done according to expert recommendation Further antitworks ontile are unlikely. Residual risk was originally high and raised to management (Alex Lagry). Risk rating was originally based on the work case scenario for both likelihood and consequence. The control measures are considered to be effective, based on historical results.
	Controls relace likitiood of failures, bit do not reduce consequence

NSW/Fairfield RWP

Risk Register - Strategic, Operational, Compliance

Initial Risk Assessment Cond	26/11/2019	Important Note
Risk Register Owner:	Phil Birkby (Operational Manager)	This risk-assessment was conducted from the aspect of
Risk Assessment Team (inclu	Veolia - Phil Birkby (Operations Manager), Violetta Wypych (Business Systems Advisor), Hannah Notris (Operations Supervisor) Aquanet - Brad Rea (Risk & Compliance Officer and Company Secretary), Craig Heidenreich (General Manaer)	Recycled Water Delivery to AquaNet e.g. water delivery between the Detention Tank and the Recycled Water Storage tank at the Fairfield Recycled Water Treatment Plant. At this point, the recycled water passes the last control/quality monitoring point of the Recycled Water plant
Business Unit:	Rosehill Recycled Water Scheme	
Risk Category:	Strategic, Operational, Compliance	T
Last Risk Review Date:	26/11/2019	T
Next Review Date	26/11/2020	

		R	SK IDENTIFICATION							RISK ANALYSIS								RISK E	VALUATION			RISK T	TREATMENT			RISK TAR	GET		
Enviror	mental Aspects		Risk Description			Current Situation		Inherent Risk Level		Controls					Residual Ris	sk Level		Just	tification			А	Actions		Residual Risk a	after Additional	Controls (Not Man	ndatory)	
Ref No.	Busines Activity s Task / Category Job	Risk/Opportunity Description (What can go wrong or what opportunities does Veolia have)	Risk Impact/Consequence (What happens if the risk occurs)	Risk Owner	Legal and Other Requirements	Previous Incidents Like and lessons learnt?	telihood Conse	quence Inherent Risk Level Ris Consequence Rational Ratio	rent Significan sk aspect? ing Yes/No	t Existing Controls What existing controls are in place?	Heirachy of Control	Control Effectiveness	Supporting Documents and records	Likelihood	Consequence	Residual Risk Level = Likelihood x Consequence	Residual Risk Rating	Acceptable? High or (Y/N) Sustification	Risk to be included in the Corporate Risk Register?	Risk Status (Active or Retired)	Further Mitigation	Action Owner	r Action Due Date	Action Stat and Progre	us ss Likelihood	Consequence	Projected Risk Level = Likelihood x Consequence	Projecte d Risk Rating	Comments
1 1	Business	Alternative third party supplier of recycled water in Western Sydney competing for inductive infinitesian information reached waters	Inability to gain additional customers for recycled water (sales impact) and prevent expansion of the scheme communic advect from 20 to 25 MI D)	Plant Manager		1	3	3 Low		20 years contract in place and take or pay covering plant coast repayment + margin Established operation and WICA licence		Effective		1	2	2	Low 2	8	(Y/N) No	Active	N/A	N/A	N/A	N/A			0 Le	ow	
2	Business	Public health incident, serious operational incident a end users' sites (ie water not suitable for end use).	(Expansion of plant form 20 to 20 wED) tt Issues at Rosehill: water recycling less acceptable to the public, the government or end users.	Plant Manager		3	4	12 High		Water Could manufacture in users Water Could Management Plan: Systemy Water and AquaNet relationship with end users - clear expectations of quality and impact of rescrictly water		Very effective		1	4	4	Medium 2	2	No	Active	N/A	N/A	N/A	N/A			0 Le	ow	
3	Susiness	Change of state government or federal government	New state government or federal government chooses	to Plant Manager		2	5	10 High		Clearly specified water quality, quantity in WICA plans and contract Documented suitable end uses in the retail agreements. Education of client during project development Contract with AqualMet and contractual protection		Effective		1	4	4	Medium	8	No	Active	N/A	N/A	N/A.	N/A			0 6	ow Co	Contractual relief from project being canned, but unlikely to cover all Veolia
4	lusiness	intervention in water issues Communications with external parties (eg media) th are not approved by Corporate Affairs department and/or not communicated to/ agreed with	cancel recycled water projects or stops supporting it. at Client relations - impact on relationship with AquaNet/ Sydney Water Adverse media	Plant Manager		3	3	9 Medi	200	PPP Corporate induction/training Communications/media procedure PR-ANZ-11-445		Effective		1	3	3 1	Low 3	2	No	Active	N/A	N/A	N/A	N/A			0 Le	. <u></u> w	costs and will not cover lost profit.
5 1	lusiness	AquaNet/Sydney Water Deterioration of relationship with AquaNet	Incorrect information in the media or with other externa parties. Contract is not extended after 20 years and/or AquaNet chooses a different partner to expand the scheme or for future scheme ar	l Plant Manager		3	5	15 High		Interface agreement with AquaNet Customer satisfaction monitoring through regular meeting (PCG and Ops Interface meeting) Opcontor magnitude with clined		Effective		1	5	5	Medium 2	8	No	Active	N/A	N/A	N/A	N/A			0 Le	ow	
			num somerna.							Park A Operating Protocols developed to ensure effective communications in place during operations. Organing celebration of success. Expansion of scope to take on O&M of Network demonstrating that WUA (Aquanet) have confidence in our operation capabilities																			
6 1	Business	AquaNet is unable to sign up additional customers AquaNet cannot expand the scheme to greater that 20 ML/d	Veolia unable to increase revenue	Plant Manager		4	1	4 Medi	.m	None		No control		4	1	4	Medium 8	8	No	Active	N/A	N/A	N/A	N/A			0 Lo	ow Th O8 cli	The 2019 asset sale to WUA removes the capital risk, now operating under an D&M model. Production and capacity to expand rely on customer and new client appetite for growth.
7	Business	AquaNet is unable to sign up additional customers	AquaNet (or Sydney Water) chooses to terminate the scheme after 20 years due to lack of financial viability : and if demand is not sufficient (e.g. customers ceasing using recycled water). AquaNet/Sydney Water may choose to terminate the scheme before the end of the 20 waves context OIB to require the project to be notified.	Plant Manager		2	4	8 Medi	am	Vecial works with AquabHa and Sydney Water to expand the scheme and sign up additional customers and/or find attematic explorations. As of 2019, WLM have taken ownership of the scheme and have indicated strongly that they wish to grow the scheme in the future.		Neutral		1	4	4	Medium 8	8	No	Active	N/A	NIA	N/A	N/A			0 Lt	ow No	No captial risk to Veolia
8 1	lusiness	AquaNet is unable to sign up additional customers	balled (reduced revenue either way) AquaNet chooses to sell the project to a third party (ma be competitor or may require renegotiation with new partner channe of relationshin)	y Plant Manager		3	3	9 Medi		Scheme has been sold as of 2019 to WUA		No control		2	3	6 1	Medium 8	8	No	Active	N/A	N/A	N/A	N/A			0 Le	ow	
10	lusiness	Rapid loss of key staff for project (eg Project Manag for D&C, Plant Manager, Process Engineer with Ion	er Loss of knowledge of project history and technical knowledge	Plant Manager		3	4	12 High		Position descriptions include relief coverage Documentation of project history, technical data storage, procedures		Effective		2	3	6	Medium ^B	8	No	Active	N/A	N/A	N/A	N/A			0 Lc	ow	
		history on project).	Loss of dirent relationship							Nequirement for four weeks' notice Rapid hing of replacement staff / able to use Corporate support staff as temporary hand-over Regular reporting Knowledge sharing across the business and the local team Best endeworks to maintain a codo worklade team solit																			
11	lusiness	Negative media relating to project	Impacts reputation among other current or potential future clients in Australia	Plant Manager		3	4	12 High		Incident management procedure Media and communications procedure Corporate affitis department All appropriate OHS, environment, water quality procedures (preventing any reportable incident occurring		Effective		1	3	3 1	Low 3	8	No	Active	N/A	N/A	N/A	N/A			0 Le	ow	
12	lusiness	Negative reputation in water industry (among	Difficulty in gaining new business development	Plant Manager		3	4	12 High		to begin with) Established and proven operation period with no contractual guality or supply incidences Technically - robust design incorporating lessons learned from similar project in Wollongong		Neutral		1	3	3	Low 3	8	No	Active	N/A	N/A	N/A	N/A	_		0 La		
13	Business	potential clients) due to technical issues with plant commercial issues Relationship with Sydney Water on this project cou affect relationship with Sydney Water on other	r opportunities due to poor reputation among potential clients d Difficulty in gaining new business development opportunities or deterioration of relationship on other	Plant Manager		3	4	12 High		No commercial controls in place - dependent on people and strategic decisions at the time. Established and proven operation period with no contractual quality or supply incidences Interface agreement with Sydney Water Customer satisfaction surveys - when required only Description of unservice for environments.		Neutral		1	2	2 1	Low 3	8	No	Active	N/A	N/A	N/A	N/A			0 Le	ow	
14	Business	Projects or as prospective client for tuture projects Relationship with AquaNet on this project could affer relationship with AquaNet on other projects or as a prospective client or nather for future projects.	existing contracts ct Difficulty in gaining new business development opportunities	Plant Manager		3	2	6 Medi	200	Positive leedback so are Regular linetace Meetings with SW for both parties to communicate issues quickly Induces a satisfication so when required only Dirotition feedback so for Dirotition feedback so for		Neutral		1	2	2 1	Low 3	2	No	Active	N/A	N/A	N/A	N/A			0 Le	ow	
16	lusiness	Poor community perception of the project	Complaints to Dpt Planning or other authorities Negative media coverage; Political - Sydney Water concerns re community	Plant Manager		3	3	9 Medi		Regular communication and cooperative relationship established during transition Community relations and complaints handling procedure DoP guidelines include noise restrictions to prevent noise nuisance with neighbours Improvements made to reduce noise and visual pollution (lighting)		Effective		1	3	3	Low 3	8	No	Active	N/A	N/A	N/A	N/A			Le	ow	
17	lusiness	Deterioration of relationship with government	perception Vandalism	Plant Manager		3	3	9 Medi		No complaints after improvements made zero complaints since Lan 2012 at least community open day Nov 2012 - no neighbours tum upicall up to complain (opportunity was provided to voice anv issues) Incident management non-white		Neutral		1	2	2	low 3	8	No	Active	N/A	N/A	N/A	N/A				000	
		authorities such as IPART and Dpt Health and Dpt Planning and Fairfield Council (and other councils o LG)	required. Difficulties on future relationships requiring approvals by relevant gvt departments.	r ian manager						Reporting to PART for WICA Reporting to PART for WICA Pro-active in communications with regulatory departments IPART and DoP invited to workshops for plans under WICA licence. IPART relaxed auditing frequency to 2-yearly (instead of yearly) for good compliance track-record		inclus a			-			-					1075						
19 1	Business	Risk that CPI does not accurately reflect increases i costs (eg key items such as electricity or wages or membrane costs increase in price more quickly tha anticipated by the contract).	n Unable to meet IRR for contract	Plant Manager		3	3	9 Medi	.m	Assumption for electricity in financial model added additional escalation over CPI Confingencies added during budget development Note: This is risk shared across the whole company		Neutral		2	2	4	Medium 5	8	No	Active	N/A	N/A	N/A	N/A			Le	ow	
20 1	operational	Foreign exchange risk during membrane replaceme campaign (primarily RO) Restricted access (external to site and internal) for	Inability to receive chemicals or other supplies	Plant Manager Plant Manager		3	3	9 Media	.m	Asset replacement projection undertaken by asset management team - try to anticipate replacement and plan financially for asset renewal. Tanks should be 31 days storage although some are smaller		Neutral		3	3	9	Medium S	2	No	Active	N/A N/A	N/A	N/A N/A	N/A N/A			L.	ow 75	Sc exchange rate with \$US assumed when developing opex.
		chemical delivery tankers or other deliveries to site (eg road closures due to roadworks, traffic accident other)	or							Site Access, Traffic and Security Procedure PR-FAI-3-4372 Chemical deliveries relatively infrequent First 8 years of operation showed no issues Critical spane parts held on site Some excitoment relatividance helilian the design (distributanchy)																			
23	Operational	Insufficient spares or consumables on site	Breakdowns cannot be repaired immediately, loss of plant availability.	Plant Manager		4	4	16 Extre	me	Plant redundancy for large items (pumps, drives, membrane trains etc etc) FMEA conducted and criticality assessment conducted by Asset MgI team and plant operators Knowledge around sparse and maintenance has solidatified over 8 years of operation. Relationship has been established with maior subcliers		Effective		2	3	6	Medium	8	No	Active	N/A	N/A	N/A	N/A			Le	ow	
24	Derational	Difficulties in claiming from warranties/warranties void	Delays in repaining/ replacing items Operational budget exceeded, decreased IRR	Plant Manager		4	3	12 High		Plant redundancy for large items (pumps, drives, membrane trains etc etc) Suppliers requiring service contracts have been identified. Knowledge around spares and maintenance has increased after the first years of operation Global relationship with large suppliers in the driver with the services of the services Budget tacking (TM) and reviews		Effective		2	3	6	Medium 2	8	No	Active	NA	N/A	NA	N/A			L	ow Du So	Jue to the age of the plant, the majority of the site assets are out of warranty. Some pro-rata warranty remains on tanks.
27	merational	Localizad or citualda blackout or newar failum du	Inshibuto produce quality or quantity of recycled water	Plant Managar		9	3	Q Marti		Issues management procedure online to assist with confinuous improvement. Knowledge around budget has increased after the first years of operation Recular asset maintenance and condition assements used to set budgets Brate lie increated in availability area on ordin assements from adverture monitorer		Effective		2	2		Martium - 5	9	No	Active	N/A	N/A	N/A	N/A					ar of 2010 Vani's hous the ORM of network on can utilize and control
-		falling on local power line, disruption of main incoming cable to plant).	e required by client; possible risk to plant assets depending on cause of power failure, possible risk to membranes depending on duration of power outage	r ian manager			Ŭ			The source of th		LICCORC		-	-			-					100					re	eservoir levels and potable supply directly to customers
28	Operational	Network unable to accept recycled water over an extended period.	Difficulty in maintaining plant and equipment, some los of income, impact on reputation	s Plant Manager		3	4	12 High		Emetgency Generator Hock-up work instruction WIS-3934 Ability to operate all our artises and recirculate within the plant Network configuration allows for partial delivery		Effective		1	2	2 1	Low 3	8	No	Active	N/A	N/A	N/A	N/A			Lo	ow	
29 1	Operational	Sydney Water unable to scopy securicary enuent Sydney Water unable to accept trade waste Staff not fully qualified or competent to carry out duties	Inability to produce quality or quantity of recycled water required by client; risk to plant assets, impact on	Plant Manager		3	4	12 High		Pagament intervolvin tais some redundancy SW supply has some redundancy Use of top-up or back-up water Internal recruitment of operators with experience and/or trade background Learning path		Effective		1	2	2 1	Low 3	8	No	Active	N/A	N/A	N/A	N/A			Le	ow	
24		Chaff and concluded due to Steam as incom	reputation	Direct Marcola				0.000		The plant has been operating for several years allowing people to gain experience Large degree of automation of plant Dedicated plant process engineer Existing company knowledge in technologies Develop the several several of the VMM SMM remotes from other plant terms in the series or other		5W				2				Antin	N/A	NUA	NA	N/A				_	
	perational	control changed code to integra of myory	requirements, high stress for remaining staff who have additional work and may be denied leave due to lack of staffing; if more than one staff member ill (eg due to	rian manager		3	3			regions regions Documented procedures, forms, checklists CMMS planning works		Ellecave			2	- -		-										UW	
20	montional	Chaff second and finited to second all approximately	contagious disease) may lead to inability to produce quality or quantity of recycled water required by client	Diget Manager				12 144		High level of automation Hire temporary/casual staff to conduct some aspects of the O&M. Engage contractors/service providers. In the past, it has been difficult to fill the gap without prior site knowledge/training Discussed exacts and exacts and exacts of an exactly to exact a section and bits.		Effective							No	Astro	NIA	NUA	MA	51/6					
		and maintenance activities during periods of high workload (eg projects, large-scale maintenance activities, serious process disruptions causing additional work on site)	Stress and dissatisfaction possibility of armage to plant and stress and dissatisfaction possibility of armage to plant or WHSEQ impacts due to staff trying to cut corners	nt						Head Office resources may be available for projects etc to support site to a certain degree Head office is located close to site, facilitating use of head office staff Other Wit operations at other plants in the region Large shutdowns will incomply be planned Her temporprogramsal staff to conduct some supects of the OBM. Engage contractors/sensice providers.					5			-					18/5						
34 (Operational	Industrial action (strike) by staff.	Inability to operate plant.	Plant Manager		1	4	4 Medi	m	EA in place Orgoing communications modes to prevent differences from escalating to industrial action Other VW operators at other plants in the region Currently, no union representation amonast the team		Effective		1	4	4	Medium	8	No	Active	N/A	N/A	N/A	N/A			Le	ow	
35 1	Operational	Inadequate and/or loss network connection	Slow access to systems such as email, procurement, CMMS, Doc centre restricting efficient plant operations. Temporary loss of access to email, documents stored on IT system, systems such as procurement, CMMS, Doc centre leading to restricted ability to operate memory and easy and example michaeses tasks	Plant Manager		2	3	6 Medi	am	Sublate internet connection has been selected and established and has been operating for numerous years without major problems. Smart phone, 4G access, able to operate remotely most business systems from Pyrmont HO Also able to work around in some instances		Effective		2	2	4	Medium 5	2	No	Active	N/A	N/A	N/A	N/A			Le	ow	
37	Operational	Loss of PLC/SCADA system	Inability to operate plant.	Plant manager		3	4	12 High		Head office support in IT and electrical engineering (IT dpt and E&I team) Service agreement in place with Plant Weave 24/37 auport than Plant Weave Possibility of remote connection to the system Loss of SCAUAPIC Response PPC03282		Effective		2	3	6	Medium 5	2	No	Active	N/A	N/A	N/A	N/A			Le	ow	
38	Operational	IT systems failure leading to a loss of historical operations data and/or administration server IT virus deleting, damaging or encrypting the data (incl. ransom malyare)	Loss of admin server data - large amount of work lost Restriction in ability to optimise process due to loss of historical data, problems reporting data to clients and regulatory bodies, immact on providence with client	Plant Manager		3	4	12 High		Prevents was ware used to be plant inton size in necessary Freewalls, mitinian is place Tape back-ups for SCADA and NAS device (additional local hard-drive storage was added at Fairfield) Cloud storage for the Fairfield administration server Periodic recording capturing the most immortant non-nex risks		Neutral		2	4	8	Medium 8	8	No	Active	N/A	N/A	N/A	N/A			Le	ow No Di	Note: review 2016 Discussed with Management (Alex Lagny) rating reviewed
39 (Operational	Poor data storage and handling leads to incorrect recording and/or reporting of plant performance data data required for billing or included in reports to external parties such as clients or regulators	Incorrect invoices, non-compliance with licence , requirements, inability to optimise plant due to incorrec plant performance data	Plant Manager t		4	3	12 High		Automatic recording through SCADA Data for innoicing is cross checked by the client Record Management Procedure Orgoing monitoring allows for early detection of issues		Effective		2	3	6	Medium	8	No	Active	N/A	N/A	N/A	N/A			Le	ow	
40	Operational	Plant fire or local fire in scrub/bushland bordering or	Damage to plant and equipment,damage to structures,	Plant Manager		3	5	15 High		A number of data handling loois has been developed and tested Periodic reporting capturing the most important process data Reportable data captured in officience excel sheets VESDA system in switchboards		Effective		2	3	6 1	Medium 5	8	No	Active	N/A	N/A	N/A	N/A			Le	ow	
		prant	oamage to PLUSCAUA, damage to IT systems, smoke damage, inability to operate due to smoke from local fin	e						r rea earns with alarm to the trigate through out the plant File watter ring main hydrahts The forget frame, The forget frame, Concurd maintenance within freeze and contification Ground maintenance within freeze and the site and have been given access keys (buzzer) Switten established to serverit solations bein site in site.																			

41	Operational	Localised flooding due to heavy rain	Damage to plant and equipment, flooding of admin building, damage to PLC/SCADA, damage to IT systems, flooding of paytratication oit and wastewater	Plant Manager 3	4 12 1	gh Structures designed to 100 yr flood level (signed off by count incident/emergency manual developed incl. response proce	ncil) edure PRO-4026	ie	2 3	6	edium 🛛	No	Active N//	A N/A	N/A	N/A	Low
42	Operational	Earthquake	pit, inability of sever to take trade waste, Damage to plant and equipment, damage to structures (operifie) unsife access to site), damage to	Plant Manager 1	5 5	edium Incident/emergency manual developed.	No con	strol	1 5	5 1	edium 🛛	No	Active N//	A N/A	N/A	N/A	Low
			infrastructure connections (power, potable water, sewer, trade waste, LAP inlet),														
43	Operational	Hail	Damage to plant and equipment, damage to vehicles, damage to structures, windows etc.	Plant Manager 2	4 8 1	edium Incident/emergency manual developed. Majority of equipment is undercover	Effectiv	ie i	1 3	3 L	w 🗵	No	Active N//	A N/A	N/A	N/A	Low
44	Operational	Lightning	Damage to plant and equipment, particularly electrical switchgear, circuits etc; loss of historical data, documents etc through damage to IT	Plant Manager 3	4 12	gh Lightning protection system Surge protection system	Effectiv	ie .	2 3	° 1	edium 🛛	No	Active N//	A N/A	NA	N/A	Low
45	Operational	Windstorm	Damage to plant and equipment due to falling objects, damage to structures, power outage	Plant Manager 3	4 12 1	gh UPS for safe shutdown of plant Back-up generator connection point for power outage	Effectiv	e	2 3	6 1	edium 🛛	No	Active N//	A N/A	N/A	N/A	Low
46	Operational	Inability to establish contracts with key suppliers/	Reduced plant availability, restrictions on the volume of	Plant Manager 2	4 8	Limited storage of loose items outside of building Contracts are already in place with major suppliers	Effectiv	e .	1 4	4	edium 🗵	No	Active N//	A N/A	NA	N/A	Low
		service providers.	recycled water that can be produced or inability to produce recycled water.			Numerous suppliers on the market Buying power as major consumer											
47	Operational	Inability to procure replacement parts for key equipment (eg due to superceded equipment for which snare parts are no longer fabricated)	Difficulty in maintaining plant availability, requirement to replace equipment rather than repairing or to modify equipment or make spare parts in-bouse (possibly with	Plant Manager 3	4 12 1	gh Failure mode and effects analysis (FMEA) conducted Critical spare parts held on site Some redundancy by design	Effectiv	e	2 3	6 1	edium 🛛	No	Active N//	A N/A	N/A	N/A	Low
49	Operational	Change in membrane specification (replacement	inferior performance or safety impacts) Possible changes to plant operating conditions, plant	Plant Manager 4	4 16 5	Ability to reverse engineer some parts freme RO & UF membranes are interchangeable	Effectiv	e	3 3	9 1	edium 🛛	No	Active N//	A N/A	N/A	N/A	Low
		available, need to replace membrane no longer available, need to replace membranes with membranes of different specification) or Supplier	may no longer be operating at optimal performance, possible requirement for CAPEX to accept membrane change.			Numerous suppliers on the market Reputable and large suppliers. Process review to be undertaken at the time of replacing the	e membranes via Change mot										
50	Operational	goes out of business Long lead times on replacement membranes	Inability to quickly replace membranes in the event of a	Plant Manager 3	4 12 8	gh One redundant train on UF and RO	Effectiv	e	2 3	6 1	edium 🛛	No	Active N//	A N/A	N/A	N/A	Low
			severe rouning incluent.			Spare membranes are used at other vivi plants Spare membranes stored on site Other membranes can be used (other suppliers - at least for	ar RO)										
51	On our firmed	lesmone in namer price	Diant unable to ment execution budget	7		Currently not running at full capacity, therefore (a) less likely event and (b) can get by on fewer membranes	ly to have all membranes suffering one fouling	-					Action M/		NIA	N/A	
52	Operational	VWQ does not pay suppliers on time (all plants)	Plant unable to meet operating budget Suppliers refuse to supply inability to get credit with	Plant Manager 3 Plant Manager 3	3 9	edium Using power brokers to get best price - corporate level agree Contract allows for power to increase at greater than CPI wit Standard lems, and condition	ement (NSW-water at least) Effectiv hile maintaining within budget		2 2	4	edium 🛛	No	Active N//	A N/A	N/A	N/A	Low
-	operational		new suppliers.			Procurement guidelines SAP and financial reporting		~	· ·	-							
						Large buying power Global agreement with some large suppliers History of corporate behaviour											
53	Operational	Service providers onsite do not comply with WHS, environmental conditions of work	Possible environmental, WHS incident (including asbestos) or delays to completion of work	Plant Manager 3	4 12 1	gh Site Induction Permit System	Effectiv	ie -	1 4	4 1	edium 🛛	No	Active N//	A N/A	N/A	N/A	Low
						Risk Assessments, JSEA/SWMS, Take 5, Always Safe Inter Contractor supervision and inspections Contractual acceement refering to site sites	ractions utilised										
						Only a small portion of activities require dig up and be expos (asbestos) of site undertaken in 2016	osed to asbestos - additional env. Assessment										
54	Operational	Poor raw water quality	Inability to produce quality or quantity of recycled water required by client; risk to plant assets (eg. RO membrane failure)	Plant Manager 3	4 12 1	gh Schedule 11 (effluent quality events) Raw water analysers Drovision for comparation for unforement	Effectiv	e	3 2	6 1	edium 🛛	No	Active N//	A N/A	N/A	N/A	Low
			memorane name)			Early warning through receiving signals from Sydney Water Sydney Water to divert if they know effluent is out of specific	r ication										
						Part A Protocols Ongoing feedback to SWC through meetings, etc											
	1					To a certain extent, plant is able to treat the raw water even i specs (limitations apply) Food revenue is curanteed if new water is out of	n It the raw water quality is not always within I plant is unable to produce - wrighte revenue										
						can be lost though Historical data on LAP water quality has been mostly consist	stent for 8 years of operation										
55	Operational	Out of specification recycled water quality	Breach of contract, non-payment for recycled water	Plant Manager 3	4 12 1	gh "Also refer to the WQ CRA" On-line analysers	Very ef	ffective	1 2	2	w Ø	No	Active N//	A N/A	N/A	N/A	Low
	1					HACCP procedures Maintenance procedures											
	1					95%ile compliance points on many parameters Ability to recirculate within plant and not discharge out of sp	pec effluent										
58	Operations'	Vandalism	Damage to plant and environment, discussions to me in the	Plant Managar -	4 12	Part B operating protocols for communications of any issues 8 years of operations with no RW cuality breeches Specific systems on building foresteries	es switches on all external doors inc rollar	Rection	1	9			Active		AUA.	N/A	lar
30	operational		water quality, unable to produce quantity, uncontrolled discharges	s new millidger	* 12	doors) Safety interlocks on control system to prevent asset damage	ge Very ef		3	° 1		NO	N/	- [N/A	NPA.	iner.	
						CCTV Insurance											
	1					Pencing around site perimeter Site lighting at night Security astrols 24/7											
57	Operational	Theft of or damage to SCADA computers	Inability to operate plant.	Plant Manager 3	3 9 1	edium Security system on buildings (sensors in admin building, ree doors)	ed switches on all external doors, inc roller Very ef	flective	1 2	2 L	w 🗵	No	Active N//	A N/A	N/A	N/A	Low
						Safety interlocks on control system to prevent asset damage CCTV	3e										
						Fencing around site perimeter Site lighting at night											
						On-call laptop Back-up SCADA software											
						Security screens on admin building windows. 24/7 security patrols Paraward antiection on computers and for SCADA access.											
58	Operational	Theft of office computers, moving plant or other site tools, equipment or plant.	Financial loss, restricted ability to operate plant	Plant Manager 3	3 9 1	edium Security system on buildings (sensors in admin building, ree doors)	ed switches on all external doors, inc roller Very ef	flective	1 2	2 L	w 🗵	No	Active N//	A N/A	N/A	N/A	Low
						Safety interlocks on control system to prevent asset damage CCTV	3e										
						Fencing around site perimeter Site lighting at night											
						On-call laptop Back-up SCADA software											
						Security screens on admin building windows. 24/7 security patrols Paraward antiection on computers and for SCADA access.											
59	Operational	Information or intellectual property theft	Loss of competitive advantage, loss of key plant data leading to inability to optimise plant performance	Plant Manager 3	4 12 1	gh Firewall Security system on buildings (sensors in admin building, ree	Effectiv Effectiv	ie -	1 3	3 L	w 🗵	No	Active N//	A N/A	N/A	N/A	Low
						doors) Safety interlocks on control system to prevent asset damage	20										
						Insurance Fencing around site perimeter											
						Site lighting at night Confidentially agreement in employment contract											
60	Operational	Downlant deeign or inferior secale numbered by	Incressed onerstional/maintenance/seeat manament	Project Manager 4	4 16	Backup of data Good relationship with the client being a competitive advant Dation maker. HAZOR, coantional lasm started coantion a	lage		1 3	3		No	Active N/A	. N/A	N/A	N/A	I ne Note: Decidual rick was originally high and raised to management (Alex Lang
60	Operational	Poor plant design or interior assets purchased by D&C contractor	costs or inability or restricted ability to produce the required quality and/or quantity of recycled water	Project Manager 4	4 10 4	Design revew, PACUP, operational team stated operating e phase + inspections), performance test, power and chemical completed	all guarantees, almost 24 months operation	·e	1 3	3 1	w z	No	Active IN/		NA	N/A	Low Note: Residual risk was originally nigh and raised to management (Arex Lagn) Risk rating was originally based on the worst case scenario for both likelihood and consequence. However, the control measures are considered to be
						Orgoing asset monitoring Several years of plant operations confirming the large major	prity of equipment/design is apporpriate										effective, based on historical results. Therefore the risk rating has been reviewed.
						Orgoing improvement Change management process in place - in particular to repa	air/replace/overhaul as required (e.g. obsolete										
66	Business	Service provided is not innovative and not up to date	Contract not renewed Impact on reputation/relationship	Plant Manager 3	4 12 8	gh Staff connected to Centre of Excellence (including R&D) exter Contributes and attends technical conferences	ternal and internal Effectiv	ie -	1 4	4 h	edium 🛛	No	Active N//	A N/A	N/A	N/A	Low
						Close relationship with thechnical equipment suppliers Regular internal and external audits											
67	Operational	Workplace harassment	Negative effect on workplace environment for staff	Plant Manager 3	4 12	improvement projects gh Behaviour/ethical training	union qualitarity largests for CONSTIDUES	re l	2 3	6	edium 🛛	No	Active N//	A N/A	NA	N/A	Low
- F			potential repercussion on client relationship and productivity	, j		Monthly HR visits to site Supervision	Elibert		ľ								
68	Business	Non-compliance with legal/regulatory requirements	Legal action against the company or individuals	Plant Manager c	5 25	Team building and celebration of success with BBQ's and ev NSW Compliance Register	vents Em.	e	1 9	3	w 🛛	No	Active M/A	A N/A	N/A	N/A	Low Note from 2015 review: Residual risk was orininally hinh and raised to
-		,	Reputation damage Inability to operate as a result of loss of licence	D		Trained and experienced staff on site and support Management review	Effectiv			l l		Ĩ					management (Alex Lagny). Risk rating was originally based on the worst case scenario for both likelihood and consequence. However, the control measures
			Penatties and fines Increasing OHS and environmental risks			Risk assessments Audits Subprototore to Isualay (comments family											are considered to be effective, based on historical results. Therefore the risk rating has been reviewed.
						Interaction with internal and external stakeholders within the Interactions with relevant government agencies	e industry										
69	Operational	Terrorism attack on the plant and associated network	Injury/death of personnel, contractors, neighbours, etc.	Plant Manager 1	5 5 1	Visible leadership (knowledge sharing) edium Security system on buildings (sensors in admin building, ree	ed switches on all external doors, inc roller Neutral		1 5	5 1	edium 🛛	No	Active N//	A N/A	N/A	N/A	Low
			manurous contamination of the water delivered to end- users Damage to Asset			Safety interlocks on control system to prevent asset damage CCTV	3e										
			-			Insurance Fencing around site perimeter											
	1					Site lighting at night Security patrols 24/7 Daily representations at Societal DMD and CCC	n (auslity monitoring)										
	1					The scheme is not an essential infrastructure and CCP system users	ides a secondary water source to the end-										
	1					The Scheme is also little known to the wider public Recycled water usage excludes human consumption											
	1					StorageInetwork includes some buffering possibly allowing attack/contamination	guaranche of water it suspected										
70	Operational	Unable to produce RW within contractual/compliance	Plant unable to meet requirements	Plant Manager 3	4 12	intelligence gathering Generations, us geternment type get Communications protocol with Scheme partners and notifica	ations Effectiv	e l	2 3	6 1	edium 🗵	No	Active N//	A N/A	N/A	N/A	Low Consequence reduced thanks to control measures reducing the magnitude of
	1	requirements, possibly due to: No or limited feedwater available from Sydney Water Poor feedwater available from Sydney Water	Income loss			Maintenance planning Performance mmonitoring Able to two off clarat lotters for excited of time to determine	eduater cubity bucase, the river										the impact
	1	Poor plant performance for medium-extended periods of time				Pure to turn or prans make for penods of time to let poor fee Feedwater buffer tank (FBT) is able to provide some feedwa (the production rate)	ater buffer for periods of time (depending on										
	1					Potable water can be topped-up if required (as per contract) quality)	t), providing water to the customers (lower										
72	Operational	No gas suppression in switchrooms	Loss of switchboard panels due to fire damage before arrival of fire brigade impacting ability to operate the	Plant Manager 4	4 16	Currently only producing a small volume of water (1/4 capac VESDA detection system in place. Plant is located in residential area with a notential fee brief	de response time of under 10 mins.	tive	2 4	8 1	edium 🛛	No	Active N//	A N/A	N/A	N/A	Low Comment (6/8/19): Risk has been highlighted by the Insurance review conducted 31/7/19. Site are obtaining a guidation for manage supression for
	<u> </u>		plant (loss of control) and supply RW to customers			Potable water/back up water available to supply to customer Switchroom and switchboard maintenance/inspections inclu	ers if plant is offline uded in CMMS										the switchroom.
73	Business	Pipe failure/burst	Third party property damage resulting in a claim	Aquanet 3	3 9 1	edium - Veolia Preventative Maintenance carried out to schedule - PM schedule determined via Asset team workshop and sub - Compliance and a sub-	abmitted to Aquanet for approval	e -	2 2	4 1	edium 🛛						Low
						- Condition assessments conducted by Asset learn - Online monitoring of tank levels and level alarms - Ability to halt production and pressurised RW sunniv remnti	tely using remote SCADA										
						Dedicated staff and contractor for optimum response time Emergency response procedures and notification protocols	s available										
						 Ability to segregate network and supply customers with pot Non-foundation customer contracts allow for interruption to Third party property interruption. 	stable water o supply										
74	Business	Missing valve covers (public inteference etc)	Third party property damage	Aquanet 2	3 6	- times pairy property insurance - Emergency contact number available on the network for the edium - Valve covers held as spares	e public to notify of any leaks	_	2 2	4	edium 🛛			nsider			Low
						- Regular network checks							ap	propriate quency for twork			
													ins inc	pections and lude in			
													exi	sting PM ivity			
													De	velop splified twork map			
													del	ailing route, ve locations			

75	Business	Pipe piercing/bunst/failure	Damage to major transport assets (railways, arterial roade)	Aquanet	2 4	8	Medium	Preventative Maintenance Main(V) of pipe bolow grand - Insurance - Emergency management and response plan	Effective	2	3 6	Medium 🛛	Develop emergency management plan to cover reporting requirements and access rights to rail corridor identify suitably certified			Low	
76	Business	Any/multiple of the above risks in effect	Customer dissatisfaction	Aquanet	2 3	6	Medium	Close evaluationship with the executances communication pathods for indextax and compliaints for internal gludance and for customer use (Beschart ship) -Ability to segregate network and scupply customers with potable water -Non-Koundation customer contracts allow for interruption to supply -Response proceedures in place	Effective	2	2 4	Medium 8	contractors			Low	

Next Risk	Review Date:	28/11/2020	RISK IDENTIFICATION											RISK ANALYSIS						RISK EVALUATI	ION	RISK	REATMENT		RISK TAROF	JET	1
	Category		Risk Description	1	1		Current Situation		inherent i	Risk Level		Controls						Residual Risk Level		Justification	tobe	Further	lections	Resi	ual Risk after Additional Con	ntrois (Not Mandatory)	-
							revious Incidents													Extreme inclu Justification t If the Corp	ided in the porate	Mitigation Describe the action to be	Act	tion Status Id Progress VB: Inclusie	Jod rost Consequence		1
Ref No.	Risk/ Opportunity Category	Hazard Activities / Tasks / Jobs / ategory Facility / Location	Risk/Opportunity Description Describe the risk/opportunity, the causes/benefit	Risk Impact/Consequence is Describe in detail	Risk Owner Who is the owner of this risk?	r Legislative is the risk linked to an WHS legislative requirement? If yes, nicese name it	ported since start of operation and lescrition. Have the	Likelhood	Consequence	Inherent Risk Level = Likelhood x	Inherent Risk Rating	Existing Controls Describe how existing control activities can mitigate t	he likelihood or consequence. (NE: More than 1 co	trols attached to one risk is allowed. Insert new row to separate control	activities)		Control Effectiveness	d Consequence Level = Likelihood	k Residual Risk Rating (Y/I	table mitigated risk Reg level is rated Reg high or (1 extreme and (all b)	isk risk Statu (Active or (N) Retired)	tus taken to or futher Action i) (likelihoot or	Action Due /	action certs reference 3 = number for Moder	2) S= Extreme Project 2) 4 = Major Le 3 = Moderate = Like rate 2 = Minor Corp.	.ted Risk .evel Projected Risk .elihood x Rating	Comments
					_	4	isting controls been effective?													is accepted, ext justification resid must be are	zeme ual risk to be	consequence) and ensure that the	1	RIVO or VAMS) 2 = Uni 1 = R	ely 1 = Insignificant re		1
OH001	Safety Wo	king at Fairfield RWP site wide - working from roofs, EWP, scissor lifts, scaffolding, Ivit over ladders, feedimobile olaforms, forkilt man-case, etc. Possibly near open tark	Risk of falling onto ground or into water ks Risk of people vs. mobile plant	Potential for fatality and injuries	Operations Manager	Work Health and Safety Act 10 2011 34	/5/14 - RIVO ref. 449851 - Fail from	3	5	15	High	Eliminate Some permanent stairs/platforms on site (by design)	Substitute Preferrably use platform ladders rather than standard ladders.	Engineer Barricading, Use contable scaffold or EWP ere accropriate.	Administrative Use spotters for mobile plant. Work at Height Permit and corporate Policy.	PPE High visibility clothing mandatory on site. Use appropriate fail-arrest/harness and PPE (eq. hats)	Effective 1	5 5	Medium Y	NA	N Active	milliontoni vinir			+	0 Low	
	wat	ar (e.g. UF, Stomwater basin). Also: all Network site locations (working off ladders, stairs, etc)	Plant: contact with electrical equipment, use of fuel (eg LPG) - contact and fire Plant operated by untrained operator	+		Work Health & Safety Regulation Iac 2017	ider. Ladder ndrails modified.							Mobile plant designed to limit access to LPG/fuel Some feed ladders have multiple levels (break) and a cage For Network sites: static lines in place, used in combination with	Company standard for working off liadders (Safe use of Ladders PRO-238) ind: rule of 3 points of contact when working on ladders EWPs and other equipment used by trained staff only.	PPE to be inspected appropriately before use Preventative Maintenance (WO) - inspect fail prevention devices (e.g. harness, etc) and static lines, anchor points, etc											
														hamessifial prevention devices Selected ascending/descending equipment with no split rings (refer Near Miss incident 2013) - safer equipment	Mobile plant pre start checklists. o Contractors using plants are asked to show evidence of licence. Site speed limits is enforced. Technologies 105 A search												
														Lining devices (cranes, sergs, namess, er) and anonor points are tested yearly (Work order)	LOTO procedure Training: Working at heights and over water Valeaminn module /trainien)												
OH002	Safety Wo heig wat	king at Fairfaid RWP site wide - working near open tanks htover (e.g. UF, Stormwater basin, tark inspection) ar Also: all Network site locations (reservoirs, sumps)	Fall into water - possibly also working alone Dropping items in water - retrieval	Potential for fatality and injuries	Operations Manager	Work Health and Safety Act 0 2011 Work Health & Safety Regulation		3	5	15	Hgh	Open tanks are limited to UF cells and Stormwater basin (large pond). Other tanks on site are roofed.		Stormwater basin: designed with platform. A concrete pathway has been implemented to reduce risk of falling (slippery ground, right-time activities)	Work at Height /Water Permit Work at Height /Water Policy	Safety boots with non-slip soles	Effective 1	5 5	Medium Y	NA	N Active					0 Low	
OH003	Safety Wo	king at Fairfield RWP site wide - Falling objects	Objects failing from above	Injury to personnel	Operations	2017 Work Health and Safety Act 0		3	4	12	Hah	by design, there is not a lot of cranage or working at		UP cells: Handratis and locked gales - no work beyond handratis without task specific JSEA. A mobile trolley is available to work abo the UF cells if recuired Barricadino	e Use soctlers when lifting with granes Working at height	t. Wear appropriate head protection (Safety heimet or bumper	Effective 1	4 4	Medium Y	NA	N Active	NA NA	NA	NA		0 Law	
	heig	ht/ over Also: all Network site locations (reservoirs, sumps) ar			Manager	2011 Work Health and Safety Regulation 2017 Division 10						height necessary on site			permitipolicy JSEA Good house keeping	cap)											
OH004	Safety Wo	king at Falling objects Sanofficially and hole of the Wandalite Metacork landing	Objects falling from above Out hole follow from above	Injury to personnel	Operations	Work Health and Safety Act 0		2	4	8	Medium			Network-Woodville : Site is on the border of the golf course - limite	Check SWL before using a lifting equipment 1 Bion environment services the third-nextv 1 Network - Woodville: work is normally done midweek, during between been which limit the environment to self hole free online:	Wear appropriate head protection (Safety helmet or bumper	Effective 2	4 8	Medium Y	NA	N Active	NA NA	NA	NA		0 Low	
	wat	#	(Network)			Work Health and Safety Regulation 2011 Division 10								(reducing exposure)Protection shed is in place over the riskiest worl location (i.e. electrical cabinet) and is of generous size - good overhead protection	during the week)												
OH010	Safety Cor Spa	Fairfaid RWP site wide - Confined space entry. ce Entering into confined space (tanks or others) Working in confined spaces. (tanks or others)	Fatalitylinjury: Engulfment, Entrapment, Oxygen deficie atmosphere, Discharge of gas/ chemical, Contaminate atmosphere, Poor communication, Vermin (bites), Disducting for for our discharge of density formation.	rt Potential for fatality / injuries d	Operations Manager	Work Health and Safety Act 0 2011 Work Health & Safety Regulation		3	5	15	High	Limited confined space entry requirement by design (normally for inspections, maintenance, etc.)	Utilise ROV inspections for tank inspections	Barricading Purposeful action is required to enter confined space Additional lighting and vertilation if required	Confined space permit Confined space register (refer to Shared Drive: NSW FRWP Safet Confined space training & permit requirements	ty) PPE and rescue equipment (harnesses, tripods, rescue lines, etc) Note from the team risk review conducted on 23Feb2016 -	Effective 1	5 5	Medium Y	NA	N Active	Review site Nicole Rile confined Dheval Josi space	(10/10/19 R i reg	Review site gister: RIVO 3805874	0	0 Low	
		read- an interest and nonnexist (anima, and par, par, no.)	Welding causing gas, sparks, heat, light Laddens: fall, etc Falling objects from above			2011 1 201 4 2								Use mechanical Illing devices to open hatch	Stant-by personnel 2way-radios Housekeeping	Simon, Dhavai Joshi and Alban Delpey : Breathing Apparatus may be required as per the Confined Space rescue plan however it is not typically available onsite (it would have to be						personnel register	s reg	Review personnel gister: RIVO			
			Slips trips falls (Poor lighting, etc) Lifting of access hatches causing manual handling injury	у											Use qualified industrial divers Sign post on all known confined spaces Use proper handing/lifting methods (or 2p lift)	rented out). Rescues involving BA are considered to be better handled by the emergency services unless noted otherwise in the task-specific risk assessment/JSEA/permit. Precautionary								3805877			
OH020	Safety Plar	t and Fairfield RWP site wide - Ifing equipment	Failing objects/equipment from above	Potential for fatality/injuries	Operations	Work Health and Safety Act 0		3	5	15	Hish	Some lifting avoided by design (floor-level equipment)		Barricadiro	Lifting equipment regularly inspected and serviced (Work order)	realization to the emergency services (needs up) may be required as noted in the task-specific permit (as part of the motificial scane). High-visibility clothing	Effective 1	5 5	Medium Y	NA	N Active	NA NA	NA	NA		0 Low	
	equ	pment Use of flowd crames, mobile crames, jibs, davit arms, rails, pulleys, forkilits, slings, chains, etc. Also: all Network site locations.	Mobile plant vs personnel (Traffic/speed) Interaction with fixed structures or electrical services or chemicals (eg. dosing lines)	r	Manager	2011 Work Health & Safety Regulation 2017						smaller equipment not requiring plant lifting, etc)		Lifting equipment is selected based on SWL and for the application Major crane has confless remote controls Mobile plant designed to limit access to LPG/fuel	SWL sign post fitted on all lifting equipment Exclusion Zones Permit, JSEA, LOTO	Suitable head and hearing protection											
			LPG cylinders and fuel contact/fire Electrocution												Singing of loads only by qualified dogmanitigger Housekeeping Communications (toobox, radio, etc.)												
															Use competent and qualified contractor Contractors Induction Technicians trained in using equipment (2 technicians trained as												
OH021	Safety Plan	t and Fairfield RWP site wide - general vehicles on site (e.g. personnel and visitors ment carsibilities, delivery vans, mobile client, etc)	Traffic/speed - interaction with pedestrian or between vehicles	Potential for fatality / injury	Operations Manager	Work Health and Safety Act 0 2011		з	5	15	Hgh	By design, limited requirement to utilise vehicle on sit By design, areas accessible to whicle is limited to co	a 2	Barricading, fencing Barriers and chains	dogmanirigger as of 30/4/2015 - JP and KL) No. on of mobile observe when deliver on observe Designated parking area and delivery couriers stop at reception All whicks/drivers recording to reception (communications -	High visibility clothing, head protection, foot protection mandatory	Effective 1	5 5	Medium Y	NA	N Active	NA NA	NA	NA		0 Low	
		Also: all Network site locations	Vehicles accessing hazardous areas - vehicle interactin with dangerous piece of equipment (incl. chemicals) Poor Visibility leading to accident	19		Work Health & Safety Regulation 2017						park, single road and process building By design, Network facilities have very limited access (mostly parking)		Building roller door operated from inside and normally closed Site can only be accessed via closed gate (authorised entry only) Vehicles utilikely to drive off-road unintentionally	authorisation) For Network facilities: very small facilities (easy to monitor for a single person), gate closed at all times.	,											
			Incorrect use of vehicles												Sign post prohibiting access if not authorised - physical "STOP" signs passed the car park of the Fairfield RMP Site induction Site request faulte for Existing RMP only other bistwork above deal	~											
															have enough road to speed on) Single direction traffic at Fairfield RWP No use of mobile phones when driving on site												
OH022	Safety Plat	t and Fairfield RWP site wide - General vehicles on site need Alex of Measure site Involves	Oil and fuel spills	Potential for injury Sing Mag fails	Operations	Work Health and Safety Act 0		3	4	12	Hgh	By design there is minimal need for vehicle movement	a	Barricading	Task specific JSEAs to include traffic controls if required the traffic souther if required Stormwater drains are sign posted (painted) Craft is freeling/socione consider the constant	Fairfield RMP: Spill kit available on site (with inspection and re	e- Effective 1	3 3	Low Y	NA	N Active	NA NA	NA	NA	+	0 Low	reduced risk as control measures
	equ	PITNITE AGO, all PREVIOTI SILLE ICCALIGES		oups, ups, tans Environmental discharge Risk of fire	in anager	Work Health & Safety Regulation 2017						on see		Point reserves are somed appropriately (nammade cadmeds, etc.) Catchment included by design (bunds, drains, neutralisation pit, was water pit, stormwater basin) Vehicle design limit access to fael	E Fairfield RWP: Environmental awareness training Site induction	sock procedure) Fairfield RMP: Drain cover available in chemical area (prevent spill to enter storm water drain) Network locations: spill kit available in Network vehicle	r.										an incident
OH023	Safety Plan	t and Fairfield RWP site wide - Visitors or larger groups or groups of children	Visitors become lost and enter dangerous areas	Potential for injury	Operations	Work Health and Safety Act 0		3	3	9	Medium			Equipment is guarded (eg. Motors)	Inductions and supervision (tour guides)	*Rafer to Fee vick revider for any discharge PPE required for visitors:	Effective 1	2 2	Low Y	NA	N Active	NA NA	NA	NA		0 Low	reduced risk as control measures
	equ	ment interacting with plant and equipment Also: all Network site locations	Visitors tampering with equipment		Manager	2011 Work Health & Safety Regulation 2017								Key required to enter particular areas	Small group numbers Group arranged in advance Traffic control during visit (by supervisor) Visit route for large enougs	- long seeves - long parts - flat, fully enclosed shoes - safety classes											implemented are likely to reduce criticality of an incidents
OH024	Safety Plan equ	t and Accessing site near busy entry gate (high traffic) pment Specifically: Visy Network locations	Traffic - interaction pedestrian-vehicles at the time of gaining access to site (operator must exit their vehicle	Potential for fatality / injury 20	Operations Manager	Work Health and Safety Act 0 2011		2	5	10	Hgh			Tum hazards lights on. Park the Network vehicle as close to the gate as possible.	Two staff received for lane orcurs (>15 secole) Warn Visy that operators are coming to site (reduce the amount of time required to be standing near traffic)	 head rontaction High visibility clothing (normal clothing requirements for our team) 	Effective 1	5 5	Medium Y	NA	N Active	NA NA	NA	NA		0 Low	
			reach the entry gate intercom in order to gain access). High traffic of trucks passing through.			2017									Pedestnars to establish eye contact with drivers												
OH25	Safety Plan equi Driv	t and Driving to sites (all sites including Fairfield plant and Network) prest - ing on	Potential for road accident (including pedestrians, othe drivers) Potential for damage to vehicles, plant and equipment	r Potential for injury/fatality to self and to others	Operations Manager	Work Health and Safety Act 0 2011 Work Health & Safety Regulation		2	5	10	High	Fairfield's base office is located nearby the Network' facilities (reduces distances to travel) Employment requirement that all employees (notably	s	Vehicle serviced regularly Vehicle with automatic transmission	Reduce as much as possible the number of trips (resources mgt) Avoiding whenever possible periods of peak traffic All drivers are licenced		Effective 1	5 5	Medium Y	NA	N Active	NA NA	NA	NA	0	0 Low	
OH26	Safety Plan	t and Delivery drivers delivering to the Fairfield RWP or any Network locations ornert - (delivery and collection)	Potential for road accident (including pedestrians, othe drivers)	r Potential for injury/fatality to self and to others	Operations Manager	2017 Work Health and Safety Act 0 2011		2	5	10	High	on call) live within thr drive of site Limited requirement for deliveries other than essentia	6	Fairfield RWP (chemical deliveries): Barricading delivery area Fairfield RWP: CCTV available for monitoring plant/equipment	Designated parking area Fairfield RWP. Delivery vehicle stop at reception before being		Effective 1	5 5	Medium Y	NA	N Active					0 Low	
	Driv (oth	ing on site `´´´´ ers)	Potential for damage to vehicles, plant and equipment			Work Health & Safety Regulation 2017									esconted Fairfield RWP. Sign post prohibiting access if not authorised - physical "STOP" signs passed the car park												
															All whiclealdrivers reporting to reception or front gate (communications - authorisation to proceed) For Natwork facilities: very small facilities (easier to monitor for a sizede access) acts access at still finance.												
															Site induction Site speed limits (for Fairfield RMP only - other Network sites don have enough road to speed on)	n											
OH030	Safety Che	micals Fairfield RWP site wide - Plant storage and dosing.	Chemical spill (possibly major spill) Chemical contact (celach surray in eye or on skin	Potential for fatality / injury Chemical reactions (vanvers, heat)	Operations Mananer	Work Health and Safety Act 0 2011		5	5	25	Edune	By design - limited amount of chemicals required by the riant (selection of removess)		Barricading, bunding Storage and initiation areas hunder and ranable of heiding and	Single direction traffic at Fairfield RWP I see souther for researchin at Mateurik Invations Labeling of storage area and vessels Site birthin + chemical delivery induction	Site minimum PPE as a minimum - provision of chemical rentertive subs fire staff	Effective 1	4 4	Medium Y	NA	N Active				+	0 Low	Residual risk considering a fatality with rare constrained (rould also have looked at main
		Maintenance activities. Chemical Bpills.	inhalation, ingestion) Generation of heat, explosion Cumulative exposure (overtime) resulting in adverse	Chemical burns (skin, airways, digestive system) Environmental pollution (possibly major)		Work Health & Safety Regulation 2017						Some of the chemicals have multiple application for t plant process (reduces the overall amount of chemicals)	~	transferring any spils Drip trays under chemical pumps - drain covers Spilash guards around pumps, screens - flange guards	Task specific JSEAs and LOTO - Permit Chemical handling training Procedures (e.g. urloading, spill response, environmental spill	Additional PPE for specific tasks (e.g. bulk delivery, maintenance) Use goves where appropriate											injury with unlikely occurrence)
			health effects Slips, trips and fall Environmental discharge (see Env. risk register)											Limited access to chemicals (e.g. locked doors, inside building, barricading, etc.) Non silp grated floor around specific areas Drocess estimization. End observed upone	incident, etc) Flushing of lines before maintenance Regular inspections of pipework for leaks (routine) Lineseed deseases and analysis	Spill kits and training for use of spill kits Maintain PPE (often individual) Safety showers and eye wash stations Immediate 1st pill exponence to exercise description with exercise											
														Material appropriately selected for chemical dauge Material appropriately selected for chemical dosing lines, tarks, etc Diktion (carrier water) of some chemicals as they are pumped arou size	Contractors supervision Contractors supervision Observation checklists	reactive sprays and gets (diphoterine) Note from the team inik review conducted on 23Feb2016 - Violetta Wypych, Robert Petrevski, Bob Maneveski, Alex											
															Mock-up scenario (VAMS WO) and debrief Wash hands Health surveillance may identify early signs of cumulative chemical	Simon, Dhaval Joshi and Alban Delpey : Emergency response and Rescue involving Breathing Apperatus are considered to be better handled by the emergency services. Evacuation is											
OH031	Safety Che	micals All Network site locations - Storage of chemicals	Chemical spill Chemical contact (splash, spray in eye or on skin,	Potential for fatality / injury Chemical reactions (vapours, heat)	Operations Manager	Work Health and Safety Act 0 2011		4	3	12	High	By design - limited amount of chemicals required at t Natwork facilities - limited need for harmful chemicals	he .	Limited access to chemicals (e.g. locked doors, inside building, barricading, etc)	exposure effects Labeling of sample/reagent vessels Site induction	the preferred safer method. Site minimum PPE as a minimum Additional PPE for specific tasks (e.g. bulk delivery,	Effective 1	2 2	Low Y	NA	N Active	NA NA	NA	NA	+	0 Low	Residual risk consequence reduced due to control measures
		Maintenance activities. Chemical Spile.	inhalation, ingestion). Slips, trips and fall Environmental discharge (see Env. risk register)	Chemical burns (skin, airways, digestive system) Environmental pollution (possibly major)		Work Health & Safety Regulation 2017						Small volumes of reagents		Non slip grated floor around specific areas Ventilation or A/C.	Laboratory competency assessed Task specific JSEAs and LOTO - Permit Otenrical handling training	maintenance) Use gloves where appropriate (where required) Spill kits and training for use of spill kits Molecular DDC observe the data of the											
		Exposure to crismicale reagante cales esti interconceptuate analysical equipment. Flammable gases and liquids.													Procedures (e.g. spin response, environmental spin incount, etc) Contractors supervision and observation checklist	National PPE (client Horiotal) Note from the team risk review conducted on 23Feb2016 - Violetta Wypych, Robert Petrevski, Bob Maneveski, Alex Simon, Dhavel Joshi and Aban Debey : Emergency response											
01000			Interfere of concerning on the	Patantial for solar international	0									Press, and do the day in a start from the start of the st		and Rescue involving Breathing Apparatus are considered to be better handled by the emergency services. Evacuation is the neeteneoticater method of the OTE can eminimum.					N 1.45-						
we wild	, Us	, and an and a second sec	Contact with skin, eyes, airways Risk of ignition/explosion (e.g. ammonia)	Chemical reactions (vapours, heat) Chemical burns (skin, airways, digestive system) Environmental pollution (possibly major) - see Env. Risk	Manager	and Assessment) Act 1989 Industrial Chemicals (Notification and Assessment) Regulations			-	~		vaporising (e.g. chlorine liquid vs gas)		return line) Storage is mostly outdoors (natural ventilation) Mixing T to reduce heatfumes generation	Maintenance/ inspection routine (storage, dosing, seal pot) Loading procedures Sign post, labels	Additional PPE where applicable (eg. full chemical-resistant subs and respirators)	1		ľ		Activit	NA					
				register		1990								Most chemical dosing system (pumps, etc) are fitted with flange guards Access to chemical areas controlled by lock and key		Note from the team risk review conducted on 23Feb2016 - Violetta Wypych, Robert Petrevski, Bob Maneveski, Alex Simon, Dhaval Joshi and Aban Debey : Emergency response and Reven involves Branch											
OH033	Safety Che	micals Fairfield Laboratory works	Exposure to chemicals (liquid, powder and gas)	Potential for moderate injury	Operations	Work Health and Safety Act 0		4	3	12	Hgh	Lab work is only performed for necessary		Selection of analytical methods (incl. considering the reagents used	Controlled access to lab (lab is typically attended and also located	be better handled by the emergency services. Evacuation is the reademeticative method d in Eye wash station	Effective 2	2 4	Medium Y	NA	N Active	NA NA	NA	NA	+	0 Low	
			Inhalation of vapoursifumes Contact with skin, eye, airways Slips, trips, falls	Chemical reactions (vapours, heat) Chemical burns (skin, airways, digestive system) Falls, injuries	Manager	2011 Work Health & Safety Regulation 2017						measurement Lab work is rationalised External laboratory used for testing where possible		Furne cupboard available (and maintained) Non-slip floor A/C is not recycling the air in the lab	admin building) Task specific JSEA Chemical handling training	Note from the team risk review conducted on 23Feb2016 - Violetta Wypych, Robert Petrevski, Bob Maneveski, Alex Simon, Dhaval Joshi and Aban Delpey : Emergency response											
			Com-Smean coscorege; L36posal of reagents (see En Risk register)	 Construction postation 											Training in use of lab equipment Lab competency assessment Disposal method of used reagents/chemicals included in W ¹	www-valuese moving presently Apparatus are considered to be better handled by the emergency services. Evacuation is the preferredisafer method.											
OH034	Safety Che	micals Fairfield RWP site wide - Flammable liquids and gases	Spillage of flammable liquids (e.g. diesel, LPG, solvent fuels, oik, welding gas) Eise execution	s, Fires and burns Inhalation of furnes Changing hume protections (effective and the second	Operations Manager	Work Health and Safety Act 0 2011 Work Health & Control Control		4	5	20	Edune	Design - Limited amount of flammables required on site	Utilise propane or butane for heating rather that aceylene	Secure entry to site and locked up storage Designated, purpose-built storage cabinets (some of those are stor	Growt housekeenion and labellion Labelled stormwater drains d Storelorder only small opy Dis loketing	Wind socks x3 Site minimum and additional PPE based on JSEA/activity Shill like and training is under 100	Effective 2	4 8	Medium Y	NA	N Active				+	0 Low	
			Emironmental discharge (see Env. Risk register)	Chemical burberhaldon (skin, anways) Manual handling Slips and falls Environmental collution		2017						Permoval of acceptance from size		Ventilation or A/C	See induction Permit, JSEA, drain covers Housekeeping Sell resource and evecuation procedure	opinikas and saming in cang kas Fire extinguishers											
															Mock-up scenario and debrief Local Fire Brigade is familiar with the site (regular visit - approx 2- yearly) and have keysigate buzzer to the plant												
OH035	Safety Che	micals Fairfield RWP Neutralisation tank - mixing incompatible chemicals together	Inadvertently mixing incompatible chemicals producing exothermic reactions, hazardous gases (eg.chlorine or softhur divide)	Potential for fatality/ injury Inhelation of fumes Chemical hume/infation (skin, eves, airways)	Operations Manager	Work Health and Safety Act 0 2011 Work Health & Safety Remittion		4	5	20	Extreme	Design - limited amount of chemical requiring neutralisation (storage/dosing, delivery, chemical relation)		Tark verted to outside Interlocks in control system to prevent mix of incompatible chemical Neutralisation is an envelop reveas, neutralision and elimination	Staff trained for use of fee antionuisher and other works Chemical handling training Evacuation procedure - spill response procedure Mork un scenario and debrief	Site PPE as a minimum - additional PPE as required Wind socks x3 Note from the team risk review conducted on 235ab2016.	Effective 1	5 5	Medium Y	NA	N Active	NA NA	NA	NA		0 Low	
			or while dealing with a spillleak	Environment discharge (see env. Risk register)		2017						~		chemicals regularly (non-stagnant under normal operations)		Violetta Wypych, Robert Petrevski, Bob Maneveski, Alex Simon, Dhaval Joshi and Aban Debpy : Emergency response and Rescue involving Breathing Apparatus are considered to											
OH036	Safety Che	micals Fairfield RWP Loading of bulk chemicals into incorrect tank	Generation of harmful gases (e.g. chlorine) Strong chemical reaction (revealed awtharmin)	Potential for fatality / injury Inhalation of fumes, case, emination	Operations Manager	Work Health and Safety Act 2011		5	5	25	Extreme	By design, number and volume of chemicals required for treatment is limited (selection of noncoor-		Design - storage facility dedicated and separated for each chemical Design follow safety cuidelines and locome learnt from minimum and	Power is only supplied to unloading area if all correct pre unloading ts checks are satisfied	be better handled by the emergency services. Evacuation is the neutroneticular method g Site PPE as a minimum - specific PPE as required Wind socks x3	Effective 1	5 5	Medium Y	NA	N Active				0	Low	<u> </u>
			Explosion Catastrophic tark failure Emirorment discharge (see env. Risk register)	Chemical burns/irritation (skin, eyes, airways)	-	Work Health & Safety Regulation 2017						engineering, etc)		collaboration with chemical suppliers Power supplied to designated chemical bay only Unitading points are locked with individual locks	Use licenced dangerous goods transporter Chemical delivery driver induction Delivery driver accompanied by delivery point technician or in conta	Note from the team risk review conducted on 23Feb2016 - Voletta Wypych, Robert Petrevski, Bob Maneveski, Alex Simon, Dhavel Joshi and Alban Delpey : Emergency response											1
															with radio CCTV Identify of chemical through order, signage, delivery dockets, MSD Chemical brooffee training	and Rescue involving Breathing Apparatus are considered to be better handled by the emergency services. Evacuation is DS the preferred/safer method.											1
													L		Evacuation procedure - spill response procedure Mock up scenario and debrief												<u> </u>
OH037	Safety Che	rricals Fairfield RWP Decanting chemical from IBCs	Increased risk of spill due to decarting Load is lifted above head Handling of tother and fittings Load may have to be trees of the second second	Potential for fatality/injury Chemical contact, burns, etc Crush injury Exer Distances (see one Pint excitent)	Operations Manager	Work Health and Safety Act 2011 Work Health & Safety Regulation 2017		3	5	15	High	Design - only citric acid may have to be decanted fro IBC to IBC	m	Prexisting karrlock connections used to connect pipes for decartin	Cualified forkilt driver and spotter. Use of JSEA/SWMS	Site PPE and additional PPE as required Safety showers and eye wash station	Effective 1	5 5	Medium Y	NA	N Active		$ \top$			0 Low	
OH038	Safety Che	micals Fairfield RWP site wide - Pipework unidentified Also: all Network site locations	Some unidentified pipework (incl. direction, nature of th fluid gas-liquid, pressure, etc) - incident due to lonk of	Energie (see env. HSK register) Potential for fatality(injury (incl. pressure) Chemical contact, burns, etc	Operations Manager	Work Health and Safety Act 2011	2	2 5		10	Hgh	For the Natwork (Fairfield PS, Woodville and Rosehil PS): pipework only carry recycled water and rvitable			Up to date PSID drawings are available at admin building. Allow identification.	Site PPE and additional PPE as required (task specific) Safety showers and eye wash station	Effective 1	5 5	Medium Y	NA N	Active	NA NA	N/A	NA	+		
			identification. Unable to identify the pipework via labels and to respon accordingly.	Enr. Discharge (see enr. Risk register)		Work Health & Safety Regulation 2017						water For the Network (customer sites): asset maintained carries only recycled water but surrounding pipework			Treat any leaks as a potential chemical leak (consider worst case scenario) Treat any pipework as potentially dangerous.												1
			Lunak detected from unknown pipework.									exposure is limited (access controlled - induction - supervision) High pressure fluids are named - induction -															1
OH040	Safety Nois	e Fairfield RWP site wide - loud or continuous noise in various areas Also: Network sites (Fairfield PS, Rosehill PS and Marubeni site)	Exposure to noise (incl. plant, equipment, traffic, coolin towers)	g Potential for moderate injury (eg. hearing impairment) Potential for miscommunication resulting in injury (talking	Operations Manager	Work Health and Safety Regulation 2017 Part 4.1	3	3 3		9	Medium	steel mostly/ rather PAC Design - equipment selection incl. consideration for noise/vbration		Acoustic enclosures fitted on loudest equipment (RO HP pumps, flo control valves)	 Equipment maintenance (eliminate abnormal vibrations) Normally spend limited amount of time in the loud areas. 	Provision of adequate ear-plugs at relevant locations (incl. Network vehicle) - ear-plugs stations refilied (VAMS WO)	Effective 1	2 2	Low Y	NA N	Active				+	\rightarrow	reduced risk as control measures implemented are likely to reduce criticality of
			cumulative exposure - health effect	over notie)		voise Management and Protection of Hearing at Work: Code of Practice								compressors are in a separate, dedicated room	own induction and training Task specific JSEA Mandatory hearing protection areas defined and when acoustic environment remnand												an incident
															Site signage Health smeillanne innbries hearinn test												L

Risk Register - Workplace Health and Safety

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NSW/Fairfield RWP

OH050	Safety t	Slps, trips, Jalis Vidoor/oddoors, ind. poorly if areas, office work, lab work Alac: all Network site locations	Slipping, tripping or falling Walking aroundion electrical leads, gutters, cable trays steps, walkways, etc Walking on uneven ground Stepping over objects	Potential for moderate injury	Operations Work Health and Safety A Manager 2011 Work Health & Safety Re 2017	Act 4 Igulation	4 3	12	Igh By design - floors are normally even, obstack minimised, access is provided - lighting (natur artificial is sufficient)	altiteps al or	Non slip flooring in some areas Some stops have yakting and/or arti-slip stops AddSional concrete pathway to waik to VP1 rather tahn waiking or univers ground Railings are provided as required	Housekeeping (eg keep walkways clear, clean up spills in Kitchen Use walkways and access ways Use portalise lighting an required Task specific JSEA and PPE Sills induction	Adequate footwear worn at all times	Effective 2	3 6	Medium Y	NA. N	Active NA	NA NA	NA	
OH060	Safety	Manaal Fairheid RNP sile web-timphanding, use of tool (nct. workshop), anding, use and/notice work, values Alao: all Network site locations epeconics, ePPE	Lifting haavy equipmention/swand weight Dangarous hending Inadequate use of soots Inadequate agroomics/evorstation Long-term fatigualinjary Repetitive tasks Cuts, scraps, bruises, etc	Potential for moderate injury (muscle, back, neck, hand: eyes, etc.) Potential for long-term injury	s, Operations Work Health and Safety A Manager 2011 Work Health & Safety Re 2017	Act 4	4 3	12	By design – Imited need for Ifting and/or hand explorment Uale mobile iifting through third party (e.g. crai	ling ne rental)	Guarding Black on relating equipment and on most bols Use electrical confines both where possible Design of workstations Machanical Black equipment evaluation on site (process building, wa area, BW area, workshop, mobile fordill + (a, etc) Portubile IRING equipment (publics), etc) Mobile toolay where applicable Educion of the analysismed when machan	Independent expert review of workstations (Oc. Therapist) - use ergenomic thrink insylbaceflownes, hard-set, foot-net, etc Taam III it machanical IMing not possible Rotate job as of rest. Marsut handling training (not. V-taaming) Training in use of workshop tools Taaki specific JSEA	of Site PPE as minimum and glows as required	Effective 2	3 6	Medium Y	NA N	Active			
UNUSI	Salaty 1	whelley, Christing, Farringe ampling pool (bacterological ampling), for the second sec	value d'autor, au exponsioname, spanse, seurg la l'existence private en barres Dour-baarling metal (conduction of heat) Confact with unattended hot appliances	ett, ett den som en	Openators 2011 Posternet Davery # Manager Work Heath & Safety Re 2017	nc •	•	10 53	 P adapt - million had to into know a had pipel, and colone are into a down and the pipel, and colone are into a down and the pipel, and party services used for most significant works, often working offsite. 	un weld, welding	Anthenis exclusion' versitation Safety feature on boiling water top and laminator	WebSingsprickgrund - those by trained/computer technicians (see an interfacing time by back). Use of adequate loads, computer with standards. Tool maintenance also imperior. Permit (por service) and subcontractor supervision/observation discubility. Tooling and tagging Hasawaging	en and an experimentation and additional PPC an impact (eg. PPC en adoptional and another globace, etc.) Rev En adoption and an additional and additional and a PPC bit bit (etc.) Ballety showers (at Fairfield RMP only)	Efledive 2	* *	Medum T	NUA NUA	Active Intracigue to the interaction of total fire ban alerts to process and on call phones	Junio 18	RIVO	
OH062	Safety I	Manual Partials RWP and all Neteork locations - Using PPE or safety equipment and particular processing procesing processing processing processing processi	incorrect PPE or damaged equipment or faulty equipm	et Potential for fatality/rejury Potential for htting body with tools or equipment	Operations Work Health and Safety A 2011 Work Health & Safety Re 2017	Act 4 Igulation	4 4	16 Ex	Eliminate possibility of contact where possible og create distance between body parts and o	s. Sjerts.	Select durable PPE Preventative maintenance (WC) checks on some PPE (e.g. chemic ads, breating approxitia) Ensure good body positioning when using tools.	I load fact load to be the termine societ Individual uses must check that PPE before, during and after cae all Taining in using some explorment Corporate allow the termine Sites suffer; champion promoting back paractice Maintain PPE stachcialar and check paractice Maintain PPE stachcialar a		Effective 2	4 8	Medium Y	NA NA	Active			
OH063	Safety	Marxail Fairfeid RWP site wide - Ascendingidescending into pit/tanklopen andring, use tanklootalsato foota, Gaa monitor failure gragonomic, Alao: all Network site locations PPE	Failed Itting equipment/PPE/gas monitoring leading to fail/rejury	Potential for fatality/injary	Operations Manager 2011 Work Health & Safety Re 2017	Act 3 Iguiation	3 5	15 B	len l		Purchase improved designed equipment: assembly and ropes for according/descending; and safety retractable line Select reputable brands	Use Iting equipment register and PPE register WO for maintenance of equipment (safety liting, slings, cranes, g monitors) Lise take 5 procedure. Lise Always Safe Mate "be in the moment / be present " thought	16	Effective 1	5 5	Medium Y	NA NA	Active NA	NA NA	NA	
OH070	Safety I	Earthiad RNP-aile wide-instrumentation, laboratory, A/C, office/admin, tools, the caraon mails, cable mays, doc	Risk of electrocution Possible use of electrical equipment nearlabove water	Potential for electrocution Potential for Fatalbylinjury Multiple injuries, burns	Operations Work Health and Safety A Manager 2011 Work Health & Safety Re 2017 Part 4-7	Act 4 Igulation	4 5	20 Es	ene By design - (RCD) Residual current devices b circuit Limited number of power points and electrical	ait into devices	Power Points raised above bench/working areas and IP rated Guarding - insulation Selection of equipment/design	Testing and tagging Good housekeeping Training First ad, CPR. Low voltage rescue Lise of appropriate equipment for the task Task specific JSEA Setton toom and cabinets are normally looked	LV relaces kit Site PPE and additional PPE as required	1	5 5	Medium Y	NA N	Active NA	NA NA	NA	
OH071	Safety I	Excitical Fairfuld RWP alte wide - Low voltage exitsh boards and equipment Also: all Network site locations (electrical panels, PLC cableds, RTU cabletes)	Contact with live wires during testing, repairing, inspecting, ac Proximity to under floor wining - risk of contact incorract use of testing equipment Unauthrelised access leading to electrocation incorrect isolations and encound	Potential for electrocution Potential for Fatally/righy Multiple injuries, burns	Operations Work Health and Safety A Manager 2011 Work Health & Safety Re 2017 Part 4.7	Act 4	4 5	20 Ex	ene By design - selection of equipment - limited n electrical equipment presenting a risk Part design (it.g. cabling, guarding) limiting p contact or reducing likelihood of contact	mber of	Automatic trip devices installed (RCD, trip relays, overload trip rela etc)	Sile induction y, Isolation parmits, task-specific JSEA Licenced electricians Contractor permit system Teatic equipment Teating and tagging (WO) Sile induction Sile in	LV rescue kt	1	5 5	Medium Y	NA N	Active			
OH072	Safety I	Eartrical Fairfeid RWP alle wide - Switch Room (MCC Motor Control Centre and PCC Power Control Centre) - Capacitor banks Alao: all Network site locations (electrical equipment, VSDs, harmonic filters)	Retains electric charge - electrocution	Potential for electrocution Potential for Fatalbylnjury Multiple injuries, burns	Operations Work Health and Safety A Manager 2011 Work Health & Safety Re 2017 Part 4.7	Act 4 Iguilation	4 5	20 54	By design - selection of equipment - limited ru electrical equipment presenting a risk Plant design (e.g. cabling, guarding) limiting p contact or reducing likelihood of contact	mber of zsable	Cabinet doors are explosion rated and fitted with explosion verts (Fairfield RWP only)	Isolution permits, task-specific JSEA Licenced electricians on site Contractor permit system Tast equipment Site induction	LV rescue kit	1	5 5	Medium Y	NA N	Active Purchase of Ni fame proof clothing for electricians	ole Rilley 31/12/19		
OH073	Safety	Electrical Fairfield RWP site wide - Switch Room - UPS/batteries Butteries overall	Electrocution - whenever power is out, UPS/battery is an on Demaged bettery casings cause burns or gases	zill Potential for electrocution Potential for Fatality Multiple inturies, burns	Operations Manager Work Health and Safety A 2011 Work Health & Safety Re-	Act 4	4 5	20 Er	By design - selection of equipment - limited re electrical equipment presenting a risk Plant design (e. a. cablina, quardina) limiting o	mber of	Barriers fitted around batteries Use insulated tools Usino sealed maintenance-free batteries (Fairfield RWP and all	Trainine First aid CPR I new whole nearce Isolation permits, task-specific JSEA UPS serviced regularly (GAMA WO) Works conducted by (General electricians	Thick rubber soled shoes/boots	1	5 5	Medium Y	NA N	Active NA	NA NA	NA	
OH074	Safety I	Also: all Network site locations Electrical Also: all Network Site locations	Risk of battery explosion Electrocution - lightning storm electrifying building or coming in direct contact	Contact with chemicals Potential for electrocution Potential for Fatalby/injury	2017 Part 4.7 Operations Work Health and Safety A Manager 2011	Act 1	1 5	5 5	contact or reducing likelihood of contact Third-centry servicing the LPS Restrict exposure in case of electrical stormli weather	skemert	Nutwork site locations) Lightning arrestors installed on site (dedicated pole and roof of pro building) - both Plant and Nutwork	Ventilation . Lightning protection serviced regularly (GAMA WO) by third party		1	5 5	Medium Y	NA N	Active NA	NA NA	NA	
CHDen	Safet	solutions Fairfield RWP site white - induition for mainternance rised as	Fire	Multiple injuries, burns	Work Health & Safety Re 2017 Part 4.7 Operations Work Health and Control	igulation	3 4	15	an By design - anna huit je fankana danink	boerd	Devices/tanks are grounded Selection of devices (mrl. Invision feature-1	Lise of drawinos		Effortion 1	5 4	Medium	NA N	Active			
01.00	Janiy	Alloc al Network Sile locations	Inconce commerce and permit, isolation procedure Incornect use of permit, isolation procedure Incornect use of permit, isolation procedure Lack of experience Incornection 25.64 (risk overlooked) Isolation device failure	Potestial for enirormental discharge (see enr. Risk register)	Manager 2011 Work Health & Sufety Re 2017	ngulation			u og danger rokal disconnect when the warks (kg, and) a already included		demonstration demonstration (res. society means say)	Isolation, permit procedure - permit review Task-specific JSEA Site induction and training						PLUM			
Unusi	Danity	soulders (Helders Education (Jano Group of Jeneral III) decident for matterance purpose (Incl. permit)	Contraction outware permit systems assume to used every time - site owner's permit fieldation system may also be required to be used depending on the sites) incorrect use of site owner's permit, isolation procedur imperportation qualified personnel Lack of experiance isolation device failure	Potentia de realizioner) Potentia de reviermental discharge (see env. Rok register) e	Manager 2017 Work Health & Safety Re 2017	na 3 Igulation	2 2					Cae virus permit system regarizes and (i required) on top of the sale cover's patient. Attend lockston/permit training seasion (if required by the site own	er)	Enective		NUCLUTI T	NA N	ACON			
CH090	Safety I	Partiell RNP-sile wide - Flooding	Poorting das to major pipe barsta (rect. bursting diako) major narifat, note: the plant is bailt in a flood plant Embioremental diakonge (possible contamination via collection of politizats on site/mail) - see enr. risk majotar Contact between fluid and electricity	or Potentia for downing and electroschon Potentia for horoscal sejo, trijo, ful Potentia for increased postvermelvelidite	Operations Wark Health and Safety A Manager 2011 Work Health & Safety Re 2017	Act 4	4 4	16 Ex			By doorp, -plant explores to weak that are closed (164) to an accidential all, consists and explored to force water bareach the water and of the plant and the astromater basis. Summater basis is designed to retain stormwater and has built in weit. Enc. disclarges are controlled through water, and the storm of the storm of the storm of the storm of the Basis water takes (20) to obtain its waiter storms of the Stormwater davies privacyback alls (basked) Process building return to confer call (lipse band) and fitted with is earness and sump pump. Plant water takes (the starbback)	cl Organ projection and env important (not basis and pts) Marinement of explorem (into two learens) a) Indident response procedure Hausakeeping and Hamical segregation (reduce contamination) (also refer to "Becthocolor" risk category) all all	Comboots, wat weather gear in addition to sile min. PPE	Effective 1	5 5	Madium Y	NA NA	Active NA	NA NA	NA	
OH091	Safety I	Rooding All Natwork Site locations - Rooding	Flooding due to major pipe bursts (incl. bursting disks) major rainfall. Emirormental discharge (possible contamination via collection of politiants on site/road) Contact between fluid and electricity	or Potential for drowning and electrocution Potential for increased sigs, trips, fall Potential for increased pest/vermin/wildlife	Operations Work Health and Safety A Manager 2011 Work Health & Safety Re 2017	Act 3 rgulation	3 5	15			Stormwater drainage throughout site (luberlied) Drainage to collect spill in buildings (pipe burst) and fitted with level sensors and samp pump Pib are fitted with level senitches	Organing inspection and anni inspection Maintenance of equipment (incl. level seasons) Housekeapting and chemical segregation (reduce contamination) (also refer to Electrocotion' risk category) Eline twise next Working	Gumboots, wet weather gear in addition to site min. PPE	Effective 1	5 5	Medium Y	NA NA	Active NA	NA NA	NA	
onito	Landery I I I	en ourieur de la contraction d	Collapse of excervation Collapse of excervation Confact with sabestos	Drowing, engativest Objects talling from overhead Prostane (pipe Jurn) Aubestos cortact / Inhalation	2011 2011 Manager 2011 Work Heath & Safety Re 2017	nu s			 Overhauf services. Equipment is largely above or in charmals. No pipotosibe bridges are in place on the mail theroogifiares. 	ground 1	conducted. Also, >500m sol-cap was inplemented to induce che of reaching the possibil jubitation communitation data Barriadatty units' andergranza bat access pits are in places to real key equipment (e.g. flow mater, valve, connections, etc)	non Ex. searcess taining to at staff Permit system: Exercision, Confessione entry and working at height As build charang consultation before escuration of Environment Management Plan (incl. asbestos) As build charang consultation before escuration taile of expediate constactions that of expediate constactions Patholing or hand escuration in high risk areas Tasks specific SJEA	Site and additional PPE								
OH101	Safety I	Execution. All Network locations - Excavation and overhead services and overhead eventoes	Hitting underground or contributed services Collegas of execution Contact with abbastos or other unknown contaminants ground (incl. industrial sites)	Electrosotion Drowning, engulfment In Objects failing from overhead Pressure (pipe burk) Contact / inhalation of asbestos or other unknown contaminants	Operations Work Health and Safety A 2011 Work Health & Safety Re 2017	Act 1 Igulation	1 5	5 14	dam By design - extremely limited requirement for excavation and overhead services at the Neth	ork sites	Baricading work area. Some experient is underground but access pits are in place to real kay experient (e.g. flow mater, valve, connections, etc) Pits Drainage pumps	Site induction are Training. Parmit system - Excession, Confined space entry and working at bits owned by other than VW or Jemens/AquaNat: Use of site exempt spatial (Frequired) Use of regulatile contractors Potholing or hand escatation in high risk areas Task specific JSEA	Site and additional PPE	Effective 1	5 5	Medium Y	NA NA	Active NA	NA NA	NA	
OH110	Safety 1	Millin, Fachler Ryte Ja wild, "Millin, work, ped anne, pad	Contact with Wildlin, warnin, past Blace sunka, politikov, dic Börger warps, base, dic Dörge pope	Postenid to faulty/stay Postenid to faulty/stay Postenida for biological huzards (verneli)	Operations Work Health and Safety A Manager 2011 Work Health & Safety Rey 2017	Act 7/2014 - RIVO 3 3440781 bee sling gulation	3 5	15	*		By doary - Inited possible wilds, weren, pair types (doar, leares, hather, wilds, wilds) and the second solution Interch repaired spray wallidad (not, in Network wilds)	She kakatini Tank specific. SEFA biodoff strapportag producting (jak in case of an injury and near mits Smale bite response protein displayed at Farinetti RNP WHO making - touboot Company and the specific strapport of the specific strapport Particle RNP on the company and the support of the specific Particle RNP on the specific strapport of the specific strapport Particle RNP on the specific strapport of the specific Particle RNP on the specific strapport of the specific strapport Particle RNP on the specific strapport of the specific strapport Particle RNP on the specific strapport of the specific strapport strapport respective strapport of the swellable (rect. in Network weblick)	Sile PPE and additional PPE as required (not gloons, masks) a)) Effective 1	5 5	Medium Y	NA NA	Active NA	NA NA	NA	
OH120	Safety I	Fre Fairheld RNP data who funds, solveds, parts, galaxi brech from - Exercise facts, but the Allow all Network site locations, particularly the Rosehill are (nearby the Shell alle)	Burra, aughyddion Cortaminants/smoka inhalation	Potential for fatality/rejury	Operations Work Health and Safety A 2011 Work Health & Safety Rey 2017	Act 3 Igulation	3 5	15	1 0		Fairbidt RMP only, Automatic A/C fire mode (induce likelihood of f propagajoo) Fire valuatient doors (eg. switch noon) Fire valuatient doors (eg. switch noon) Fire valuatient doors outbale extrinsi Firevitancie detection and alarms in most locations	In Some all dangemous poods in appropriate autoinstativoratives designed for the product. Show for in the dangemous goods atome or fame a proof cablest while the workshop, Product autoinger, with hazardous substances register No smoking on site. Fire booster station on site (Fairfield RNIP) and fire hydrants Fire worden taining Fire edingsitems training	Site PPE is made of outton in Fire ediographies (several types for several types of fires) an blanking Fire hoad Note from the hearn fak review conducted on 25Feb2016 - Voletate Wypy, Robert Petrevek, Bob Manweak, Alex Simon, Dhavai Jodri and Alan Debys; Fire Riscoaleveoardin inviholti Breating Appartate are	d Effective 1	5 5	Medium Y	NA NA	Active			
OH130	Safety 1	Nonking Fairfaild RWP and Network locations: UV or temperature	Surburn, heat stress, hypothermia Possible cumulative effect (leading to skin cancer)	Potential for moderate injury	Operations Work Health and Safety A Manager 2011 Work Health & Safety Re 2017	Act 3 Iguiation	3 4	12	by design - plant and facilities are partially un	Ser cover		Evelociation drifs Farabilism relationshin with local fize det Stuff awareness (toobox, WHS meetings, etc)	constanted to be better handled by the emergency services. Function in the neiderant method Uniform with long sleeves and long parts to protect against surburn Uniform with insulated jacket to protect against cold Surblock available - hat bern available	Effective 1	4 4	Medium Y	NA NA	Active			
OH131	Safety 1	Norking Fairfield RWP and Network locations: Dust, sand, foreign bodies in eyes conditions	Potential for eye injuries due to various environmental factors including dust, sand and foreign bodies	Potential for moderate injury	Operations Manager 2011 Work Health and Safety A 2017	Act 3 Igulation	3 3	9 M	diam By design - plant and facilities are partially ind Plant and other Network location Use IEEs or no powdered chemicalis, products (low exposure)	etc	HMAC - Air filtration - for indoors only	Staff awareness (toobox, meetings, etc) Preventative Maintenance of HVAC	i or wells i W conterfine risones Protective glasses part of mandatory PPE Additional protection (eg. glasses/masks) as required	Effective 2	3 6	Medium Y	NA NA	Active NA	NA NA	NA	
OH132	Safety	Vorking Fairfield RWP and all other Network locations: Laboratory works (not. field reading), sampling Contract with initier autor possibly containing bacterial-viruses/etc and other containiteants	Contact with harmful biological material (incl. ingestion/inhalation, eyes, skin, etc) and other contaminants	Sicknessinjary Contamination of others (family members, etc)	Operations Work Health and Safety A Manager 2011 Work Health & Safety Re 2017	Act 3 Iguiation	3 5	15	Identify the sampling testing lexposure due to limit for contact. Secondary treated effluent (some treatment is Otionination of the feedwater early in the pro- (reducing likelihood/sepssure)	ad need neel esa	Discreet sampling points and drainage No foreign contaminants other than the naw water contaminants an chemical dosed Mostly work in favourable conditions (lab)	Sampling methods, incl. flaming, disinfection of pipework d Suff training and lak computency assessment Extinglicitisking is prohibited in the lab and while performing samplinghasting in the faild Wash hands regulatly Pacificitant board such available in highworks, and lakou/k	Site PPE and plastic gloves as required Eyewash stations	Effective 1	5 5	Medium Y	NA NA	Active NA	NA NA	NA	
OH133	Safety 1	Partiel RWP and all other Network locations: Staff services, long hours (especially during shutdowns and call out periods)	Increased risk of incidents in general, human errors Increased risk of car accidents on commutaltransport between Network locations Increased risk of miscommunication	Potential for fatalitylinjury	Operations Work Health and Safety A Manager 2011 Work Health & Safety Re 2017	Act 3 rgulation	3 5	15	Igh Here temporary staff to do some of the work of out if required Staff must live within the of site maximum	rhip		Rotatr ensuring staff rotation - manage resources Minimum breaks between shifts and during shifts During shutdown in particular, promote healthy earling and appropriate hydration - also organise local accommodation when rotating in under management of the second stateme		Effective 1	5 5	Medium Y	NA NA	Active NA	NA NA	NA	
om34	Samety	rainaid noir an a' dhe fillean Iodions. Lone working	stawe train, or aggravating incident outcomes Increased risk of human error Increased risk of mental health disease when Ione working is recurring.	ye səhrmən rər mənənği fişiriy	Manager Work Health and Safety A 2011 Work Health & Safety Re 2017	3 Igulation		13	remer possible, work is done during sak's m huas Fairfield RNP only: most alarm call-pap catils basiness hours can be addressed and resolu- renciely (correction to SCADA from home), require saff to come to alse physically. Fairfield RNP only: Security patrols are done Thirkness remeit-	te of d don't by a		International operations of the second secon		E-methine 1	> 5	Y	NA NA	Activit NA	-un NA	ΝΆ	
OH140	Safety I	Pressure Furfield RNVF site weis - failure of pipes or fistures under pressure (compresse air, Buic, d., pa) Pressure vesalls RO vesales and pipeordit. Intradeguate matterial satedidin Alter air Memorit Notifonis	e Equipment failure (e.g. random fault, fault due to corrosion, over-pressurised, etc.) Incorrect operation/usage (inc.) incorrect material selection) Exposure to noise affecting hearing	Potential for fatality/injury	Operations Work Health and Safety A Manager 2011 Work Health & Safety Re 2017	Act 3 Igulation	3 5	15	ligh		By design - Pressure steepasts for application only (limited) Material selection, tank/secal design following regulations, supplie third parties Designed controlled pressure release systems to avoid failure (e.g. enhaust, PRV), bursting disks) Software and hardwired interlooks - online monitoring and control - safe modes.	Pipework tosted for operating pressure and above d by Regular inspections, Maintenance Pressure vessel inspection and registration with NSW WorkCover ((yealty) Experienced Technicians fail Task specific JSEAPermit	Site PPE as a minimum, additional as required (incl. additional glasses, hearing protection)	I Effective 1	5 5	Medium Y	NA N	Active NA	NA NA	NA	
OH150	Safety I	Management Fairfield RNP fair date - Improper use of the safety and security procedurativystams - aubcontract Asic at Network locations - s	Potential for breach of safety procedures leading to injury/latality	Risk of fatality/mjary	Operations Work Health and Safety A 2011 Work Health & Safety Re 2017	Act 4 Igulation	4 5	20 Ex	Annal builded mpt moles - evices the cont performance: opportunity to identify non-comp contraction, escalate issue and communicate plant	adora Ajeng Isa other	Loolad acoss (keys required, galles, etc.) Fairfaid RNP: CCTV monitoring	Contractor selection Stills induction Format and JSEA (task specific) Signamistion discontractors on site - possible use of 2way radio to stally in contact (Fainfeld RNP-only) Taxen communication related to contractor supervision (use white board and team shared calendar)	s	Effective 1	5 5	Medium Y	NA NA	Active NA	NA NA	NA	
OH151	Safety I	Farifield RNP-ball wide-activities possibly affecting long-term health (i.e. math risk martin leading, noise, could with chemicals and biological species (vinu, bacteria, etc), unertail health, etc) Also: all Network sites Workin: Earlieft RNP-Da wide, activities and biological species	Long-term health impacts. Health Impacts	Potential for health impact (ranging from minor to major) Potential for health impact (measing from minor to major)	Operations Work Health and Safety A Manager 2011 Work Health & Safety Re 2017 Oreratives Work Health and Concernent	Act 4 act	4	16 Ext	Design - reduce exposure to those activities b selection of equipment, plant design, etc	y	Traaria she oo harf aafara polio ohoo nooshin. So'r	In addition to all other control measures identified in this risk regist health survivalince has been implemented (medical test) to regular mention the staff's health mention the staff's health	er, y Wear PDF of the consert size need in anod coastic-	Effective 2	4 8	Medium Y	NA N	Active NA		NA	
UH152	Sarrety	rement rver save wide - activities eg, itting pit lefs, lifting samp partps,cutiling, conditions weight, traversing bose ground, possibly leading to strains , sprain , repetitive hjury.	* ====01 mpacta	 - service for resent impact (ranging from minor to major) 	y u-persecres Work Health and Safety A Manager 2011 Work Health & Safety Re 2017	regulation 3	- 4	12	commune repetitive movements by rotating tas change method of movement if possible. Keep hands out of "line of fire" when undertail Eliminate bare skin by keeping skeeves on PP down and wearing long parts.	 , une two persons or a mechanical aid. ing work. E rolled 	enerse sale on new suffice paths where possible, limit traverse to across gravel etc. Lubricate p2 lici hingss each time opened to maintain least resistant for ease of litting.	 Twar Correct commig and grows gwing body maintum support. Ensure PFE: In ort wom and is in good condition. Select glows suitaie for the task to be undertaken, eg welding, cutting protection etc. 	www.mmm.commett.sze.ansd.in.good.condition.	Emediate 2	* 8	Y Y	nA N	Picand NA	NA NA	NA	
OH153	Safety Safet-	Working in Morking in presimity of basy roads and traffic Area	Personfequipment hit by a car	Accident, injury, death, property damage	Operations Work Health and Safety A Manager 2011 Work Health & Safety Re 2017	Act Iguiation	2 5	10	en		Spotkerbullic management training Spoclasist traffic management contractors utilised Weakly utilize charges risk transmission	Dián Intere	- High Vis clothing	Neutral 2	5 10	High Y	NA	Ep			
0H154	Safety	Area Working in Not job specific	Lone worker	Inability to get assistance when an incident occurs	Operations Work Health and Safety A Manager 2011 Work Health & Safety Re 2017 Operations Work Health and Safety A	rgulation Act	3 4	12	lgh			Convergence Chay Road Rules - Fadgue management Drug & Alcohal Pulsey - Lone worker procedure in place		Effective 2	2 4	Medium Y	NA	Emergency management plan to be developed	_		
		Hazaroosi Area			Manager 2011 Work Health & Safety Re 2017	gulation						 No high risk activities conducted in lone worker situation 									

							Consequence		
	·····			People	Injuries or aliments not requiring medical treatment.	Minor injury or First Aid Treatment Case.	Serious injury causing hospitalisation or multiple medical treatment cases.	Life threatening injury or multiple serious injuries causing hospitalisation.	Death or multiple life threatening injuries.
E - Ex H - Hi M - M L - Lo High c	treme risk – detailed gh risk – needs seni edium risk – specify w risk – manage by pr Extreme risks musi	or management attent management respons routine procedures	ion sibility	Environment	Minor environmental consequence (minor spill)	Environmental nuisance (unsightly or offensive condition caused by pollution)	Material environmental harm (actual or potential harm that is not trivial)	Serious environmental harm (actual or potential harm that is of a high impact or on a wide scale)	High level serious environmental harm (serious environmental harm that affects the wider community)
the risl	to Low or Medium .	aaneu treatment plans t	Teduce	Reputation	Internal Review	Scrutiny required by internal committees or internal audit to prevent escalation.	Scrutiny required by external committees or Auditor General's Office, or inquest, etc.	Intense public, political and media scrutiny. E.g Front page headlines, TV, etc.	Assembly inquiry or Commission of inquiry or adverse national media.
				Business Process & Systems	Minor errors in systems or processes requiring corrective action, or minor delay without impact on overall schedule.	Policy procedural rule occasionally not met or services do not fully meet needs.	One or more key accountability requirements not met. Inconvenient but not client welfare threatening.	Strategies not consistent with Government's agenda. Trends show service is degraded.	Critical system failure, bad policy advice or ongoing non- compliance. Business severely affected.
				Financial	1% of Budget or <\$5K	2.5% of Budget or <\$50K	>5% of Budget or <\$500K	>10% of Budget or <\$5M	>25% of Budget or >\$5M
					Insignificant	Minor	Moderate	Major	Catastrophic
	Probability:	Historical:			1	2	3	4	5
	>1 in 10	Is expected to occur in most circumstances	5	Almost Certain	5-M	10-H	15-H	20-E	25-E
po	1 in 10 – 100	Will probably occur	4	Likely	4-M	8-M	12-H	16-H	20-E
eliho	1 in 100 – 1,000	Might occur at some time in the future	3	Possible	3-L	6-M	9-M	12-H	15-H
LIK	1 in 1,000 – 10,000	Could occur but doubtful	2	Unlikely	2-L	4-M	6-M	8-M	10-H
	1 in 10,000 – 100,000	May occur but only in exceptional circumstances	1	Rare	1-L	2-L	3-L	4-M	5-M

Adapted from Standards Australia Risk Management AS/NZS 4360: 2004

Appendix C.09

Management Systems - Water

Rosehill Network Pty Ltd – WICA Application

Rosehill Network Pty Ltd

ACN 131 213 691

RRWS-IMS-DOC-003 Water Quality Management Plan

Version No	Version Date	Approved By	Status	Next Revision Date
0.1	4 May 2020	N/A	Draft	N/A
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Document Approver: CEO

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1. Introduction

Rosehill Network Pty Ltd ('**Rosehill Network**') holds Network Operator's Licence number 09_002 issued under the *Water Industry Competition Act 2006* (NSW) ('**WICA**') under which it owns water infrastructure that forms part of the Rosehill Recycled Water Scheme ('**Rosehill Scheme**'). This document, Rosehill Network's Water Quality Management Plan ('**WQMP**'), has been developed to satisfy the requirements of the *Water Industry Competition (General) Regulation 2008* (NSW).

1.1 **Rosehill Scheme Overview**

The Rosehill Scheme involves:

- extracting secondary treated effluent from Sydney Water's Liverpool to Ashfield Pipeline ('LAP');
- treating the effluent to produce high quality recycled at the Fairfield Advanced Water Treatment Plant ('Plant'); and
- transporting recycled water from the Plant, through a distribution network ('**Network**') to customers in the Fairfield, Cumberland, and Parramatta local government areas ('**Customers**').

The scope of the Rosehill Scheme is shown in **Annexure A**.

The Rosehill Scheme is underpinned by a 20-year Project Agreement between AquaNet Sydney Pty Ltd ('**AquaNet**') and Sydney Water and is capable of delivering up to 25 million litres of recycled water per day to Customers.

Under the Project Agreement, AquaNet delivers recycled water to Sydney Water for the sale to its own customers ('**Foundation Customers**'). Sydney Water has retail contracts with the Foundation Customers. Sydney Water supplies up to 32ML/d of treated effluent (according to an effluent specification in the Project Agreement) to the Plant from the LAP. AquaNet may sell any water in excess of that required to supply the Foundation Customers directly to its own customers ('**Non-Foundation Customers**').

AquaNet owns the Plant and has entered into an Operation and Maintenance Agreement with Veolia Water Australia Pty Ltd (**'Veolia**' or **'VWA**') who is responsible for maintaining and operating the Plant.

Rosehill Network and its sister company, AquaNet, have entered into a Pipelines Agreement whereby Rosehill Network constructed and owns the Network. Rosehill Network has entered into an Operation and Maintenance Agreement with Veolia who is responsible for maintaining and operating the Network.

Both Rosehill Network and Veolia hold Network Operator Licences under WICA.

The contractual structure of the Rosehill Scheme is depicted in **Annexure B**.

AquaNet and Rosehill Network are both part of the Water Utilities Australia group of companies ('**WUA**') and through its various subsidiaries, WUA provides the resources, skills and expertise required for AquaNet and Rosehill Network to deliver the Rosehill Scheme.

2. **Executive Summary**

2.1 Purpose

This WQMP has been developed for the Rosehill Scheme and is to be read in conjunction with the Veolia Document, *MAN-3954-4 Operations Management Plan – Rosehill Recycled Water Scheme* (OMP), which provides an overview of the plant's Integrated Business Management System (IBMS).

This WQMP together with OMP address the 12 elements of the framework for the management of recycled water quality and use, as detailed in the Australian Guidelines for Water Recycling.

Throughout both of the documents specific references are provided to relevant procedures, work instructions and other documents that all together form the FAWTP Management System.

Detailed references are provided in the Veolia Document, *TEM-3978-1 WICA Requirements Reference Table*.

2.2 Expertise in producing and maintaining recycled water quality

2.2.1 **Design, Management and Regulation**

At the commencement of the scheme AquaNet oversaw the RRWS through two major subcontracts for the Plant and Network as follows:

- Plant Agreement: Veolia was responsible for owning, designing, constructing, maintaining and operating the Plant under a 20 year (2011) agreement with AquaNet Sydney Pty Ltd (AquaNet).
- Pipelines Agreement: Rosehill Network Pty Limited (Rosehill Network) was responsible for owning, designing, constructing, maintaining and operating the Network under a 20 year (2011) agreement with AquaNet.

In 2019 the ownership of AquaNet and Rosehill Network was transferred to Water Utilities Australia (WUA), and consequently the scheme management changed, whereby:

- AquaNetand Rosehill Network, subsidiaries of Water Utilities Australia, wholly owns and is responsible for the overall delivery of the RRWS. Rosehill Network holds the WICA Network Operator's Licence number 09_002 for the operation of the RRWN and AquaNet holds the WICA Retail Supplier's Licence 10_01R for the operation of the RRWS.
- Veolia Water is responsible for the Operation and Maintenance of the Scheme, including both the Plant and Network. Veolia holds the WICA Network Operator's Licence number 09_001 for the operation of the Plant.

Veolia Water is a world leader in water reuse, with over 40 water reuse projects worldwide, recycling over 600 megalitres a day, producing high quality treated water. Veolia Water has extensive experience in creating alternative water resources that will be used for:

- Irrigation for agriculture
- Irrigation of recreational areas, including golf courses and sports fields
- Toilet flushing
- Car washing
- Increasing environmental and river flows
- Industrial reuse: make up water for boilers & cooling towers, process water, cleaning & manufacturing.

2.2.2 **Design & Construction**

AquaNet engaged Parsons Brinkerhoff (PB), a highly experienced water industry design consultant, to complete the detailed Network design and associated hydraulic modelling. Highly experienced contractors were utilised for construction such as CLM Infrastructure Pty Ltd to install the Network, Tasman Tanks to install the reservoirs and KSB to supply the pumps.

Veolia Water Australia utilised the resources of Veolia Water Solutions and Technologies, to manage the design and construction of the Plant.

Veolia Water Solutions and Technologies has unique technologies that can treat wastewater, bore water, sea water, contaminated water or process water to produce high quality water essential for industrial reuse applications. Veolia Water Solutions and Technologies has designed and built water recycling plants to meet customers' site requirements in the oil & gas, mining, power, food & beverage, municipal and pharmaceutical market sectors.

2.2.3 **Operation**

Across Australia, Veolia has over 20 long term water operations contracts, involving more than 60 water and wastewater treatment plants. Veolia has more than 865 employees providing water and wastewater services to up to 4 million people in Australia and New Zealand.

2.2.4 Independent Verifier

Sydney Water and AquaNet engaged an independent verifier, Kellogg Brown & Root Pty Limited (KBR), to ensure that the design and construction of the RRWS was delivered according to the specifications that form part of the Project Agreement.

3. Analysis of the Recycled Water

3.1 **Recycled Water Quality**

3.1.1 Source of Water

The RRWS sources secondary effluent from the Sydney Water Liverpool to Ashfield Pipeline (LAP) as described in the Veolia Document, *TEM-3819 FAWTP Source Water Characterisation*.

3.1.2 Recycled Water Quality

The Plant treats the secondary effluent from the LAP to produce high quality recycled water to meet the Recycled Water Specification before it is stored in the recycled water storage tank on the Plant site.

Refer to the Veolia Document, **TEM-3898-1 Recycled Water Specification**, for the parameters that are measured and their targets. The specification also identifies which parameters are monitored online and which parameters are tested in the laboratory.

On-line parameters are measured on a continuous basis. All other parameters are measured by the internal and / or external laboratory on a daily, weekly, or monthly basis as specified in the Veolia Document, *TEM-3799-4 Laboratory Analysis Schedule*.

The recycled water must meet the target parameters 95% of the time as measured on an annual basis. The recycled water must never exceed the limit to trigger product failure.

3.1.3 End Uses

The RRWS supplies Recycled Water to industrial, commercial and residential uses as described in the Veolia Document, *PRO-3820-3 Rosehill Recycled Water Scheme Overview*.

3.1.4 **Routes of Exposure**

Routes of exposure include airborne spray from cooling towers, firefighting spray, physical contact with water during manufacturing, inadvertent drinking and contact with finished products.

The routes of exposure for each of these customers have been assessed and are documented in the Veolia Document, *EXT-3877-1 Customer Exposure Assessment and Health Performance Targets*.

3.1.5 **Receiving Environment**

The receiving environments of the RRWS include:

- Recycled water customer sites and processes
- The natural environment through irrigation or mains break
- The Sydney Water sewer system through Plant waste stream
- Scour points along the Network that are used to drain or flush the Network during an emergency or a water quality event.

Other end points include air valves and reservoir overflows.

3.2 Recycled Water System

3.2.1 Key Characteristics

The RRWS has the following key components and is depicted in the general diagram below:

- Effluent collection and treatment by Sydney Water and supply to the LAP
- Effluent extraction at the LAP
- Plant (including treatment by reverse osmosis, ultrafiltration, chlorination and other processes)
- Trade waste pumped to the Sydney Water sewerage system
- Network (consisting of pipes, reservoirs and pump stations)
- Potable water connection points
- Customers

A detailed description of the RRWS is provided in the Veolia Document, *PRO-3820-3 Rosehill Recycled Water Scheme Overview*, and shown in the images below.

Image 2.2 - RRWN Schematic

Key Components of the Network include:

- Pipelines (PVC, PE, Ductile Iron and Stainless Steel).
- Pump stations (Fairfield & Rosehill).
- Reservoirs (Fairfield, Woodville & Rosehill).
- Online Water Quality monitoring units (Fairfield, Woodville and Smithfield).
- Isolation valves at approximately 1km intervals.
- Air valves at high points in the pipeline.
- SCADA monitoring and control system.
- Communication systems.
- Potable Water connections.
- Scours at low points approximately every 1km along the pipeline.
- Customer meter sets including back flow protection.

3.2.2 System Analysis

Screening Level Risk Assessment

In 2008, in partial fulfilment of the requirements of the 2006 Australian Guidelines for Water Recycling (AGWR) a screening-level (microbial) risk assessment (SLRA) was undertaken by Sydney Water to quantify potential health risks associated with recycled water for the proposed recycled water uses of the RRWS.

The risk assessment did not identify any human health risks that exceeded the acceptable annual risk benchmark of 10-4 (1 additional infection per 10,000 persons per annum), either by the gastrointestinal (ingestion) or respiratory (inhalation) route.

As part of this study a desktop assessment of the required log reductions of microbial pathogens was also undertaken. It was found the predicted log reductions based on the proposed design exceeded those required in the 2006 Australian Guidelines for Water Recycling for industrial, municipal and fire-fighting use, in most cases by many orders of magnitude.

Values of 14 log reduction were estimated for bacteria (target 5.3), 10.55 log for viruses (target 6.5) and greater than 7.25 log reduction for protozoa (target 5.1), ensuring that recycled water was treated fit for its intended application in industry and irrigation as well as fire-fighting.

The SLRA study was undertaken by Dr Michael Storey of Sydney Water, Science and Technology.

Preliminary Risk Assessment and Critical Control Point Identification

Following the SLRA, a Preliminary Risk Assessment was held on the 19th September 2008. Attendees included:

- Narelle Berry IPART
- Jameel Bhana, Lisa Currie, Paul Dixon Veolia
- Troy Walker, Annalie Roux Veolia (Western Corridor)
- Kim Hardy, Catherine Stokes Jemena
- Richard Shuil, Darren Atkins Sydney Water
- Linda Gyzen AquaNet
- Samson Tam Veolia Water Solutions and Technologies (VWS)

A Preliminary Risk Assessment TEM-3830 was developed as an outcome of this workshop.

As part of the workshop held on 19th September 2008 preliminary Critical Control Points (CCP's) were also identified.

The preliminary risk assessment and CCP identification were used to engineer controls into the RRWS.

A second series of Risk Assessment and CCP workshops were held in September / October 2010. The purpose of these workshops was to confirm the CCP's within the whole RRWS and to identify residuals health and environmental risks that have not been eliminated through Plant design.

The first of the workshops was to confirm the CCP's within the scheme.

Attendees included:

- Narelle Berry IPART
- Phil Narezzi, Andrew Richardson, Kate Simpson Veolia
- Charles Edmiston, John McGuinness, Ronald Bean, Melanie Blake VWS
- Arthur McAuley, Rajesh Gobel Jemena
- Colin Thompson AquaNet
- Ron Bouwman– South West Health

The purpose of the second of the two workshops was to undertake a risk assessment to identify any outstanding health and environmental risks.

Attendees included:

- Narelle Berry IPART
- Ron Bouwman South West Health
- Phil Narezzi, Andrew Richardson, Kate Simpson Veolia
- Charles Edmiston, John McGuinness, Ronald Bean, Melanie Blake VWS

- Rajesh Gobel Jemena Operations
- Colin Thompson AquaNet
- Frank Vidovic Sydney Water

Results of the workshops were recorded in the Veolia Document, CRA-VW-ROS-2000-D1 Risk Assessment and Confirmation of CCP.

3.2.3 **Review of System Analysis**

The recycled water system analysis will be reviewed annually in conjunction with AquaNet in order to identify and incorporate any changes.

The analysis will also be reviewed following any major scheme expansion or change in end user requirements.

3.3 **Recycled Water Quality Data**

3.3.1 Historical Data

The source water for the RRWS comes from the catchments of Liverpool and Glenfield STPs, which form part of the Malabar Wastewater System. The two STPs receive both domestic and industrial waste (trade waste).

The design of the plant was based on the analysis of historical operational data from these two catchments.

3.3.2 Assessment of Data

The database generated using the historical data of the raw water sources has been supplemented by the implementation of an onsite data historian. This historian is linked to the plant SCADA system and provides long term storage of plant process data.

4. Preventative Measures for Water Quality Management

4.1 **Preventative Measures**

4.1.1 Multiple Barrier Approach

In accordance with the AGWR, the RRWS uses a multiple barrier approach to manage hazards in recycled water. Under this approach, a number of sequential processes are used, each of which provides a barrier to one or more hazardous parameters. The multiple barrier approach has a number of advantages:

- Reduced performance of one barrier does not result in a total loss of management;
- It may be possible to temporarily increase the performance of the remaining barriers while remedial action is taken to restore function of the faulty barrier;
- As a combination, multiple barriers produce less variability in performance than single barriers (AGWR).

There are several barriers in the RRWS to ensure that recycled water that does not meet the Quality Specification is not supplied to customers. They are:

- Trade Waste Agreements Sydney Water effluent collections are covered by trade waste agreements (Sydney Water responsibility)
- Secondary Effluent Feed Sydney Water treats the effluent to secondary treated effluent standard (Sydney Water responsibility)
- Monitoring of Feed Quality Effluent is not be allowed into the Plant if the quality falls outside the effluent specification (Veolia responsibility)
- Plant Unit Processes Unit process barriers within the Plant are such that contaminants are removed in order to meet the Quality Specification (Veolia responsibility). Unit process barriers

are summarised in Table 4.1 below. Full details are given in Table 4.2.

	Ultrafiltration	Reverse osmosis	lon exchange	Chlorination
Bacteria	Ø	Ŋ	Ŋ	Ø
Viruses	Ø	Ŋ	Я	ß
Parasites	Ø	ß	K	Ø

Table 4-1	Summary of Unit Process Barriers
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- Quality at Plant Outlet Recycled water that does not meet the Quality Specification is not allowed to transfer from the Plant into the Recycled Water tank. (Veolia responsibility)
- Network Monitoring Quality is re-tested as it enters the Network to ensure that it still meets the Quality Specification (Veolia Responsibility). Recycled water that does not meet the Quality Specification is not delivered to the Customers. (Veolia Responsibility).

In all cases SCADA systems are used to monitor water quality and alarms are triggered when quality parameters are drifting towards the limits. This provides operators with time to take corrective action prior to the recycled water falling outside the Quality Specification.

Critical Process	Hazard Controlled	Virus	Bacteria	Protozoa	Validation Information Source	Expected Performance	
1.SWC STP's	Virus, Bacteria, Protozoa	0	0	0	Awaiting correlation from SWC of STP performance vs log removals achieved. Will not claim credit for log removals until data is received.	Raw water quality within Table A of contract specification.	
2. UF	Virus, Bacteria, Protozoa	1.5	4	4	Memcor studies, GAP scheme trail (SA) Memcor studies Memcor studies	Target PDT to be set based on commissioning parameters at a level which equates to Bacteria / Protozoa log removal of 4 across the process.	
3. RO	Virus, Bacteria, Protozoa	1.1	1.1	1.1	Membrane supplier, Western Corridor Scheme	Gives 1.1 log credit for bacteria, viruses and protozoa based on 1.1 log reduction in conductivity	
4. pH Adjustment	Suitable pH for industry. Incorrect pH for disinfection	0	0	0	Process modelling software Published information on disinfectant chlorine vs. pH. pH range setpoint from contract	The pH of the recycled water contractually must be between 6 and 9. The target for pH is 6.6-8.5.	
5.Chlorine dosing	Virus, Bacteria, Protozoa	4			Published information (GC White, 2004) on log reduction vs CT*	Log removal for bacteria is 4 log for CT = 50mins.	
			4	0	Residual chlorine setpoint set by the Contract.	Residual chlorine setpoint target of 1.0mg/L. Limits to product failure are <0.7mg/L and >5.0mg/L.	
Total		7.6	9.1	5.1			
Required		6.5	5.3	5.1			

Table 4-2 Summary of CCP Targets and	Validation	Information	Sources,	and Expected	Performance
	for the F	AWTP.			

*CT = concentration * contact time


4.1.2 Additional Preventative Measures

A risk assessment workshop was held in September / October 2010. The purpose of the workshop was to confirm the preventive measures and barriers within the plant and to identify any residual health and environmental risks that were not eliminated through plant design.

The first step of the risk assessment process was to identify hazards and their existing controls in accordance with the Veolia Document, *PRO-263-5 Risk Management Procedure*.

Following identification, the hazard was assessed with existing controls in place. Based on this, a risk score was generated which was used to assess the adequacy of existing controls.

This procedure was undertaken for each process step in the RRWS.

Results were recorded in the Veolia Document, CRA-VW-ROS-2000-D1 Risk Assessment and Confirmation of CCP.

4.1.3 **Document Preventative Measures and Strategies**

The definition of process limits for the process barriers is defined in the Veolia Document, **TEM-3836 HACCP Register**. This document details the alarm and alert limits for each barrier and the corrective actions to be taken if these limits are reached.

4.2 **Critical Control Points**

4.2.1 Identification of Critical Control Points

A CCP workshop was held in September / October 2010. The purpose of the workshop was to confirm the CCPs within the plant, create critical limits and to develop response plans if these limits are breached.

After completion of the hazard assessment, each treatment step was assessed for its criticality in controlling a specific health or other hazard.

Three types of control points were adopted:

- Critical Control Points (CCP): process points identified to control water quality health hazards.
- Critical Operational Points (COP): points identified to control hazards affecting continuity of supply.
- Quality Control Points (QCP): points identified as impacting on the process train but cannot be monitored online or monitoring point for final product quality where the control may be to dispose of or reprocess non-conforming product.

CCPs and COPs are managed using the same protocol except for reporting of exceedances. CCPs and COPs monitor and identify failures of the barriers that would result in the residual risk of a hazard increasing above the level identified in the risk assessment.

Each barrier that was identified as a control in the risk assessment was assessed for its criticality in controlling the specific hazard.

A full description of critical control points for the plant is given in document HACCP Register TEM-3836.

For more details refer to the Veolia Document, *MAN-3941-2 Process Operations Plan – Fairfield Recycled Water Plant*.

4.2.2 Establish Mechanisms for Operational Control

Following the identification of CCPs, alert and alarm levels were developed.



The purpose of an alert level is to advise the plant operator that a critical limit is being approached and that corrective action needs to be undertaken to ensure that the critical limit is not breached. Corrective procedures have been developed for alert levels for each CCP identified.

The purpose of an alarm level is to advise the plant operator that a critical limit has been reached and that corrective actions will immediately be undertaken. Corrective procedures have been developed for alarm levels for each CCP identified. These procedures will typically include automatic shutdown of plant equipment to minimise the impact of the CCP breach.

Summary screens on SCADA allow the plant operator to readily review the status and set points of CCP alert and alarm limits.

Details of the critical controls points along with their alert and alarm limits are given in the Veolia Document, *TEM-3836 HACCP Register*.

5. Verification of Recycled Water Quality

5.1 **Recycled Water Quality Monitoring**

5.1.1 **Characteristics to be monitored**

The characteristics to be monitored throughout the Plant have been identified and defined by several documents and studies. These include:

- Project Agreement
- O&M Agreement
- Water Quality Risk Assessment
- HACCP analysis

5.1.2 **Operational plan**

Based on the requirements of the documents listed in Section 4.1.1 an overarching Veolia Document has been developed, *MAN-3941-2 Process Operations Plan – Fairfield Recycled Water Plant*.

The Veolia Document, **TEM-3799-4** Laboratory Analysis Schedule, details the location and frequency of sampling to be undertaken on site. The Process Operations Plan also details how analysis results will be managed to ensure that it is representative and reliable.

IPART will be notified in the event of any significant changes being made to this sampling plan.

5.1.3 **Documentation and training**

A number of procedures and work instructions have been developed to support the implementation of the Process Operations Plan, and to ensure consistency in sampling and reporting.

All VWA Operators have been trained in these procedures.

5.2 **Recycled Water Users**

5.2.1 Enquiry and Response for Customers

Customer enquiries are handled in accordance with the Veolia Document, *PRO-3915-3 Stakeholder Engagement and Evaluation Procedure*.

Veolia customer complaints are handled in accordance with the Veolia Document, *PRO-3916-2 Handling Complaints Procedure*.



5.2.2 **Customer Satisfaction and Communication**

A quarterly report covering water quality is provided to Customers. Customer participation in the RRWS is optional. The RRWS is dependent on Customers continuing to use Recycled Water as the sole source of revenue for the Scheme.

Regular communication with Customers is undertaken by AquaNet in accordance with the agreed terms of the recycled water supply agreement.

Any feedback from individual Customers is considered seriously by Veolia and AquaNet and improvements implemented to the extent that they are commercially viable and fit in with requirements of the other Customers.

5.3 **Recycled Water Quality Reporting**

Internal and External Reporting takes place on a regular basis in accordance with the Veolia Document, *PRO-3816-2 Internal and External Reporting Procedure*.

6. Validation, Research and Development

6.1 Validation Processes

Validation of the Fairfield Advanced Water Treatment Plant was undertaken in accordance with the Veolia Document, *PL-FAI-20-2924-1 Validation Plan for Rosehill Recycled Water Treatment Plant*.

The objective of the validation was to ensure that hazards originally identified by the HACCP team were complete and correct and that they were being effectively controlled under the proposed HACCP plan.

The following HACCP principles were validated:

Hazard Analysis	Validate that all major risks have been identified Validate that the risks have been correctly rated and ranked Validate the efficiency of the process barriers as control measures	
Identification of Control Points	Validate that there are CCPs for all significant hazards Validate that the CCPs are at appropriate stages of the process	
Critical limits	Validate that the critical limits control the hazards	
Monitoring of Control Points	Validate that the monitoring system will ensure that the control measure at the CCP is efficient	
Corrective Actions	Validate that the Corrective Action procedures will prevent non- conforming water from reaching the consumer.	

6.2 **Change in Conditions and New Equipment**

Processes are revalidated when changes to conditions, process equipment or operating protocol occur in accordance with the Veolia Document, *PRO-3807-1 NSW Water – Change Management Procedure*.

In the event of significant changes, a new process validation plan will need to be developed if it has any effect on the integrity and reliability of the process.



6.3 **Design of equipment**

Validation of the Fairfield Advanced Water Treatment Plant was undertaken in accordance with the Veolia Document, *PL-FAI-20-2924-1 Validation Plan for Rosehill Recycled Water Treatment Plant*.

6.3.1 Validation of Equipment and Infrastructure

This procedure outlines a 4 step approach to the validation of new equipment and infrastructure:

1. Desktop Validation

The FAWTP process was validated at the desk top level to quantify its ability to achieve the required water quality objectives.

2. Validation of the Process by Pilot Plant Testing

A pilot plant representative of the Fairfield Advanced Water Treatment Plant was built prior to the plant design and construction to validate the choice of process technologies.

The pilot plant studies allowed confirmation that the FAWTP process could achieve the required recycled water quality based on the design basis feed effluent quality.

3. Validation of the Process Efficiency from the Literature

Further supporting the pilot plant results, sources of information available from literature and manufacturers were compiled in order to validate the efficiency of each treatment barrier and CCP at the FAWTP. This information will be submitted to the Validation team during the validation workshop for review.

4. Design Review

The FAWTP design was also reviewed by an independent reviewer with experience in water treatment. The consulting company selected for the independent review was KBR.

6.3.2 Validation of Process

The validation of the efficiency of the barriers for the FAWTP was undertaken using a two part process:

1. Process Proving

The first part consisted of the individual Process Unit Proving Tests which was conducted during the commissioning phase of the FAWTP during April to June 2011.

The Process proving was conducted between 14 August and 25 August 2011. During the performance trial, the plant was required to operate under normal operating conditions to produce 20 ML/d or a lower pro-rata volume if insufficient feed was available to the plant to produce 20 ML/d. The performance trial was scheduled to take place over 10 consecutive days.

The Product water quality was monitored during these periods to validate the efficiency of the process steps to remove satisfactorily contaminants and hazards identified in the risk assessment.

2. Validation Workshop

A validation workshop was held on Wednesday 14 September 2011 at the FAWTP and was facilitated by the AWTP plant manager, Andrew Richardson. The purpose of the workshop was to review the HACCP process and to validate the effectiveness of the HACCP system in place.

The members of the validation team were Anne Caillon (Design and Construction Process Engineer), Kate Simpson (Operations Process Engineer), Andrew Richardson (Operations Manager), Colin Thompson (AquaNet Representative), Paul Cousins (Design and Construction Control Systems Engineer), and Troy Walker (Technical Manager).

After the workshop, it was concluded that:



- All major risks to human health and/or the environment posed by the recycled water have been identified, rated and ranked and that control measures have been put in place to control these.
- A system of critical control points has been put in place to control recycled water quality and ensure that it is of a quality that does not pose a hazard to human health and/or the environment.
- The critical limits selected are appropriate to the hazards and will ensure control of recycled water quality.
- The plant, operating normally, will not breach the critical limits, as demonstrated during the plant performance trial.
- Systems are in place to ensure that if the plant operating conditions approach the critical limits, automated corrective actions will take place to ensure that no water produced with any critical limit breached will reach the recycled water network.

6.4 Investigation studies and research monitoring

Following commissioning of the plant, process data from the SCADA is being recorded to a plant historian database.

This data is analysed to identify any emerging trends, and to develop improved operating protocols to treat the LAP secondary effluent.

A dedicated process engineer is a member of the plant team. A key part of that role is process optimisation based on process data review. The site process engineer is supported by the Engineering department at VWA's corporate offices in Pyrmont and more broadly by the extensive technical knowledge of recycling available within VWA and in Veolia Water worldwide.

VWA implements a variety of knowledge transfer techniques to ensure that the staff at each of its operations can benefit from pertinent knowledge from other sites and from research and development projects. In 2010, for example, a "lessons learned" workshop in water recycling was conducted at the Bundamba Advanced Water Treatment Plant in Brisbane, gathering technical staff from eight reuse and membrane plants to share lessons in water recycling.

Technical staff from Veolia's operations worldwide also frequently visit Australia and present technical information from other sites. Technical information sharing is also available through an on-line knowledge transfer network.

Veolia Water also has an extensive research and development program worldwide, with Australia being a key hub for research in recycling and membrane processes. This includes the co-funding of a Chair of Water Recycling at the University of Queensland.

7. **Operator, Contractor and User Awareness**

7.1 **Recycled Water Quality Awareness**

7.1.1 **Operator and Contractor Awareness**

Base level process and operations training provides new operators with a minimum level of training required to understand and operate the Fairfield plant.

All contractors are required to undertake a site specific induction providing awareness and outlining the requirements for water quality. The contractors are engaged with the Fairfield site in accordance with the Veolia Document, *MAN-3954-4 Operations Management Plan – Rosehill Recycled Water Scheme*.

7.1.2 End User Awareness

Sydney Water conducted a training and awareness forum for foundation customers in September 2010. The forum included Jemena, Veolia Water and specialists in implementation of recycled water guidelines.



AquaNet also held a breakfast for potential customers that included a detailed description of the RRWS, and overview of the recycled water treatment process and case studies from the foundation customers.

Further one on one enquiry and response meetings were conducted between AquaNet and potential customers during the process of negotiating recycled water supply agreements.

During the process of finalising the recycled water supply agreements, customers were provided with the following information:

- Recycled water quality specification,
- Approved end uses list and
- RO Water Briefing paper (technical paper on RO recycled water), it's uses and precautions needed in relation to materials being used.

7.2 User Consultation Strategy

AquaNet, ensures that customers are actively involved in water quality issues through the initial water quality education process that forms part of the recycled water supply agreement negotiation process and through the regular quarterly reporting that forms part of the recycled water supply agreements.

Individual customers have limited ability to influence a change in the Quality Specification, however constructive suggestions are taken on board and all customers will be consulted before any proposed change to the Quality Specification by the RRWS proponents. Customers confirmed agreement with the Quality Specification and the terms of supply through execution of their recycled water supply agreement.

Ongoing communication with customers is in accordance with Communication Protocol that forms part of the recycled water supply agreements and in accordance with the Veolia Document, *PRO-3915-3 Stakeholder Engagement and Evaluation Procedure*.

7.3 **Promotion of Benefits of Recycled Water Use**

The RRWS is an innovative project in which both Aquanet and Veolia are actively marketing in public forums, seminars, and through brochures and company websites. Any opportunity to promote the RRWS is welcomed by Aquanet and Veolia.

Listing of the benefits of recycled water use forms part of all promotional opportunities.

7.4 Unintended Use

All recycled water equipment in the RRWS and on customer sites is clearly and permanently labelled with safety signs that follow the current version of the Safety Signs for the Occupational Environment standard AS/NZS 1319.

Recycled water pipe work has colour coding that conforms to the guidelines for recycled water in the NSW Code of Practice for Plumbing and Drainage 2006. Signs advising of the use of recycled water on site and induction training help prevent unauthorised use. These measures ensure that customer employees, site visitors and other stakeholders are aware that the recycled water is 'not for drinking'.

7.5 Unauthorised Uses

The recycled water supply agreements clearly state authorised specific end uses for each customer. It is a condition of the agreements that customers take responsibility for ensuring that:

- They restrict recycled water use to these specific uses
- Take the backflow and cross connection precautions as defined by the Water Supply Code of Australia (WSA).



Unintended and unauthorised end uses are most likely to be as a result of accidental cross connection of the Network or Customer recycled water systems with the potable water network. This risk is mitigated through measures such as

- Dial Before You Dig (DBYD) providing advice to workers working in the vicinity of the Network
- Customer site inductions and signs at the entrance to Customer Sites informing visitors (including plumbers) that recycled water is in use
- A requirement in the recycled water supply agreements for installation of recycled water systems by customers to comply with the NSW Plumbing and Drainage code

Licensed plumbers are used for all new connections to ensure that cross contamination does not occur in the Network.

Term	Definition	
Consequence	The outcome of an event expressed qualitatively or quantitatively, being a loss, injury, disadvantage or gain. There may be a range of possible outcomes associated with an event.	
Codes	Mandatory industry codes, and voluntary industry codes with which the organisation chooses to comply.	
Compliance	Ensuring that the requirements of laws, regulations, industry codes and organisational standards are met.	
Organisational standards	Any code of ethics, codes of conduct, good practices and charters that an organisation may deem to be appropriate standards for its day-to-day operations.	
Project	The complete project.	
Hazard	A source of potential harm or a situation with a potential to cause loss.	
Likelihood	A qualitative description of probability or frequency	
Risk	The chance of something happening that will have an impact upon objectives. It is measured in terms of consequence and likelihood.	
Risk assessment	The overall process of risk analysis and risk evaluation	
Risk management	The culture, processes and structures that are directed towards the effective management of potential opportunities and adverse effects.	

8. Terms and Definitions

9. Veolia Reference Documents

Document Code Reference	/ Document Name
TEM-3978	WICA Requirements Reference Table
PRO-3819	FRWP Source Water Characterisation
TEM-3899	Feed Water Specification
TEM-3898	Recycled Water Specification



TEM-3799	Laboratory Analysis Schedule	
PRO-3820	Rosehill Scheme Overview	
TEM-3830	Preliminary Risk Assessment and Critical Control Point Identification	
MAN-3954	Operations Management Plan	
PRO-263	Risk Management	
TEM-3836	HACCP Register	
MAN-3941	Process Operations	
MAN-3935	I & E Management Manual	
PRO-3915	Stakeholder Engagement and Evaluation	
PRO-3916	Handling Complaints	
PRO-3816	Internal and External Reporting	
MAN-3813	Validation	
PRO-3817	Change Management	

10. Abbreviations

AGWR	Australian Guidelines for Water Recycling	
AquaNet	AquaNet Sydney Pty Ltd	
FAWTP	Fairfield Advanced Water Treatment Plant	
НАССР	Hazard analysis and critical control point	
IBMS	Integrated Business Management System	
LAP	Liverpool to Ashfield Pipeline	
PLC	Programmable logic controller	
RO	Reverse osmosis	
Rosehill Network	Rosehill Network Pty Ltd	
RRWS	Rosehill Recycled Water Scheme	
RRWN	Rosehill Recycled Water Network	
SCADA	Supervisory Control and Data Acquisition system	
SLRA	Screening Level Risk Assessment	
STP	Sewerage Treatment Plant	
swc	Sydney Water Corporation	
VWA	Veolia Water Australia	
vws	Veolia Water Technologies and Solutions	



Annexure A – Overview of the Rosehill Scheme





Annexure B – Rosehill Scheme Contractual Framework



Rosehill Network Pty Ltd

ACN 131 213 691

RRWS-IMS-DOC-002 Infrastructure Operating Plan



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1. Introduction

Rosehill Network Pty Ltd ('**Rosehill Network**') holds Network Operator's Licence number 09_002 issued under the *Water Industry Competition Act 2006* (NSW) ('**WICA**') under which it owns water infrastructure that forms part of the Rosehill Recycled Water Scheme ('**Rosehill Scheme**'). This document, Rosehill Network's Infrastructure Operating Plan, has been developed to satisfy the requirements of the *Water Industry Competition (General) Regulation 2008* (NSW).

1.1 **Rosehill Scheme Overview**

The Rosehill Scheme involves:

- extracting secondary treated effluent from Sydney Water's Liverpool to Ashfield Pipeline ('LAP');
- treating the effluent to produce high quality recycled at the Fairfield Advanced Water Treatment Plant ('Plant'); and
- transporting recycled water from the Plant, through a distribution network ('**Network**') to customers in the Fairfield, Cumberland, and Parramatta local government areas ('**Customers**').

The scope of the Rosehill Scheme is shown in **Annexure A**.

The Rosehill Scheme is underpinned by a 20-year Project Agreement between AquaNet Sydney Pty Ltd ('**AquaNet**') and Sydney Water and is capable of delivering up to 25 million litres of recycled water per day to Customers.

Under the Project Agreement, AquaNet delivers recycled water to Sydney Water for the sale to its own customers ('Foundation Customers'). Sydney Water has retail contracts with the Foundation Customers. Sydney Water supplies up to 32ML/d of treated effluent (according to an effluent specification in the Project Agreement) to the Plant from the LAP. AquaNet may sell any water in excess of that required to supply the Foundation Customers directly to its own customers ('Non-Foundation Customers').

AquaNet owns the Plant and has entered into an Operation and Maintenance Agreement with Veolia Water Australia Pty Ltd (**'Veolia**' or **'VWA**') who is responsible for maintaining and operating the Plant.

Rosehill Network and its sister company, AquaNet, have entered into a Pipelines Agreement whereby Rosehill Network constructed and owns the Network. Rosehill Network has entered into an Operation and Maintenance Agreement with Veolia who is responsible for maintaining and operating the Network.

Both Rosehill Network and Veolia hold Network Operator Licences under WICA.

The contractual structure of the Rosehill Scheme is depicted in **Annexure B**.

AquaNet and Rosehill Network are both part of the Water Utilities Australia group of companies ('**WUA**') and through its various subsidiaries, WUA provides the resources, skills and expertise required for AquaNet and Rosehill Network to deliver the Rosehill Scheme.

2. Executive Summary

This plan explains how Veolia manage the infrastructure assets to best satisfy the contractual and relevant regulatory requirements for the Rosehill Scheme.

This plan complements Rosehill Network's Water Quality Management Plan as well as the VWA Infrastructure Operating Plan for the Plant and the VWA Water Quality Management Plan for the Plant



by providing details regarding all key asset management activities. The plan is further supported by the Veolia Document, *MAN-3954 Operations Management Plan – Rosehill Recycled Water* **Scheme**, which provides an overview of the way Veolia addresses the requirements for Quality, Safety, Environment, Asset and Risk Management as required by the Veolia Business Management Manual and relevant standards.

The key features of Veolia's Asset Management Plan are:

- Establishment of an advanced Asset Management System with the potential to be linked to the SCADA system to ensure accurate and appropriate data capture from day one.
- Early and rigorous attention paid by the Asset Management team to develop a comprehensive maintenance program.
- Integration of condition monitoring, renewal and whole of life cost planning processes to promote high availability and durability of assets.
- A focus on providing a competent, well trained and well supported operations team, with a view to establishing an 'asset management culture' on the RRWS.
- Development of effective maintenance and renewal schedules with an emphasis on condition monitoring to minimise risks.
- Implementation of special information systems to manage UF and RO membranes, as well as capital renewal.
- Selective use of RCM through the operations phase to address reliability issues.

3. Abbreviations

The following abbreviations are used in this Plan:

AquaNet	AquaNet Sydney Pty Ltd	
CIP	Clean in Place	
CMMS	Computerised Maintenance Management System	
EIS	Environmental Impact Statement	
Fairfield AWTP	Fairfield Advance Water Treatment Plant	
FARWP	Fairfield Advanced Recycled Water Plant	
FMEA	Failure Mode and Effects Analysis	
VAMS	Veolia Asset Management System	
IBMS	Integrated Business Management System	
КРІ	Key Performance Indicator	
LOS	Level of Service	



MTBF	Mean Time Between Failure	
O&M	Operations and Maintenance	
OH&S	Occupational Health and Safety	
PLANT	The Fairfield Recycled Water Plant	
РМ	Preventative Maintenance	
RCA	Root Cause Analysis	
RCM	Reliability Centred Maintenance	
RO	Reverse Osmosis	
Rosehill Network	Rosehill Network Pty Ltd	
RRWS	Rosehill Recycled Water Scheme	
SCADA	Supervisory Control and Data Acquisition	
UF	Ultrafiltration	
VWA	Veolia Water Australia	

4. Introduction

4.1 **Context**

This Infrastructure Operating Plan has been prepared as an outline plan in order to assist with the management of assets at Fairfield AWTP.

4.2 **Scope**

The Infrastructure Operating Plan has been developed to provide the following information:

- An overview of the asset management strategy and how the Infrastructure Operating Plan is developed in accordance with this;
- Descriptions of the staff organisational structure and processes to be put in place to implement the asset management aspects of the Water Quality Plans and monitor compliance with all requirements;
- Explanation of the process for developing, reviewing and updating the maintenance program.
- An outline of the asset management information systems to be used;
- Details of how preventative, corrective and breakdown maintenance is to be conducted on site;
- An overview of the process and value of assessing criticality for all assets;
- An overview of the process for performing condition and risk assessment and how this information is used for future planning;



- An outline of the capital investment strategy and the processes involved in making decisions regarding asset refurbishment and replacement;
- Details of the asset renewal program, which consists of major periodic maintenance items, including overhauls and replacement; and
- A summary of how RO and UF membranes are to be managed.

4.3 **Objectives**

The Infrastructure Operating Plan is designed to ensure that the Rosehill Scheme assets are managed to the principles of Veolia's Asset Management Strategy. This strategy is an integrated and flexible approach, encompassing whole of life cycle costs.

The primary objectives of the Infrastructure Operating Plan are to enable the physical assets of the scheme to be maintained, repaired, rehabilitated and replaced in such a way as to ensure the following outcomes:

- No drop in level of service delivered over the duration of the contract.
- Optimum equipment performance, reliability and availability.
- Minimum total cost of ownership of each asset over its life cycle.
- Minimum business risks to all stakeholders.
- Compliance with all statutory and contractual requirements.

5. Asset Management Strategy

5.1 Strategy overview

Veolia's strategy for asset management uses an integrated approach which considers all aspects of the asset's life cycle including safety, operational performance, levels of service, contractual requirements, maintenance requirements and the asset's whole of life costs.

A flexible approach accommodates the continuing change in external factors associated with economic influences, customer expectations and business needs. Veolia's strategy enables ready reassessment and reiteration of inputs and outputs via periodic reviews and appraisals of all areas contained in an asset's life cycle.

Veolia's asset management strategy and is designed to:

- Reflect industry best practice.
- Produce an integrated structure that supports all the activities of the business.
- Ensure that the owner, operator and customers are not exposed to undue risk.
- Ensure sustainability of the environment.
- Create an objective, transparent management tool for monitoring asset performance against the relevant statutory obligations, policies, standards, levels of service and operational targets, and for reporting to authorities, customers and community.



- Minimise the cost of the managed assets over their useful life by balancing investment needs within economic and operational guidelines to ensure maximum efficiency in terms of capital investment and operational costs.
- Ensure that the Plant maintains the minimum flows for which it was designed.
- To manage and operate the Plant as an efficient business enterprise, it is essential to maintain the quality and performance of the assets at their optimum level. Detailed in this Infrastructure Operating Plan is the processes, which provide:
 - An effective mechanism for compiling a comprehensive asset register of all plant assets linked with quality, physical parameters, condition, criticality and performance of the assets.
 - Procedures for determining and recording asset condition and criticality;
 - Evaluating whole of life options;
 - Techniques for determining asset short- and long-term investment priorities and balance against the availability of funds; and
 - A program for asset management, maintenance, upgrading and replacement of assets that can cater for dynamic conditions.

5.2 **Planning Framework**

Veolia utilises an integrated approach to asset management planning which considers the impact of all internal and external influences on the systems assets – technical, financial, social, political and economic.

Veolia establishes maintenance regimes, maintenance standards, operating procedures and investment and replacement strategies that are linked to ensure ongoing service delivery in the most cost effective manner.

The asset management planning process consists of an annual review and refinement to allow for changing internal and external factors such as:

- The asset management principles, strategy and objectives of the asset owner;
- Industry-wide guidelines and standards for assessment management (including the International Infrastructure Management Manual)
- Environmental legislation;
- Funding and investment priority philosophies;
- Occupational health and safety regulations;
- Changing technology;
- Industrial relations legislation; and
- Community expectations.

The asset management framework that is to be used for developing and revising the integrated Asset Management Plan is shown in the following table:



Step		Details
Step 1	Define Performance Criteria and Service Levels	These are defined using contract requirements and KPIs, EIS requirements, Licence Requirements, Environmental Plan and statutory obligations and performance standards.
Step 2	Establish Policies and Procedures	The policies and procedures required to deliver Veolia's asset management strategy reside in the Operations Management Plan (On Tap).
Step 3	Define Asset Register and Data Standard	The Plant's assets are defined and categorised into specific areas and asset types using an asset register and data standard. The asset register is created and maintained in Veolia's Computerised Maintenance Management System (CMMS) software.
Step 4	Define Maintenance Requirements	Maintenance requirements for assets are determined and managed in Veolia's CMMS. Preventative maintenance implemented based on manufacturers recommendations and asset condition and risk assessment.
Step 5	Asset Condition Grading and Assessment	Assets have regular condition assessments conducted with defined standards and policies. An overall asset assessment is performed to identify any areas of potential concern.
Step 6	Analysis and Review of Asset Assessment	From the information collected in Step 5, an asset assessment identifies any shortfalls in asset condition and performance. A decision is then made either to continue to maintain or renew assets. Assets may be operated to failure based on whole of life costing evaluation options.
Step 7	Review Maintenance Requirements	Based on decisions made in Step 6, the options to increase or decrease maintenance expenditure is determined, reviewed and evaluated.
Step 8	Asset Replacement Program	Based on the assessments made in Step 6, the options available for asset replacement or refurbishment can be determined, reviewed and evaluated.
Step 9	Review / Revise Investment Needs	To assess the implications of changing inputs, business parameters, outputs, standards and targets, the results of outputs and total expenditure needs will be reviewed.

6. Asset Management Organisation

6.1 Veolia Staffing Structure and Responsibilities

An organisational structure showing key Veolia positions relevant to asset management is shown in **Annexure C**.

The asset management responsibilities of the key site-based staff are as follows:

• Operations Manager – Jointly review and approve the O&M Plan.



Level 6 Operator – Key site point of contact for all maintenance issues. Organise material resources and supervise operator-maintainers, electrical and mechanical tradesmen and subcontractors engaged in corrective maintenance and technical or vendor specific preventative maintenance activities. Manage the supply and transfer of spare parts and other and other inventory to and from the onsite store.
 Responsible for maintenance program planning. Develop and coordinate major preventative maintenance activities, including condition monitoring. Maintain the asset register. Develop the maintenance strategy and asset replacement program. Manage client reports and communications.

The asset management responsibilities of the key members of Veolia's asset management team, based in the Veolia Water Australia head office, are as follows:

- Corporate Asset Manager Manage the provision of IT systems and engineering services support to enable assets to be managed in accordance with the asset management requirements of the O&M Plan, the asset renewal program, and the reporting requirements of The Client.
- Asset Performance Engineer– Assist in data collection and CMMS establishment activities and perform systems administration for VAMS. Facilitate workshops and provide technical and systems support for RCM.
- Jointly review and implement the asset management component of the O&M Plan. Oversee development of the maintenance plan to align with best practice for Plant operations and maintenance. Review all aspects of the asset management framework, including the maintenance strategy and asset replacement program.
- Assist in the development of the asset renewal program, as well as ongoing monitoring and reporting. Track performance of asset renewals and provide IT support for the capital planning system.
- Asset Project Engineer– Conduct serviceability and reliability investigations. Provide engineering and project management assistance for major asset renewal and improvement projects.
 Provide engineering support to plant staff. Perform analysis of CMMS and carry out rootcause-analysis (RCA) and reliability investigations as required. Ensure that information is appropriately captured and stored in the Computerised Maintenance Management System (CMMS) VAMS, and monitor and report on Plant asset management performance.
- Electrical / Controls Engineer Administer, develop and arrange for training for the site SCADA system. Provide project management and engineering assistance for key electrical and controls projects.

6.2 Labour Resourcing

To achieve the maintenance objectives of the Plant, the following staff are allocated:

- Veolia operator-maintainers in addition to operating the Scheme, Five (5) operators carry out routine asset maintenance. The following tradespeople are available on dayshift to carry out preventive and breakdown maintenance tasks:
 - instrument technicians, electrical and mechanical fitters.
- Network Coordinator available to coordinate and carry out operations and works on the Network.



- General subcontractors resourcing requirements vary depending on the work scheduled, but subcontractor tradesmen are engaged on an ad-hoc basis to carry out basic maintenance routines (as required).
- Specialist subcontractors separate commercial agreements are established for the carrying out of specialist maintenance activities such as servicing of chemical instrumentation, large pump systems, lifting equipment etc.

Key service suppliers, including subcontractors, were identified during the procurement phase of the project. A continuing review process is to take place to ensure that service and supply is optimised.

6.3 Equipment Resourcing

The following facilities are available including, mobile plant and equipment to ensure maintenance at the plant is properly carried out:

- Maintenance workshop
- Electrical workshop
- Spares storeroom
- Workshop gantry
- Workshop storage for consumables and tools
- Workshop bench tools (bench grinder, drill etc.)
- Workshop welding bay and equipment
- Operator vehicles (utilities etc.)
- Operator laptops
- Tools (mechanical fitting, electrical etc.)
- Instrument calibration equipment
- Condition monitoring equipment (Non-contact thermometer etc.)
- Lifting equipment (block and tackle etc.)
- Access equipment (ladders, davits etc.)
- PPE and safety equipment (gas detectors, chemical suits, masks etc.)

Equipment required for major overhauls/repairs or specialised maintenance is generally provided by service contractors.

6.4 **Culture and Training**

In line with the Veolia Document, *POL-7-3 Learning and Development Policy*, Veolia fosters an 'asset management culture' through communication, leadership and training. Culture is a key element that ensures that the objectives of the O&M Plan are realised. Veolia facilitates this by first appointing highly motivated, skilled and experienced staff to key positions. In addition, the following support is provided:

General systems training of all staff to enable them to:
 use the CMMS system to manage assets, maintenance activities, condition assessment and spare parts.



- understand the specific CMMS data collection and reporting needs of asset management, and how this is used by the business to reduce risk, generate efficiencies and savings, and improve performance.

Specialised asset management staff are available to assist key staff to enable them to:

- perform criticality analysis of assets and condition grading and use this information to manage risk and prioritise renewals

- perform 'whole of life' analysis to understand and justify capital projects involving renewal or modifications

- use and analyse the results of condition monitoring technologies and analysis techniques (such as vibration, oil analysis and thermography) to promote 'predictive' maintenance.

- perform root-cause-analysis to fault-find complex or repeated failures.
- Communication and involvement of key staff in asset management developments within the company through:
 - regular site-based meetings with the asset management staff;
 - attendance at periodic maintenance and CMMS user-group conferences;
 - participation in workshops to plan specific asset management improvements;
 - dissemination of maintenance systems updates via electronic means

In accordance with the Veolia Document, *PRO-15-1 Contractor Management Procedure*, Veolia use its Contractor Management System to ensure that all subcontractors who carry out maintenance activities are suitably qualified and trained and have appropriate insurances.

Similarly, Veolia staff who carry out maintenance are to have a suitable trade and/or other qualifications and must be aware of all appropriate legislation and standards. In this way, the Plant Operator will ensure that all activities are performed in a safe and competent manner.

6.5 **Policies and Procedures**

The policies and procedures required to implement the asset management strategy form part of Veolia's Integrated Business Management System. The system's documentation is stored within the BMS system and is controlled and maintained in accordance with the Veolia Document, *PRO-129 Documented Information Procedure*.

The integrated management system is used to manage all aspects of the operation and maintenance of the Rosehill Recycled Water Scheme. This includes the following Veolia Documents:

- STA-311-2 Asset Management Strategy
- PRO-3825-2 CMMS Operations and Maintenance Procedure
- PRO-3826-2 Conducting Preventative Maintenance Procedure
- PRO-3827-2 Conducting Breakdown Maintenance Procedure
- PRO-3821-2 Membrane Maintenance and Replacement Procedure
- PRO-327-1 Criticality and Condition Grading Procedure
- PRO-3822-2 Asset Condition and Risk Assessment Procedure
- PRO-326-1 Developing and Maintaining an Asset Replacement Plan Procedure
- PRO-3828-2 Spares Parts Management Procedure
- POL-12-2 Asset Management Policy



- PRO-3829-2 Asset Reporting and Analysis of Maintenance Procedure
- TEM-38-1 VAMS Static Data Recording Procedure
- PRO-331-2 Asset Location Numbering and Data Procedure

A complete list of Veolia documents pertaining to the Rosehill Recycled Water Scheme (RRWS) can be generated at any time from the BMS. Reports can show complete listings of recently updated documents.

6.6 Establishment of Systems

Veolia manage data in multiple information systems to make asset management effective for the RRWS. The most important of these systems is the computerised maintenance management system (CMMS). The process of setting up these systems prior to commissioning has been critical to asset management, as shown below.

6.7 **Documentation and Records**

Veolia capture and store, within its CMMS historical information relating to maintenance, repair and replacement activities conducted on infrastructure assets. Overall, the CMMS records the following:

- Comprehensive asset register reflecting an up-to-date configuration of the RRWS equipment
- History of all preventative, corrective and breakdown asset maintenance conducted on all assets
- Instrument calibration history
- Meter information and condition monitoring results
- Inventory of spare parts holdings

In addition, the CMMS records the financial details of all purchases of materials and labour carried out in the course of conducting maintenance.

6.8 **Compliance and Management Review**

As part of the Integrated Business Management System, this Infrastructure Operating Plan is subject to internal audits and review to ensure that activities on site comply with the requirements of the plan.

Revision of this information takes place for the life of the operating contract to allow for changing internal and external factors such as changing technology, funding and investment priority philosophies, Environmental, WHS and IR regulations and other factors.

7. **Performance Management**

7.1 Levels of Service Targets

The mandatory performance criteria for the RRWS are defined in the Contract Requirements.

These operational performance requirements define the minimum level of service (LOS) in terms of water quality, water volume and general performance that is to be delivered by the Plant Operator.

The LOS is defined in the reference specification in Veolia Document, *TEM-3898-1 Recycled Water Specification*.

The successful commissioning of the Plant was a milestone for demonstrating that the initial asconstructed equipment configuration is able to deliver the required LOS.

LOS is a key driver of asset management, particularly in setting targets for (a) plant and equipment availability; (b) maintenance productivity and effectiveness; and (c) equipment operational efficiency.

7.2 **Performance monitoring and review**

Veolia monitor performance and reports to the client on a monthly basis, performance against the agreed standards in accordance with the Contract Requirements.

The supervisory control and data acquisition (SCADA) system is the key source of online equipment performance monitoring for the RRWS. This SCADA performance data is used in three ways:

- Key flow, process and quality information will be stored in a data historian for trending analysis, monitoring and fault finding.
- Those items that contribute to a General Failure or Water Quality Failure is captured in the Performance Management System, which can be used for client reporting.
- Performance indicators based on meters that fall below, or rise above, a predefined level (such as motor currents and log reduction values for UF cells) have the potential to trigger corrective maintenance activities in the CMMS.

In addition to process monitoring and optimisation of energy consumption Veolia perform condition monitoring and periodic efficiency reviews of major machinery. This review entails analysing the operating efficiency of high-energy-consuming equipment, specifically the RO pumps.

The purpose of performing this analysis is two-fold. The first is to promote energy savings—inefficient pumps require more energy to meet the same output. Where a significant drop in efficiency is detected, a maintenance activity is to be raised in the CMMS to investigate and identify the root cause of the problem. The second is to identify early indications of deterioration in condition.

7.3 Changes to Service Levels

If future changes in demand or other requirements (such as recycled water quality) necessitate modifications to the LOS, then it will be necessary for Veolia to carefully consider how the delivery of the new LOS will impact the performance and management of its assets.

8. Asset Inventory

8.1 General

Veolia maintains an up-to-date inventory of infrastructure assets, known as the 'asset register', reflecting the as-built configuration of the plant.

The asset register database is carefully structured with an appropriate resolution to ensure that:

- site staff, managers and engineers are able to find items easily and unambiguously;
- data capture is properly matched to analysis and reporting requirements; and
- maintenance history and cost information are captured at the right level (identified in a risk assessment process).



8.2 Asset Register

The scope of the asset register is to identify all infrastructure assets associated with the Plant, including machinery, structures, and electrical installations.

The asset register has been created, using data from numerous sources including

- Asset list
 - Grouped in major system and equipment areas
- As-built equipment lists (mechanical, electrical, valve and instrumentation)
 Potential for make, model, serial number, size, capacity, warranty, asset type
- As-built drawings

 primarily the process and instrumentation drawings (P&IDs) as a checklist for asset that have been included
- Financial
 - purchase date and price where know.

Once collected, asset data is collated into an asset register using the agreed structure for the asset hierarchy as defined in Veolia guidelines. Veolia then developed a full asset inventory in the CMMS and integrates this information, along with the O&M manuals and spare parts lists as part of the Business Management Plan.

8.3 Asset interface points (boundaries)

The limits of the agreement for the Asset Management and the Operations of the RRWS are defined in the Veolia Document, *TEM-3942-1 Definition of Interface Points*.

9. Asset Management System

9.1 **CMMS**

9.1.1 General

- A Computerised Maintenance Management System (CMMS) forms the basis of Veolia's asset management and maintenance plans and will be used for scheduling, recording and analysing all maintenance activities.
- Veolia uses a new generation computerised maintenance management system (CMMS), called VAMS. The system utilises a web interface and is an important tool for the day-today management of asset maintenance and repairs, as well as spares inventory.
- Based on the leading asset management software platform Infor EAM, VAMS has been specially developed by Veolia Water to suit the needs of managing water and wastewater treatment infrastructure assets. It includes many features, including: modules for managing asset details and configuration, preventative maintenance planning and scheduling, purchasing, management of spares, workflow and analysis.

9.1.2 Establishment and Use of Asset Management System

- Veolia has developed an asset register and preventative maintenance work order data in the computerised maintenance management system (CMMS).
- The CMMS comprise an inventory of all managed assets. It includes criticality and condition grading of all asset components, and other relevant data such as capacity, size



and age. Information is archived to allow trending of asset condition over the operating period.

- Most importantly, the system is to be used to capture data relating to all inspection and maintenance activities conducted at the Plant.
- All required preventative, corrective and breakdown maintenance information is entered into the VAMS database, properly linked to the assets that work is to be carried out on. Upon completion of tasks, maintenance personnel record the task as completed in VAMS with the following information:
 - $\circ \quad \text{date completed} \quad$
 - personnel undertaking the work
 - labour hours for task
 - materials used
 - asset condition and performance data as observed during maintenance activities, including a brief description of work and important notes
- A high quality preventive maintenance program is critical to prevent inadequate equipment performance that can result in environmental or process incidents. Adherence to the preventive maintenance program must be assessed on a frequent basis, using maintenance performance indicators.
- VAMS is used to monitor preventive and corrective maintenance ratios with the objective of minimising breakdowns and failures.
- Regular reviews of maintenance performance will lead to progressive refinement and optimisation of the overall maintenance program. Equally important is the issue of breakdown maintenance, which must be undertaken in a timely, reliable manner.
- A KPI dashboard can be individually configured to monitor performance against certain contractual measures, compliance with statutory requirements as well as benchmarking and monitoring of internal KPI's.

10. Maintenance Planning and Execution

10.1 Work Instructions

Work orders and associated task instructions are planned for and generated prior to their required start date. They are issued by the Level 6 Operator to a trade group who are responsible for:

- Preparation review of work to be undertaken and ensuring that all materials, spares and tools are available for the timing of the work.
- Safety and Environmental constraints permits to work, entry permits etc. to be completed as required in high risk areas such as confined spaces.
- Operational constraints avoid incidents leading to water quality or quantity problems.
- Completion of all maintenance tasks.
- Closing of work instructions in the Computerised Maintenance Management. System with all required data completed hours worked, spares used, external resources etc.



If something unexpected is noted while undertaking the work, the person responsible for the maintenance is required to raise a breakdown maintenance order. Work instructions for each asset are regularly reviewed by all maintenance staff.

For efficiency, work instructions are not raised for minor housekeeping items, such as keeping plant clean and tidy, and operational running checks that must be done on a daily basis. These items are managed using Veolia Documents, *TEM-3778-2 Daily SCADA Checks* and *TEM-3777-2 Operator Rounds*.

10.2 **Maintenance program optimisation**

Initially, the preventative maintenance program has been developed on the basis of vendor recommendations and Veolia Maintenance Standards. This program is reviewed regularly and in the event of reliability issues occurring. To this end, Veolia will apply an initial maintenance review and optimisation process, as well as ongoing selective application of analysis in accordance with the principles of reliability centred maintenance (RCM). For more detail refer to the Veolia Document, *PRO-327-2 Criticality and Condition Grading Procedure*.

RCM provides a rigorous analysis framework for ensuring that the most cost-effective maintenance activities are employed to manage an asset's failure modes. There are a number of different versions of RCM, but the key elements of any RCM process are defined in SAE Standard JA1011 Evaluation Criteria for Reliability Centered Maintenance. Consistent with this standard is the 'RCM-2' framework, which Veolia Water has successfully used in a number of applications, particularly in North America.

When properly applied, RCM typically results in a reduced amount of routine maintenance work, while introducing more inspections and diagnostic activities to identify hidden failures and enable a greater degree of maintenance that is condition-based.

Application of RCM is most effective when a 'review group' approach is employed. To achieve this, a well-trained facilitator will conduct workshops with relevant plant-based technical experts. Software is used to document the steps taken and the resulting actions.

Although it can be time-consuming to perform, the outcome of RCM will usually be not only improved reliability and cost, but also an audit trail for maintenance changes, and a much deeper understanding of the assets by all participants. This last point contributes very positively to developing a proactive asset management culture within the operations team.

On the RRWS, Veolia will apply selective use of the comprehensive RCM framework for critical assets where there are major reliability issues or excessive maintenance costs.

10.3 **Preventative Maintenance**

10.3.1 General preventative maintenance

Maintenance of the RRWS is predominantly a planned activity, with the emphasis on regular inspection, routine servicing and timely replacement or repair of asset components. Excessive maintenance is to be avoided, but each asset and asset component should be capable of reaching its economic life.

The preventative maintenance requirements of the RRWS are initially dictated by vendor recommendations and Veolia Maintenance standards. These in turn will be designed to ensure maximum reliability of plant items and developed on the basis of information provided from a variety of sources, including manufacturer's recommendations, equipment operation and maintenance manuals and operational experience from other plants. In general they fall into two groups:

1. Time-based preventative maintenance – this is applied where the operation of equipment is fairly consistent over time and is scheduled in the Computerised Maintenance Management



System on the basis of fixed intervals of time (such as monthly, quarterly or annually). This includes regular inspections and checks of all process equipment

2. Running hours-based preventative maintenance – this is applied where operation of equipment is highly variable, for which maintenance investigations and/or actions are triggered by running hours

For more detail refer to the Veolia Document, **PRO-3826-2** Conducting Preventive Maintenance **Procedure**.

10.4 **Corrective maintenance**

In addition to planned preventative maintenance, there is a need to perform on-condition, or 'corrective', maintenance. This is essentially maintenance conducted on the basis of sub-optimal condition, with the aim of preventing further loss of performance or running to failure.

Corrective maintenance may come about as a result of a discovery from a condition inspection or test, or during the conduct of a preventative maintenance routine. Alternatively it may be triggered by online condition or performance monitoring parameters, which give early indication of deterioration.

10.5 **Condition Monitoring**

While many corrective maintenance activities cannot themselves be easily planned, the inspections, diagnostic checks and condition monitoring activities that trigger them can be. In this way, Veolia employ a number of 'predictive' maintenance activities as part of the preventative maintenance plan for the Rosehill Recycled Water Scheme.

Condition monitoring and inspections are planned to be an integral part of the maintenance strategy for the RRWS. These include:

- Online monitoring of efficiency, performance and condition indicators.
- Vibration analysis.
- Oil analysis.
- Thermographic imaging, (where possible).
- Corrosion monitoring.
- Visual inspection and condition grading.

10.6 Breakdown Maintenance

In contrast to the more organised structure of preventative maintenance, emergency and breakdown maintenance is unpredictable and requires operations and maintenance personnel to be reactive.

Since one of the primary objectives of maintenance is to ensure that equipment is able to meet the required performance standard at all times, then all breakdowns must be attended to.

Breakdowns that constitute an 'incident' are to be addressed as outlined in the Veolia Document, *MAN-3935-4 Incident and Emergency Management Manual*.

When a breakdown is discovered, operator-maintainer personnel identify the item and a decision is made as to how the item is addressed. This decision takes into account a number of different factors, including: the risks and consequences of not rectifying the problem; the costs and complexity of



rectifying the problem; the criticality of the item that failed and its impact on operations; and the overall priorities of the client and operations team.

Information about the breakdown maintenance activity is then entered into the CMMS at the earliest opportunity, and this includes the type/mode of failure, as well as details about the suspected cause, the results of follow-up investigations and the impact on operations, personnel and equipment safety and/or the environment. In the process, the item will be automatically added to the outstanding work list with an appropriate response time along with any tools or spares required.

If the breakdown maintenance item is an emergency, maintenance staff may repair the selected asset on the spot, ensuring all WH&S procedures are undertaken and input into the CMMS at the completion of the works.

In addition to providing historical information, capture of the failure information also provides input into planning activities. Where, for example, equipment is identified with unusually low mean time between failures (MTBF) and/or is incurring unexpectedly high maintenance costs, the whole of life costs of the asset will be reviewed with a view to revising the preventative maintenance and routine checks associated with that item.

For more detail refer to the Veolia Document, **PRO-3827-2** Conducting Breakdown Maintenance **Procedure**.

10.7 Outage Planning

Veolia plan carefully for maintenance that requires taking plant out of service. At all times, the operations and maintenance team act to ensure a balance between servicing equipment without compromising availability of plant.

As much as possible outages are scheduled to ensure minimum impact or risk to operations. An understanding of the criticality of the assets is essential to ensure that if maintenance is performed on equipment that is normally in standby, then there is still sufficient system redundancy to mitigate against the key risks.

For this reason, it is expected that outages for major preventative items and repairs as much as practical are planned to coincide with periods of reduced output.

10.8 Spare Parts

10.8.1 Management of Spare Inventory

Initially spare parts have been purchased in accordance with Veolia's process for identification of critical spares as well as suppliers' recommendations. The spare parts inventory is established in the CMMS.

Spare parts are linked to assets and maintenance activities and be identified as used when they are removed from the store. This in turn automatically adjusts stock levels left in the CMMS.

Minimum stock levels are be allocated for each spare part. Once reached reorder reports can be produced for maintenance personnel. The minimum stock level are be based on lead time of replacement, frequency of used, price and criticality of the spare part. Each spare is linked to a preferred supplier to assist in purchasing of new stock.

The CMMS is capable of producing the following reports:

- Monthly reports with average spare part values to determine:
 - Volume and value of spare parts on shelf



- Volume and value of spare parts used during the month
- Volume and value of spare parts purchased during the month
- Stocktake audits are conducted yearly to determine the accuracy of the system.

10.8.2 **11.7.2 Critical spares identification**

The criticality of the spare parts is an indication on how important it is to have a spare part on site. Having the right spare parts at the right time can save the plant from a long-term loss of production. However, having expensive and poorly chosen spare parts on site can be considered as unutilised capital and a waste of space in the plant's storeroom.

The criticality assessment for spares is a decision making tool to help decide, according to the suppliers' recommendations and the team's experience, whether a spare should be purchased or not.

The spare parts criticality is assessed on a figure calculated from asset criticality and lead time. The result of the assessment is the spare criticality and can be used to assist with the decision to hold an item.

For more detail refer to the Veolia Document, PRO-3828-2 Spare Parts Management Procedure.

11. Criticality Assessment

11.1 **Priorities**

Evaluating asset criticality is one of the most important asset management activities that Veolia conduct on the Rosehill Recycled Water Scheme.

As an indicator of the 'consequence' of asset failure, criticality grading enables assets and associated management activities to be prioritised based on risk. At the Fairfield Recycled Water Plant, Veolia use criticality for the following:

- Monitoring asset risk levels. Performing asset assessment, based on combining the results of criticality with the latest condition grade (see condition assessment below).
 Asset risk levels are then used to set priorities for renewals.
- Listing critical spares. Identifying critical spares required to be held on site, based on asset criticality and lead time.
- Prioritising reliability analysis. Setting priorities for analysing assets to improve maintenance costs or reliability, including analysis for reliability centred maintenance (RCM).

11.2 **Criticality Grading**

Veolia defines an asset as critical if a significant adverse impact is expected in the event of total failure. When determining the criticality grade, the assessor must understand how the asset fits into the larger process, and how its failure will impact overall operational performance, operator and customer safety, and the environment.

The grading is conducted in accordance with the Veolia Document, *PRO-327-2 Criticality and Condition Assessment Procedure*.

Criticality grading of assets in the Plant has been conducted following commissioning of the Plant. Since criticality is determined by plant configuration, future criticality assessment will be performed as



required by the asset team and involve site staff or when modifications are undertaken or if high risk events occur.

12. Condition Grading and Asset Assessment

12.1 Purpose

The purpose of the condition grading and asset assessments is to provide a structured and consistent approach to review the condition and expected life of the asset, maintenance and renewal requirements, and the management of risk which feeds into the asset renewal plan.

A risk-based approach represents best practice in determining the method of assessment, and the frequency of monitoring activities. Asset condition rating and criticality factor are determined to produce an asset risk level assessment.

12.2 **Condition Grading**

The condition grade for an asset is an indicator of the likelihood of total asset failure within 12 months of the assessment.

Operational staff is required to perform the assessment in groups of two as a minimum to reduce the level of error from subjectivity. The assessment is based on factoring in multiple criteria, taking into account the dominant failure modes of each asset and the signs of deterioration in condition that best predict where the asset lies in its life-cycle as per the Veolia Document, *PRO-327-2 Criticality and Condition Grading Procedure*.

12.3 Inspection frequency and records

Asset condition inspections are programmed on an annual basis as a minimum and opportunistically carried out with repairs and scheduled works.

12.4 Asset Assessment

The asset assessment is conducted using the condition and criticality gradings in accordance with Veolia Document, *PRO-327-2 Criticality and Condition Grading Procedure*.

12.4.1 Low Asset Risk Level

For assets with a 'low' score (1-4) the assessment has determined that given the criticality and the condition, they are of minimum current risk to the treatment plant operation.

If it turns out that renewals are planned for a given period, then a low score suggests that the renewal is not required if the main justification is on the basis of condition. Therefore, such activities, in the right circumstances can be delayed.

12.4.2 Moderate Asset Risk Level

For assets with a 'moderate' score (5-6), the criticality and condition are such that there is not high enough risk to clearly justify a renewal (although it could be considered), but sufficient risk to warrant closer monitoring of the asset's performance and condition. If the condition deteriorates further, then it is incumbent of Veolia to then address the 'high' risk level.

12.4.3 High Asset Risk Level

For assets with a 'high' score (8-10), the asset risk must be immediately and actively managed. The Operator must investigate the asset more thoroughly then determine whether to plan a renewal for the earliest opportunity or put in place a failure contingency strategy. The latter may involve purchasing a spare part or arrange for a work-around in the event of asset failure.



12.4.4 Extreme Asset Risk Level

Only critical assets can have an 'extreme' score (12-15), which is designed to set the priority of action above assets with a 'high' level. In reality having an extreme score means that failure of the asset will result in adverse consequences and the likelihood is possible or expected. Immediate intervention or a failure management plan is required to be in place.

12.5 Asset Assessment Reporting

Gradings for criticality and condition will be recorded in time-series data in the CMMS to enable trending and review of historical indicators.

13. Asset Renewal and Durability

13.1 Forecasting challenges

The main asset management system at the Plant will be the CMMS. However, it should be noted that a CMMS is primarily designed as a maintenance transaction system, to schedule and record details of maintenance as it is carried out.

Such systems are not suitable for long term forecasting of capital renewal requirements, since these items will depend heavily on individual failure patterns and deterioration curves that apply for different assets. At any plant, the number of different failure patterns is as varied as the number of assets themselves, and to deal with this complexity, it is necessary to use a separate planning system.

13.2 Planning and Managing Renewals

To manage the expenditure on asset replacement and refurbishment and ensure that they are planned in such a way as to minimise operational risks while remaining cost-effective, Veolia will implement its Contract Asset Renewal Management System (Sinapse).

Employed at a number of sites, Sinapse is a decision support system (DSS) that combines a structured process with a simple user interface for developing and managing the asset renewal program.

At its heart is a methodology for combining the results of the asset risk level assessment, as well as a historical renewal summary and a future renewal strategy, consisting each of a renewal 'profile' based on the following parameters:

- renewal intervention frequency;
- number of refurbishments per life-cycle of the asset;
- replacement cost; and
- refurbishment cost.

Key information is presented in a structured format to enable the maintenance team to make decisions about how to best manage risk and renewal. This information includes:

- Risk level. The results of the last criticality, condition and asset assessments. If the risk level is high or extreme, the manager is required to make comments about what is being done to address this, including a failure contingency strategy if applicable.
- Historical summary. A list of historical renewals carried out on the asset, as well as a summary of the actual past renewal profile, determined by averaging the data in the list. The more renewals that are carried out the more accurate this data becomes.
- Renewal strategy. A strategy for managing renewals moving forward is based on Veolia's projection of the above four renewal profile parameters. This strategy may be



altered at any time based on review of the historical summary as well as the current asset risk level.

• Future renewals. The planned renewal strategy will automatically produce a list of all upcoming renewals based on the renewal strategy and the date and type of the last renewal carried out.

Veolia use the Sinapse system not only to determine whether renewals for low risk-level assets should be delayed and for high risk-levels brought forward, but also to track and report past expenditure, as well as prepare future budgets and long term models.

13.3 Handover and Residual Life

The SINAPSE system has been designed in such a way as to accommodate plants in which the assets are handed over at the end of the contract term.

Where assets have a stipulated handover life requirement. Where the system identifies that the normal program could lead to the asset not meeting this requirement, it will automatically program an extra intervention at the end of the contract to ensure this requirement is met. The Operations Manager may then bring this extra intervention to the second last or third last years of the contract to ensure that the workload is manageable.

This value will be used in the SINAPSE to assist the Operations Manager in determining whether planned replacement of the asset needs to be brought forward to avoid unplanned failure.

13.4 Analysis of Whole Life Costs

The SINAPSE is a planning system based on combining simplified predictive modelling of failure with assessment of the asset risk level. It can be used to generate both short-term budgets and long-term forecasts. However, when it comes time to perform major interventions, more investigation is required.

The methodology to be adopted by the Operations Team in the decision to create, renew or dispose of an asset will be based on the 'whole of the life' costs associated with the asset, using discounted cash flows and economic evaluation.

Whole of life costing analysis brings together all the costs of ownership and operation over the whole life of an asset. An example of the type of costs involved with whole life cycle costing is shown in the following table:



When planning to renew assets, Veolia will consult as required all relevant contract and technical documents, in particular as-built drawings, manufacturer-supplied information and the durability plan.



This will ensure that material selection, and other factors that influence asset durability, are properly addressed during the Operations phase.

The outcomes of the condition grading and asset assessment are to identify critical and non-critical areas of operation and review the type of future asset maintenance or replacement that is required.

The analysis of the assessment score is linked to a whole life cycle cost analysis. Each asset is evaluated for risk and whole of life cost for its specific future maintenance needs.

Part of the analysis and review is to determine the actions required to be undertaken. The options available include:

- Current preventative maintenance activities are reviewed and increased or decreased;
- Pre-emptive asset replacement or refurbishment is employed;
- Increased condition monitoring;
- Purchasing of critical spares to mitigate this risk;
- Run to failure (for assets that are not critical)

A continuing emphasis is to be placed on utilising information collected and analysed to review the breakdown maintenance expenditure, preventative maintenance expenditure and asset renewal program.

Properly organised maintenance takes into account economic aspects and operating constraints. Increasingly, non-repairable components are used for basic equipment. The cost of repairing these components is often very high, and therefore a cost-benefit analysis must be undertaken to justify whether such a repair is economically viable compared with replacement of the component.

As a general rule, replacement of small items of equipment is preferred with the faulty item being removed and repaired in specialised workshops. Certain repairs are more economically performed by specialists who have advanced training and specialised tools at their disposal and are able to complete the work faster and cheaper. This brings about the need to subcontract selected maintenance work. This practice takes account of experience acquired in other applications and increases operational security.

13.5 Asset Disposal

In instances where a decision is made to dispose of an asset, then the disposal activity will be conducted in accordance with the Veolia Document, *PRO-3823-2 Asset Creation and Renewal Procedure*.

For the infrastructure assets within the RRWS, the owner will be AquaNet. Disposal will necessitate that the Operations Manager takes responsibility, obtains the appropriate approvals and conducts, as required, a risk assessment to ensure that the means of disposal is not only cost-effective, but also safe and environmentally friendly.

If the asset includes any data stored within it, then it will be the Operations Manager's responsibility to ensure that the information is properly erased prior to, or in conjunction with the disposal.

14. Asset Review and Planning

14.1 General

Following a review of preventative maintenance tasks or an asset assessment, maintenance may be increased to reduce risk and prolong asset lives and ultimately reduce expenditure. The decrease in maintenance on a specific asset is only undertaken if there is no increase in risk to plant operation.



Maintenance may also be decreased or ceased and the asset may be run to failure if it does not affect plant operation.

Any decisions made on changes to maintenance requirements on a specific asset initiate a review of maintenance requirements of assets of similar type across the plant. All assets of similar types will be re-evaluated with specific emphasis on the effect of the changes on risk to operations.

14.2 Asset Review and Reporting Program

A tapered review process is utilised to minimise plant resources and to implement a process that accurately reflects the rate of change in condition of the asset and associated risk of failure.

Where practical ongoing condition based monitoring and review will be undertaken. The Veolia Document, *PRO-3829-2 Asset Reporting and Analysis of Maintenance Procedure*, details the reporting and asset review process that will be undertaken.

Over time, the review period for individual assets, or groups of assets, is optimised based on asset history data, and appropriate techniques for decay and risk analysis.

15. Capital Investment Strategy

15.1 Asset Renewal

Veolia has developed schedules for asset renewal. In the process it has identified the estimated costs associated with all asset overhaul and replacement activities through the life of the Contract.

15.2 Initial Planning

Planning for future capital investment needs and options aim to focus on the objectives and investment categories shown in the following table:

Objective	Capital Investment Category	
Estimate the investment needed over time to maintain the serviceability of existing assets	Renewal: Capital - Maintenance investment for assets	
Meet higher water quality and environmental standards	Water Quality: Capital - Water quality investment Environment: Capital - Environmental investment	
Meet higher service levels and performance standards	Improvements: Capital - Service levels investment	
Meet growth in demand	Growth and New Demand: Capital - growth and demand investment	

Adopting an integrated approach to asset management planning establishes the appropriate links between investment needs and outputs to:

- Identify the current level of service, performance, condition and serviceability of the assets
- Establish appropriate targets, standards and forecasts of service levels
- Establish planned and justified investments by priorities
- Balance investment, operational and maintenance needs with outputs


The outcome of the iteration process is to identify the preferred investment needs and options.

15.3 **Project Appraisal and Investment Studies**

When needs have been identified, the resulting capital investment needs are evaluated, justified and prioritised as part of the project appraisal process.

Investment studies should be undertaken to deal with strategic options, while project appraisals focus on individual schemes and projects. Investment studies will cover:

- Investment strategy
- Investment justification
- Unit costs
- Investment compilation by asset type/investment category
- Assessment of outputs
- Assessment of total investment

Project study and appraisal reports will cover:

- Justification of need
- Statement of facts (including current situation and forecasts)
- Design criteria (including planning horizon)
- Options consideration
- Investment costs
- Operating costs/ operating method
- Whole of life cycle cost/net present value options summary of all options and costs
- Investment type, allocation and priority ranking
- Investment program and profiling

15.4 **Capital Program – Compilation and Priority Ranking**

The capital investment proposals and options derived from the asset management planning studies have to be expressed in varied formats to assist the priority ranking of projects. Using an integrated format to collate the Asset Renewal Plan allows sensitivity analyses to be undertaken to determine the effects of varying and re profiling investment needs with outputs.

The effect of sensitivity tests on the various investment categories could include the following.

- Maintenance of assets: changes in asset maintenance and replacement policies could be assessed and linked to service levels, standards and asset lives. Performance criteria could be reviewed
- Growth development: forecast rates of growth and new development could be reassessed



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Compilation of projects into a Capital Investment Program would begin at the project appraisal stage, where project need, justification and benefits (both technical and financial) would all be subject to scrutiny. Within each investment category (i.e., Renewal, Water Quality, Environment, Improvement, Growth and New Demand, and Other), projects would be graded by priority. This would involve various techniques including whole of life cycle analysis and timed targets.

Investment category is prioritised by analysing investment levels by category and asset type to a capital investment expenditure ceiling. Scenarios examined would include least cost options, economic appraisal, maintenance options and establishing hurdle grades to supplement the serviceability and actual performance criteria.

The final preferred Capital Investment Program derived from the investment review and iteration process leads into the Asset Renewal Plan.

The systematic structured approach to asset management planning integrates key aspects into an overall strategy to operate the system effectively and economically.

By introducing an integrated process to justify the investment needs, economic optimisation comes from ensuring that resources are effectively directed at assets to achieve their maintenance, operation and service outputs.

The Asset Renewal Plan is an integral part of the asset management system and ensures that the performance of assets provide the service level objectives in the longer term.

By establishing the condition and performance of existing assets, a benchmark can be established to justify asset investment needs in conjunction with funding threshold and priorities.

Asset management planning is an important part of Veolia's management strategy to support the efficient and effective operation and maintenance of the Plant.

16. Membrane Management

16.1 General

Having effective management and maintenance of the membrane system will ensure that the water quality objectives are met and the most cost effective operation of system from an energy, chemical consumption and membrane replacement perspective is achieved.

A clearly defined membrane maintenance programme involves a number of clearly defined processes. These include performance monitoring and process testing.

Another key component of monitoring fouling rates is the ability to autopsy the membrane modules. In addition to using the resources of the membrane supplier, or a third party provider, the membrane modules can be sent to Veolia Water's Research centre in Paris, Centre de Recherche Maison Laffitte (CRML).

Autopsy diagnostics allow identification of the cause of potential membrane degradation and fouling problems as well as optimisation of the CIP solutions depending on the fouling characteristics.

16.2 Membrane Types

Two types of membranes are used in the FRWP's process:

- Ultrafiltration UF Membranes, Memcor/Evoqua S10N
- Reverse Osmosis RO Membranes, Hydranautics ESPA 2LD



16.3 Membrane Management

A key aspect of optimising the asset lives is the effective management of the Plant's membrane inventory.

In Australia, Veolia manages successfully ultrafiltration (UF) and reverse osmosis (RO) membranes in several plants the largest being:

- For UF membranes Bendigo plant with average output capacity 126 ML/day
- For RO membranes Sydney Desalination Plant with average output capacity 250 ML/day.

For detailed information regarding membrane management refer to the Veolia Document, *PRO-3821-2 Membrane Maintenance and Replacement Procedure*.



Annexure A – Overview of the Rosehill Scheme









Annexure C – Key Veolia Personnel



Appendix C.11

Contingency Plans

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Rosehill Network Pty Ltd – WICA Variation Application



AquaNet Sydney Pty Ltd

ACN 131 235 124

RRWS-IMS-DOC-001 Retail Supply Management Plan



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1. Introduction

AquaNet Sydney Pty Ltd ('AquaNet') holds Retail Supplier's Licence number 10_01R issued under the *Water Industry Competition Act 2006* (NSW) ('WICA') under which it supplies high quality recycled water from the Rosehill Recycled Water Scheme ('Rosehill Scheme'). This document, AquaNet's Retail Supply Management Plan ('Retail Plan'), has been developed to satisfy the requirements of the *Water Industry Competition (General) Regulation 2008* (NSW).

The Retail Plan provides:

- an overview of the Rosehill Scheme including the contractual structure under which it operates;
- a summary of the contractual arrangements that AquaNet has entered into with Sydney Water Corporation (**'Sydney Water**') and Customers for the supply of recycled water, and in particular the supply priority and interruptibility provisions of those arrangements;
- a summary of the events that could cause a supply interruption, the likelihood, and how AquaNet will manage such events; and
- a description of the arrangements that AquaNet has in place to manage compliance with specified codes.

1.1 Rosehill Scheme Overview

AquaNet is the retail supplier of the Rosehill Scheme. The Rosehill Scheme involves:

- extracting secondary treated effluent from Sydney Water's Liverpool to Ashfield Pipeline ('LAP');
- treating the effluent to produce high quality recycled at the Fairfield Advanced Water Treatment Plant ('**Plant**'); and
- transporting recycled water from the Plant, through a distribution network ('**Network**') to customers in the Fairfield, Cumberland, and Parramatta local government areas ('**Customers**').

The scope of the Rosehill Scheme is shown in **Annexure A**.

The Rosehill Scheme is underpinned by a 20-year Project Agreement between AquaNet and Sydney Water and is capable of delivering up to 25 million litres of recycled water per day to Customers.

Under the Project Agreement, AquaNet delivers recycled water to Sydney Water for the sale to its own customers ('**Foundation Customers**'). Sydney Water has retail contracts with the Foundation Customers. Sydney Water supplies up to 32ML/d of treated effluent (according to an effluent specification in the Project Agreement) to the Plant from the LAP. AquaNet may sell any water in excess of that required to supply the Foundation Customers directly to its own customers ('**Non-Foundation Customers**').

AquaNet owns the Plant and has entered into an Operation and Maintenance Agreement with Veolia Water Australia Pty Ltd (**'Veolia**') who is responsible for maintaining and operating the Plant.

AquaNet and its sister company, Rosehill Network Pty Ltd ('**Rosehill Network**'), have entered into a Pipelines Agreement whereby Rosehill Network constructed and owns the Network. Rosehill Network has entered into an Operation and Maintenance Agreement with Veolia who is responsible for maintaining and operating the Network.

Both Rosehill Network and Veolia hold Network Operator Licences under WICA.



The contractual structure of the Rosehill Scheme is depicted in **Annexure B**.

AquaNet and Rosehill Network are both part of the Water Utilities Australia group of companies ('**WUA**') and through its various subsidiaries, WUA provides the resources, skills and expertise required for AquaNet and Rosehill Network to deliver the Rosehill Scheme.

2. **Recycled Water Supply Arrangements**

The sale of water to Sydney Water for supply to Foundation Customers is governed by the Project Agreement between AquaNet and Sydney Water. AquaNet also supplies its own direct customers in accordance with recycled water supply agreements ('**Supply Agreements**') between AquaNet and Non-Foundation Customers.

2.1 **Project Agreement**

Under the terms of the Project Agreement, the Foundation Customers have priority with respect to recycled water supply and are entitled to peak day demand for up to three consecutive days. After three consecutive peak days of usage Foundation Customers are only entitled to the average day demand for the next three days to allow the recycled water storages to be recharged.

Recycled water supply to Foundation Customers under the Project Agreement must be in accordance with the Recycled Water Quality Specification (**'Specification**').

The Project Agreement provides for two alternative potable water supply options:

- 1. Top-up potable water which is available for supply into the Rosehill Scheme Network at the Fairfield, Woodville and Rosehill reservoirs; or
- 2. Back-up potable water supplied at the customer sites through a break tank or a three way valve at the customer meter.

In all cases potable water is supplied by Sydney Water. AquaNet or its subcontractors will purchase top-up potable water and Foundation Customers will purchase back-up potable water.

Foundation Customer meter reading, billing and communication is the responsibility of Sydney Water under the Project Agreement.

The Project Agreement also includes Operational Protocols which set out the requirements and obligations of AquaNet in providing routine and event based communications regarding:

- Notifications of interruption of recycled water supply;
- Notifications of interruption of demand for recycled water;
- Notifications of shortfall in demand for recycled water;
- Notifications of shortfalls in recycled water supply;
- Monitoring the operation of Foundation Customer valves and supervisory equipment; and
- Access to Foundation Customer Sites.

2.2 Supply Agreements

At present, AquaNet only supplies commercial and industrial Non-Foundation Customers from the Rosehill Scheme under the terms of a Supply Agreement. The Supply Agreement incorporates interruptible supply of recycled water meeting the Specification. Non-Foundation Customers enter into



Supply Agreements with AquaNet on an optional basis with agreements subject to commercial negotiation.

Under the terms of all Supply Agreements, recycled water supply is on an interruptible basis. This is a core requirement due to:

- 1. Foundation Customers having supply priority under the Project Agreement; and
- 2. The delivery of recycled water being subject to factors outside the control of AquaNet.

All recycled water supply under the Supply Agreements will be in accordance with the Specification.

Non-Foundation Customers make their own arrangements with Sydney Water for a potable water supply for circumstances where recycled water supply is unavailable or curtailed.

AquaNet will interrupt recycled water supply if any of the following circumstances occur:

- Interruption of supply is necessary to meet Foundation Customer supply obligations;
- Recycled water does not meet the Specification;
- The customer has breached a condition of the Supply Agreement such that further supply of recycled water presents a risk to human health, the environment or Rosehill Scheme facilities;
- An emergency or force majeure event;
- Recycled water is unable to be delivered (this can result from problems in effluent supply, operation of the plant or operation of the Network); or
- Any material change in circumstance such that supply of recycled water presents a risk to human health, the environment, operation of Rosehill Scheme facilities or would result in a breach by AquaNet of any law or approval.

If supply is interrupted, customer obligations to pay for recycled water are suspended.

In the event of operational issues, AquaNet will maintain supply provided that storages in the Rosehill Scheme are sufficient to supply Foundation Customer demand while maintaining supply.

AquaNet is responsible for meter reading and billing in respect of Non-Foundation Customers.

Operational Protocols form part of the Supply Agreements and set out the requirements and obligations of AquaNet and the Non-Foundation Customer to provide routine and event based communications relating to:

- Data exchange;
- Monitoring and recording of Recycled Water in accordance with the Specification;
- Notifications of interruption of supply;
- Notifications of interruption of demand;
- Notifications of shortfall of supply;
- Notifications of shortfall of demand;
- Out of Specification events and the operational response to an out of Specification event;



- Operation of the customer valves and supervisory equipment; and
- Access to the Site by AquaNet.

3. **Probability of Supply Interruptions**

3.1 Interruption Due to Demand Exceeding Availability

The Rosehill Scheme has been designed with sufficient capacity to meet Foundation Customer peak demand with capacity for sale to other customers in the event that it is not required by the Foundation Customers. It is therefore reasonable to expect that there will be some level of supply interruption to Non-Foundation Customers.

The design of the Rosehill Scheme provides for potential expansion of the Plant from 20ML/day to 25ML/day. AquaNet will make a commercial decision as to the viability of initiating this expansion by monitoring the level of interruption that occurs as demand grows.

Top-up Water (see section 2.1) will not be used to maintain supply to Non-Foundation Customers as the Top-up water costs more than the revenue that would be lost by AquaNet interrupting supply.

Recycled Water is sold to Foundation Customers and AquaNet customers at 90% of the potable water price.

3.2 Risk Assessment

AquaNet convened a series of Risk Assessment and Critical Control Point workshops in September / October 2010 to identify and establish processes to mitigate any outstanding health and environmental risks and ensure that interruptions are minimised. Workshop participants included representatives from AquaNet, Veolia, Sydney Water, IPART and NSW Department of Health.

The methodology used for Hazard Assessment and Risk Management was in accordance with Veolia Document **PRO-263-5 Risk Management Procedure**, which is based on AS4360, the Australian Standard for risk management.

Output from the workshops included a detailed risk assessment and confirmation of the Rosehill Scheme critical control points.

3.3 Interruption Due to Incidents or Operational Problems

Design of the Rosehill Scheme includes a level of redundancy to ensure that the Network and Plant can operate reliably and loss of supply due to operating problems will be rare. The following design principles have been incorporated into the Rosehill Scheme:

- Pumping stations have been designed with 30% redundancy at full flow and 50 to 100% at lower flows;
- Reservoir locations have been selected such that supply can be maintained for a period of hours during pumping station failure via gravity feed;
- Allowance has been made to connect a temporary generator at both Fairfield and Rosehill in the event of a long term power outage;
- The Plant has full redundancy in the major process trains (i.e. pumps, ion exchange, Micro Filtration Units and Reverse Osmosis Units); and
- The Plant includes a 3ML of storage for secondary treated effluent to smooth out supply fluctuations.



The Scheme is monitored on a 24 hour basis 7 days per week with early warning alarms and equipment condition tested through monitoring of key parameters.

Early warning alarms allow the operators to identify and follow any short term trend and take appropriate corrective action to rectify any recycled water quality or supply issues and avoid interruption to supply.

Maintenance regimes have been put in place by Veolia to ensure that the Rosehill Scheme operates continually and reliably. Planned maintenance that necessitates a partial or full shutdown of equipment will be scheduled in periods of low demand so that supply can be maintained wherever possible.

To the extent that there are interruptions due to operating problems, these issues will be temporary and corrected by Veolia as specified in the Infrastructure Operating Plan.

In the event that the Network or Plant is damaged by any party or a Force Majeure event, then supply may need to be interrupted while the damage is repaired. Reasonable precautions have been taken to prevent such occurrences such as condition monitoring, network surveillance and site security.

3.4 Interruption Due to Effluent Supply

In the event that Sydney Water is unable to provide sufficient effluent to maintain full plant operation or the quality of the effluent falls outside agreed parameters, an Effluent Event will be triggered under the Project Agreement and Sydney Water will provide Back-up or Top-up potable water as an alternative. The probability of an Effluent Event occurring is outside the control of AquaNet.

3.5 Interruption Due to Recycled Water Quality

The Plant has been designed such that it can operate reliably and consistently supply recycled water to the required Specification so that interruption due to quality issues will be rare. In the event that there is an off-specification event, production and/or deliveries will be shut down rather than supply off-specification recycled water to Foundation Customers or AquaNet customers. To the extent that there are interruptions due to quality problems, these issues will be temporary and corrected by Veolia as specified in the WUA Document *RRWS-IMS-DOC-003 Water Quality Management Plan*.

Recycled water quality is monitored continuously at various points throughout the Rosehill Scheme including at the extremities of the Network. Recycled water from the Plant that does not meet the Specification will not be permitted to enter the Network, and in the event that water in the Network is out of Specification then the water will be disposed of through the various scour points. It will not be supplied to customers.

3.6 AquaNet Financial Viability

The Rosehill Scheme is supported by a 20 year Project Agreement with Sydney Water under which AquaNet will receive an ongoing revenue stream from sale of recycled water to Foundation Customers.

The revenue stream provides for:

- Purchase of treated water from Veolia under the Plant Agreement;
- Operating costs of AquaNet and the recycled water distribution network; and
- A return on invested capital.

Project expansion will occur when sufficient market is secured to justify the incremental capital and operating costs of the expansion.



The financial structure of the Rosehill Scheme is such that the risk of financial failure for AquaNet is low. If financial failure were to occur, customers could revert to their potable water back-up supplies or the Minister could appoint a Retailer of Last Resort as provided for in the WICA.

4. Alternative Supplies of Water

In the event that recycled water supply is interrupted, customers will not be left without sufficient water. If the Rosehill Scheme is producing insufficient recycled water to meet demand, supplies of potable water (in the form of Top-up water and Back-up water purchased from Sydney Water) are available to maintain water supply to Foundation Customers.

Non-Foundation Customers are supplied on an interruptible basis and make their own arrangements to manage interruptions to supply of recycled water by arranging back-up potable water supply from Sydney Water.

AquaNet can purchase Top-up potable water subject to limits specified in the Project Agreement, to meet Foundation Customer supply obligations. Those limits are:

- 3% of total Rosehill Scheme recycled water volume from April to September; and
- 7% of total Rosehill Scheme recycled water volume from October to March.

There is no limit on the use of Back-up potable water by Foundation Customers under the Project Agreement.

AquaNet's sole source of income is from the delivery and sale of recycled water. AquaNet therefore has a strong incentive maintain supply of recycled water and minimise the use of potable water.

5. **Compliance**

WUA manages risk and compliance through an integrated management system ('**IMS**'). WUA's IMS is a centralised system which combines the elements of a quality management system, work health and safety management system and an environmental management system. WUA's IMS is third party certified to the requirements of:

- AS/NZS ISO 9001, Quality Management Systems;
- AS/NZS 4801, Occupational Health and Safety Management Systems; and
- AS/NZS ISO 14001, Environmental Management Systems.

As a member of WUA, the policies, procedures and controls of the IMS apply to AquaNet.

The values, principles, standards and norms of behaviour of WUA are detailed and communicated to employees, contractors and business partners in a variety of ways. At the most fundamental level, WUA expects its employees, contractors and business partners to act with honesty and integrity, be ethical and act in caring and respectful way towards each other, our customers, the community, and the environment.

The Board of WUA has approved two key policies relating to WUA's values and principles which relate to sustainability, workplace safety, quality of products and the protection of the environment. These are the WUA Documents, *WUA-IMS-DOC-003 Sustainability Policy* and *WUA-IMS-DOC-001 Quality, Health, Safety and Environment Policy*.

The Audit, Risk & Compliance Committee ('**ARCC**') of WUA has been established by the WUA Board to provide an objective review of the effectiveness of WUA's financial reporting and risk management framework. The principal role of the ARCC is to assist the Board in fulfilling its corporate governance



and oversight such as: health and safety, financial reporting; financial condition; internal controls; internal and external audit; risk management compliance; insurance; and sustainability.

5.1 **Code of Practice for Customer Complaints**

The WUA Document, *RRWS-IMS-DOC-004 Code of Conduct for Customer Complaints* has been developed by AquaNet and is consistent with the Australian Standard for complaints handling *AS ISO 10002*—2006.

The Code of Conduct for Customer Complaints specifies the process by which AquaNet will respond customer or community complaints, contact details and how the complaint can be escalated if necessary.

The Code of Practice for Customer Complaints is available on the AquaNet website and customers will be made aware of the Code prior to commencement of supply of recycled water.

AquaNet will abide by the Code of Conduct for Customer Complaints.

5.2 **Code of Conduct for Debt Recovery**

The WUA Document **RRWS-IMS-DOC-005 Code of Conduct for Debt Recovery** has been developed by AquaNet and is consistent with the terms of the recycled water supply agreements between AquaNet and its customers.

The Code of Conduct for Debt Recovery specifies steps that AquaNet will take in relation to overdue bills, unpaid bills and disputes. A short term payment plan will be available for customers suffering financial hardship.

The Code of Practice for Debt Recovery is available on the AquaNet website and customers will be made aware of the Code prior to commencement of supply of recycled water.

AquaNet will abide by the Code of Conduct for Debt Recovery with all customers.

5.3 Marketing Code of Conduct

The Marketing Code of Conduct published by the NSW Government specifies how marketers must conduct themselves when they deal with small retail customers. A person is a small retail customer in relation to water supply if the maximum rate at which water is supplied, pursuant to one or more water supply contracts, to all premises that the person owns, leases or occupies is less than 15 megalitres per year.

Rosehill Scheme water is highly treated and can cause accelerated corrosion in materials normally used for water reticulation such as cast iron, copper and concrete. Special materials must be used to handle the water or it must be treated further if standard materials are used. In either case, the cost and inconvenience of these options is likely to make Rosehill Scheme water unattractive for individual small customers.

Of the industrial, commercial and local government customers and potential customers that AquaNet presently deals with, only some local government irrigation sites and two to three line of main industrial users are small retail customers. AquaNet has no plans to market directly to residential customers.

If the Rosehill Scheme is extended to supply new developments, for example through dual pipe systems, then AquaNet's present plan is to supply other retailers on a wholesale basis for onward supply to customers in those developments.

AquaNet will develop the recycled water market through one to one business to business communication such as meetings, phone calls and emails.



AquaNet will also maintain an internet site with information on the Rosehill Scheme and the benefits of recycled water use. Customer events will occasionally be held and will be by invitation.

AquaNet will abide by the NSW Government Marketing Code of Conduct in communication with small customers.

5.4 **Transfer Code of Conduct**

The NSW Government Transfer Code of Conduct describes the arrangements that apply when a customer of any size is transferred from one licensed retailer supplier to another or to a public water utility, or from a public water utility to a licensed retail supplier. The Code imposes obligations on both the incoming and outgoing retailer, and the network operator.

At present Sydney Water and AquaNet are the only retailers that will be supplying water from the Rosehill Scheme and that situation is unlikely to change in the foreseeable future.

6. Implementation and Review

AquaNet will:

- ensure that this Plan is fully implemented and regularly reviewed according to the guidelines below;
- supply recycled water in accordance with the terms of the Project Agreement and Supply Agreements; and
- provide routine and event based communications in accordance with the agreed operational protocols.

This Plan will be reviewed on direction of the Minister or if any of the following circumstances occur:

- AquaNet enters into arrangements to supply Small Retail Customers;
- There is a change to the terms of the Supply Agreements that represents a material change to this Plan; or
- A change is required as the result of a change in law.

The Codes of Practice for customer complaints or debt recovery will be reviewed if:

- There is a change to the WICA regulations or other law that has a material effect on the codes;
- There is a material change to the terms of the Supply Agreements; or
- There is a material change to AquaNet processes.

If the Plan or Codes of Practice are updated as a result of the above processes, an updated copy will be provided to IPART and when agreed, posted on the AquaNet website with copies provided to the ombudsman and the Minister.



Annexure A – Overview of the Rosehill Scheme









Rosehill Network Pty Ltd

ACN 131 213 691

RRWS-IMS-DOC-002 Infrastructure Operating Plan



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1. Introduction

Rosehill Network Pty Ltd ('**Rosehill Network**') holds Network Operator's Licence number 09_002 issued under the *Water Industry Competition Act 2006* (NSW) ('**WICA**') under which it owns water infrastructure that forms part of the Rosehill Recycled Water Scheme ('**Rosehill Scheme**'). This document, Rosehill Network's Infrastructure Operating Plan, has been developed to satisfy the requirements of the *Water Industry Competition (General) Regulation 2008* (NSW).

1.1 **Rosehill Scheme Overview**

The Rosehill Scheme involves:

- extracting secondary treated effluent from Sydney Water's Liverpool to Ashfield Pipeline ('LAP');
- treating the effluent to produce high quality recycled at the Fairfield Advanced Water Treatment Plant ('Plant'); and
- transporting recycled water from the Plant, through a distribution network ('**Network**') to customers in the Fairfield, Cumberland, and Parramatta local government areas ('**Customers**').

The scope of the Rosehill Scheme is shown in **Annexure A**.

The Rosehill Scheme is underpinned by a 20-year Project Agreement between AquaNet Sydney Pty Ltd ('**AquaNet**') and Sydney Water and is capable of delivering up to 25 million litres of recycled water per day to Customers.

Under the Project Agreement, AquaNet delivers recycled water to Sydney Water for the sale to its own customers ('Foundation Customers'). Sydney Water has retail contracts with the Foundation Customers. Sydney Water supplies up to 32ML/d of treated effluent (according to an effluent specification in the Project Agreement) to the Plant from the LAP. AquaNet may sell any water in excess of that required to supply the Foundation Customers directly to its own customers ('Non-Foundation Customers').

AquaNet owns the Plant and has entered into an Operation and Maintenance Agreement with Veolia Water Australia Pty Ltd (**'Veolia**' or **'VWA**') who is responsible for maintaining and operating the Plant.

Rosehill Network and its sister company, AquaNet, have entered into a Pipelines Agreement whereby Rosehill Network constructed and owns the Network. Rosehill Network has entered into an Operation and Maintenance Agreement with Veolia who is responsible for maintaining and operating the Network.

Both Rosehill Network and Veolia hold Network Operator Licences under WICA.

The contractual structure of the Rosehill Scheme is depicted in **Annexure B**.

AquaNet and Rosehill Network are both part of the Water Utilities Australia group of companies ('**WUA**') and through its various subsidiaries, WUA provides the resources, skills and expertise required for AquaNet and Rosehill Network to deliver the Rosehill Scheme.

2. Executive Summary

This plan explains how Veolia manage the infrastructure assets to best satisfy the contractual and relevant regulatory requirements for the Rosehill Scheme.

This plan complements Rosehill Network's Water Quality Management Plan as well as the VWA Infrastructure Operating Plan for the Plant and the VWA Water Quality Management Plan for the Plant



by providing details regarding all key asset management activities. The plan is further supported by the Veolia Document, *MAN-3954 Operations Management Plan – Rosehill Recycled Water* **Scheme**, which provides an overview of the way Veolia addresses the requirements for Quality, Safety, Environment, Asset and Risk Management as required by the Veolia Business Management Manual and relevant standards.

The key features of Veolia's Asset Management Plan are:

- Establishment of an advanced Asset Management System with the potential to be linked to the SCADA system to ensure accurate and appropriate data capture from day one.
- Early and rigorous attention paid by the Asset Management team to develop a comprehensive maintenance program.
- Integration of condition monitoring, renewal and whole of life cost planning processes to promote high availability and durability of assets.
- A focus on providing a competent, well trained and well supported operations team, with a view to establishing an 'asset management culture' on the RRWS.
- Development of effective maintenance and renewal schedules with an emphasis on condition monitoring to minimise risks.
- Implementation of special information systems to manage UF and RO membranes, as well as capital renewal.
- Selective use of RCM through the operations phase to address reliability issues.

3. Abbreviations

The following abbreviations are used in this Plan:

AquaNet	AquaNet Sydney Pty Ltd	
CIP Clean in Place		
CMMS Computerised Maintenance Management System		
EIS	Environmental Impact Statement	
Fairfield AWTP Fairfield Advance Water Treatment Plant		
FARWP Fairfield Advanced Recycled Water Plant		
FMEA Failure Mode and Effects Analysis		
VAMS Veolia Asset Management System		
IBMS Integrated Business Management System		
КРІ	Key Performance Indicator	
LOS Level of Service		



MTBF	Mean Time Between Failure	
O&M Operations and Maintenance		
OH&S Occupational Health and Safety		
PLANT	The Fairfield Recycled Water Plant	
РМ	Preventative Maintenance	
RCA	Root Cause Analysis	
RCM Reliability Centred Maintenance		
RO Reverse Osmosis		
Rosehill Network	Rosehill Network Pty Ltd	
RRWS	Rosehill Recycled Water Scheme	
SCADA Supervisory Control and Data Acquisition		
UF	Ultrafiltration	
VWA	Veolia Water Australia	

4. Introduction

4.1 **Context**

This Infrastructure Operating Plan has been prepared as an outline plan in order to assist with the management of assets at Fairfield AWTP.

4.2 **Scope**

The Infrastructure Operating Plan has been developed to provide the following information:

- An overview of the asset management strategy and how the Infrastructure Operating Plan is developed in accordance with this;
- Descriptions of the staff organisational structure and processes to be put in place to implement the asset management aspects of the Water Quality Plans and monitor compliance with all requirements;
- Explanation of the process for developing, reviewing and updating the maintenance program.
- An outline of the asset management information systems to be used;
- Details of how preventative, corrective and breakdown maintenance is to be conducted on site;
- An overview of the process and value of assessing criticality for all assets;
- An overview of the process for performing condition and risk assessment and how this information is used for future planning;



- An outline of the capital investment strategy and the processes involved in making decisions regarding asset refurbishment and replacement;
- Details of the asset renewal program, which consists of major periodic maintenance items, including overhauls and replacement; and
- A summary of how RO and UF membranes are to be managed.

4.3 **Objectives**

The Infrastructure Operating Plan is designed to ensure that the Rosehill Scheme assets are managed to the principles of Veolia's Asset Management Strategy. This strategy is an integrated and flexible approach, encompassing whole of life cycle costs.

The primary objectives of the Infrastructure Operating Plan are to enable the physical assets of the scheme to be maintained, repaired, rehabilitated and replaced in such a way as to ensure the following outcomes:

- No drop in level of service delivered over the duration of the contract.
- Optimum equipment performance, reliability and availability.
- Minimum total cost of ownership of each asset over its life cycle.
- Minimum business risks to all stakeholders.
- Compliance with all statutory and contractual requirements.

5. Asset Management Strategy

5.1 Strategy overview

Veolia's strategy for asset management uses an integrated approach which considers all aspects of the asset's life cycle including safety, operational performance, levels of service, contractual requirements, maintenance requirements and the asset's whole of life costs.

A flexible approach accommodates the continuing change in external factors associated with economic influences, customer expectations and business needs. Veolia's strategy enables ready reassessment and reiteration of inputs and outputs via periodic reviews and appraisals of all areas contained in an asset's life cycle.

Veolia's asset management strategy and is designed to:

- Reflect industry best practice.
- Produce an integrated structure that supports all the activities of the business.
- Ensure that the owner, operator and customers are not exposed to undue risk.
- Ensure sustainability of the environment.
- Create an objective, transparent management tool for monitoring asset performance against the relevant statutory obligations, policies, standards, levels of service and operational targets, and for reporting to authorities, customers and community.



- Minimise the cost of the managed assets over their useful life by balancing investment needs within economic and operational guidelines to ensure maximum efficiency in terms of capital investment and operational costs.
- Ensure that the Plant maintains the minimum flows for which it was designed.
- To manage and operate the Plant as an efficient business enterprise, it is essential to maintain the quality and performance of the assets at their optimum level. Detailed in this Infrastructure Operating Plan is the processes, which provide:
 - An effective mechanism for compiling a comprehensive asset register of all plant assets linked with quality, physical parameters, condition, criticality and performance of the assets.
 - Procedures for determining and recording asset condition and criticality;
 - Evaluating whole of life options;
 - Techniques for determining asset short- and long-term investment priorities and balance against the availability of funds; and
 - A program for asset management, maintenance, upgrading and replacement of assets that can cater for dynamic conditions.

5.2 **Planning Framework**

Veolia utilises an integrated approach to asset management planning which considers the impact of all internal and external influences on the systems assets – technical, financial, social, political and economic.

Veolia establishes maintenance regimes, maintenance standards, operating procedures and investment and replacement strategies that are linked to ensure ongoing service delivery in the most cost effective manner.

The asset management planning process consists of an annual review and refinement to allow for changing internal and external factors such as:

- The asset management principles, strategy and objectives of the asset owner;
- Industry-wide guidelines and standards for assessment management (including the International Infrastructure Management Manual)
- Environmental legislation;
- Funding and investment priority philosophies;
- Occupational health and safety regulations;
- Changing technology;
- Industrial relations legislation; and
- Community expectations.

The asset management framework that is to be used for developing and revising the integrated Asset Management Plan is shown in the following table:



Step		Details
Step 1	Define Performance Criteria and Service Levels	These are defined using contract requirements and KPIs, EIS requirements, Licence Requirements, Environmental Plan and statutory obligations and performance standards.
Step 2	Establish Policies and Procedures	The policies and procedures required to deliver Veolia's asset management strategy reside in the Operations Management Plan (On Tap).
Step 3	Define Asset Register and Data Standard	The Plant's assets are defined and categorised into specific areas and asset types using an asset register and data standard. The asset register is created and maintained in Veolia's Computerised Maintenance Management System (CMMS) software.
Step 4	Define Maintenance Requirements	Maintenance requirements for assets are determined and managed in Veolia's CMMS. Preventative maintenance implemented based on manufacturers recommendations and asset condition and risk assessment.
Step 5	Asset Condition Grading and Assessment	Assets have regular condition assessments conducted with defined standards and policies. An overall asset assessment is performed to identify any areas of potential concern.
Step 6	Analysis and Review of Asset Assessment	From the information collected in Step 5, an asset assessment identifies any shortfalls in asset condition and performance. A decision is then made either to continue to maintain or renew assets. Assets may be operated to failure based on whole of life costing evaluation options.
Step 7	Review Maintenance Requirements	Based on decisions made in Step 6, the options to increase or decrease maintenance expenditure is determined, reviewed and evaluated.
Step 8	Asset Replacement Program	Based on the assessments made in Step 6, the options available for asset replacement or refurbishment can be determined, reviewed and evaluated.
Step 9	Review / Revise Investment Needs	To assess the implications of changing inputs, business parameters, outputs, standards and targets, the results of outputs and total expenditure needs will be reviewed.

6. Asset Management Organisation

6.1 Veolia Staffing Structure and Responsibilities

An organisational structure showing key Veolia positions relevant to asset management is shown in **Annexure C**.

The asset management responsibilities of the key site-based staff are as follows:

• Operations Manager – Jointly review and approve the O&M Plan.



Level 6 Operator – Key site point of contact for all maintenance issues. Organise material resources and supervise operator-maintainers, electrical and mechanical tradesmen and subcontractors engaged in corrective maintenance and technical or vendor specific preventative maintenance activities. Manage the supply and transfer of spare parts and other and other inventory to and from the onsite store.
 Responsible for maintenance program planning. Develop and coordinate major preventative maintenance activities, including condition monitoring. Maintain the asset register. Develop the maintenance strategy and asset replacement program. Manage client reports and communications.

The asset management responsibilities of the key members of Veolia's asset management team, based in the Veolia Water Australia head office, are as follows:

- Corporate Asset Manager Manage the provision of IT systems and engineering services support to enable assets to be managed in accordance with the asset management requirements of the O&M Plan, the asset renewal program, and the reporting requirements of The Client.
- Asset Performance Engineer– Assist in data collection and CMMS establishment activities and perform systems administration for VAMS. Facilitate workshops and provide technical and systems support for RCM.
- Jointly review and implement the asset management component of the O&M Plan. Oversee development of the maintenance plan to align with best practice for Plant operations and maintenance. Review all aspects of the asset management framework, including the maintenance strategy and asset replacement program.
- Assist in the development of the asset renewal program, as well as ongoing monitoring and reporting. Track performance of asset renewals and provide IT support for the capital planning system.
- Asset Project Engineer– Conduct serviceability and reliability investigations. Provide engineering and project management assistance for major asset renewal and improvement projects.
 Provide engineering support to plant staff. Perform analysis of CMMS and carry out rootcause-analysis (RCA) and reliability investigations as required. Ensure that information is appropriately captured and stored in the Computerised Maintenance Management System (CMMS) VAMS, and monitor and report on Plant asset management performance.
- Electrical / Controls Engineer Administer, develop and arrange for training for the site SCADA system. Provide project management and engineering assistance for key electrical and controls projects.

6.2 Labour Resourcing

To achieve the maintenance objectives of the Plant, the following staff are allocated:

- Veolia operator-maintainers in addition to operating the Scheme, Five (5) operators carry out routine asset maintenance. The following tradespeople are available on dayshift to carry out preventive and breakdown maintenance tasks:
 - instrument technicians, electrical and mechanical fitters.
- Network Coordinator available to coordinate and carry out operations and works on the Network.



- General subcontractors resourcing requirements vary depending on the work scheduled, but subcontractor tradesmen are engaged on an ad-hoc basis to carry out basic maintenance routines (as required).
- Specialist subcontractors separate commercial agreements are established for the carrying out of specialist maintenance activities such as servicing of chemical instrumentation, large pump systems, lifting equipment etc.

Key service suppliers, including subcontractors, were identified during the procurement phase of the project. A continuing review process is to take place to ensure that service and supply is optimised.

6.3 Equipment Resourcing

The following facilities are available including, mobile plant and equipment to ensure maintenance at the plant is properly carried out:

- Maintenance workshop
- Electrical workshop
- Spares storeroom
- Workshop gantry
- Workshop storage for consumables and tools
- Workshop bench tools (bench grinder, drill etc.)
- Workshop welding bay and equipment
- Operator vehicles (utilities etc.)
- Operator laptops
- Tools (mechanical fitting, electrical etc.)
- Instrument calibration equipment
- Condition monitoring equipment (Non-contact thermometer etc.)
- Lifting equipment (block and tackle etc.)
- Access equipment (ladders, davits etc.)
- PPE and safety equipment (gas detectors, chemical suits, masks etc.)

Equipment required for major overhauls/repairs or specialised maintenance is generally provided by service contractors.

6.4 **Culture and Training**

In line with the Veolia Document, *POL-7-3 Learning and Development Policy*, Veolia fosters an 'asset management culture' through communication, leadership and training. Culture is a key element that ensures that the objectives of the O&M Plan are realised. Veolia facilitates this by first appointing highly motivated, skilled and experienced staff to key positions. In addition, the following support is provided:

General systems training of all staff to enable them to:
 use the CMMS system to manage assets, maintenance activities, condition assessment and spare parts.



- understand the specific CMMS data collection and reporting needs of asset management, and how this is used by the business to reduce risk, generate efficiencies and savings, and improve performance.

Specialised asset management staff are available to assist key staff to enable them to:

- perform criticality analysis of assets and condition grading and use this information to manage risk and prioritise renewals

- perform 'whole of life' analysis to understand and justify capital projects involving renewal or modifications

- use and analyse the results of condition monitoring technologies and analysis techniques (such as vibration, oil analysis and thermography) to promote 'predictive' maintenance.

- perform root-cause-analysis to fault-find complex or repeated failures.
- Communication and involvement of key staff in asset management developments within the company through:
 - regular site-based meetings with the asset management staff;
 - attendance at periodic maintenance and CMMS user-group conferences;
 - participation in workshops to plan specific asset management improvements;
 - dissemination of maintenance systems updates via electronic means

In accordance with the Veolia Document, *PRO-15-1 Contractor Management Procedure*, Veolia use its Contractor Management System to ensure that all subcontractors who carry out maintenance activities are suitably qualified and trained and have appropriate insurances.

Similarly, Veolia staff who carry out maintenance are to have a suitable trade and/or other qualifications and must be aware of all appropriate legislation and standards. In this way, the Plant Operator will ensure that all activities are performed in a safe and competent manner.

6.5 **Policies and Procedures**

The policies and procedures required to implement the asset management strategy form part of Veolia's Integrated Business Management System. The system's documentation is stored within the BMS system and is controlled and maintained in accordance with the Veolia Document, *PRO-129 Documented Information Procedure*.

The integrated management system is used to manage all aspects of the operation and maintenance of the Rosehill Recycled Water Scheme. This includes the following Veolia Documents:

- STA-311-2 Asset Management Strategy
- PRO-3825-2 CMMS Operations and Maintenance Procedure
- PRO-3826-2 Conducting Preventative Maintenance Procedure
- PRO-3827-2 Conducting Breakdown Maintenance Procedure
- PRO-3821-2 Membrane Maintenance and Replacement Procedure
- PRO-327-1 Criticality and Condition Grading Procedure
- PRO-3822-2 Asset Condition and Risk Assessment Procedure
- PRO-326-1 Developing and Maintaining an Asset Replacement Plan Procedure
- PRO-3828-2 Spares Parts Management Procedure
- POL-12-2 Asset Management Policy



- PRO-3829-2 Asset Reporting and Analysis of Maintenance Procedure
- TEM-38-1 VAMS Static Data Recording Procedure
- PRO-331-2 Asset Location Numbering and Data Procedure

A complete list of Veolia documents pertaining to the Rosehill Recycled Water Scheme (RRWS) can be generated at any time from the BMS. Reports can show complete listings of recently updated documents.

6.6 Establishment of Systems

Veolia manage data in multiple information systems to make asset management effective for the RRWS. The most important of these systems is the computerised maintenance management system (CMMS). The process of setting up these systems prior to commissioning has been critical to asset management, as shown below.

6.7 **Documentation and Records**

Veolia capture and store, within its CMMS historical information relating to maintenance, repair and replacement activities conducted on infrastructure assets. Overall, the CMMS records the following:

- Comprehensive asset register reflecting an up-to-date configuration of the RRWS equipment
- History of all preventative, corrective and breakdown asset maintenance conducted on all assets
- Instrument calibration history
- Meter information and condition monitoring results
- Inventory of spare parts holdings

In addition, the CMMS records the financial details of all purchases of materials and labour carried out in the course of conducting maintenance.

6.8 **Compliance and Management Review**

As part of the Integrated Business Management System, this Infrastructure Operating Plan is subject to internal audits and review to ensure that activities on site comply with the requirements of the plan.

Revision of this information takes place for the life of the operating contract to allow for changing internal and external factors such as changing technology, funding and investment priority philosophies, Environmental, WHS and IR regulations and other factors.

7. **Performance Management**

7.1 Levels of Service Targets

The mandatory performance criteria for the RRWS are defined in the Contract Requirements.

These operational performance requirements define the minimum level of service (LOS) in terms of water quality, water volume and general performance that is to be delivered by the Plant Operator.

The LOS is defined in the reference specification in Veolia Document, *TEM-3898-1 Recycled Water Specification*.

The successful commissioning of the Plant was a milestone for demonstrating that the initial asconstructed equipment configuration is able to deliver the required LOS.

LOS is a key driver of asset management, particularly in setting targets for (a) plant and equipment availability; (b) maintenance productivity and effectiveness; and (c) equipment operational efficiency.

7.2 **Performance monitoring and review**

Veolia monitor performance and reports to the client on a monthly basis, performance against the agreed standards in accordance with the Contract Requirements.

The supervisory control and data acquisition (SCADA) system is the key source of online equipment performance monitoring for the RRWS. This SCADA performance data is used in three ways:

- Key flow, process and quality information will be stored in a data historian for trending analysis, monitoring and fault finding.
- Those items that contribute to a General Failure or Water Quality Failure is captured in the Performance Management System, which can be used for client reporting.
- Performance indicators based on meters that fall below, or rise above, a predefined level (such as motor currents and log reduction values for UF cells) have the potential to trigger corrective maintenance activities in the CMMS.

In addition to process monitoring and optimisation of energy consumption Veolia perform condition monitoring and periodic efficiency reviews of major machinery. This review entails analysing the operating efficiency of high-energy-consuming equipment, specifically the RO pumps.

The purpose of performing this analysis is two-fold. The first is to promote energy savings—inefficient pumps require more energy to meet the same output. Where a significant drop in efficiency is detected, a maintenance activity is to be raised in the CMMS to investigate and identify the root cause of the problem. The second is to identify early indications of deterioration in condition.

7.3 Changes to Service Levels

If future changes in demand or other requirements (such as recycled water quality) necessitate modifications to the LOS, then it will be necessary for Veolia to carefully consider how the delivery of the new LOS will impact the performance and management of its assets.

8. Asset Inventory

8.1 General

Veolia maintains an up-to-date inventory of infrastructure assets, known as the 'asset register', reflecting the as-built configuration of the plant.

The asset register database is carefully structured with an appropriate resolution to ensure that:

- site staff, managers and engineers are able to find items easily and unambiguously;
- data capture is properly matched to analysis and reporting requirements; and
- maintenance history and cost information are captured at the right level (identified in a risk assessment process).



8.2 Asset Register

The scope of the asset register is to identify all infrastructure assets associated with the Plant, including machinery, structures, and electrical installations.

The asset register has been created, using data from numerous sources including

- Asset list
 - Grouped in major system and equipment areas
- As-built equipment lists (mechanical, electrical, valve and instrumentation)
 Potential for make, model, serial number, size, capacity, warranty, asset type
- As-built drawings

 primarily the process and instrumentation drawings (P&IDs) as a checklist for asset that have been included
- Financial
 - purchase date and price where know.

Once collected, asset data is collated into an asset register using the agreed structure for the asset hierarchy as defined in Veolia guidelines. Veolia then developed a full asset inventory in the CMMS and integrates this information, along with the O&M manuals and spare parts lists as part of the Business Management Plan.

8.3 Asset interface points (boundaries)

The limits of the agreement for the Asset Management and the Operations of the RRWS are defined in the Veolia Document, *TEM-3942-1 Definition of Interface Points*.

9. Asset Management System

9.1 **CMMS**

9.1.1 General

- A Computerised Maintenance Management System (CMMS) forms the basis of Veolia's asset management and maintenance plans and will be used for scheduling, recording and analysing all maintenance activities.
- Veolia uses a new generation computerised maintenance management system (CMMS), called VAMS. The system utilises a web interface and is an important tool for the day-today management of asset maintenance and repairs, as well as spares inventory.
- Based on the leading asset management software platform Infor EAM, VAMS has been specially developed by Veolia Water to suit the needs of managing water and wastewater treatment infrastructure assets. It includes many features, including: modules for managing asset details and configuration, preventative maintenance planning and scheduling, purchasing, management of spares, workflow and analysis.

9.1.2 Establishment and Use of Asset Management System

- Veolia has developed an asset register and preventative maintenance work order data in the computerised maintenance management system (CMMS).
- The CMMS comprise an inventory of all managed assets. It includes criticality and condition grading of all asset components, and other relevant data such as capacity, size


and age. Information is archived to allow trending of asset condition over the operating period.

- Most importantly, the system is to be used to capture data relating to all inspection and maintenance activities conducted at the Plant.
- All required preventative, corrective and breakdown maintenance information is entered into the VAMS database, properly linked to the assets that work is to be carried out on. Upon completion of tasks, maintenance personnel record the task as completed in VAMS with the following information:
 - $\circ \quad \text{date completed} \\$
 - personnel undertaking the work
 - labour hours for task
 - materials used
 - asset condition and performance data as observed during maintenance activities, including a brief description of work and important notes
- A high quality preventive maintenance program is critical to prevent inadequate equipment performance that can result in environmental or process incidents. Adherence to the preventive maintenance program must be assessed on a frequent basis, using maintenance performance indicators.
- VAMS is used to monitor preventive and corrective maintenance ratios with the objective of minimising breakdowns and failures.
- Regular reviews of maintenance performance will lead to progressive refinement and optimisation of the overall maintenance program. Equally important is the issue of breakdown maintenance, which must be undertaken in a timely, reliable manner.
- A KPI dashboard can be individually configured to monitor performance against certain contractual measures, compliance with statutory requirements as well as benchmarking and monitoring of internal KPI's.

10. Maintenance Planning and Execution

10.1 Work Instructions

Work orders and associated task instructions are planned for and generated prior to their required start date. They are issued by the Level 6 Operator to a trade group who are responsible for:

- Preparation review of work to be undertaken and ensuring that all materials, spares and tools are available for the timing of the work.
- Safety and Environmental constraints permits to work, entry permits etc. to be completed as required in high risk areas such as confined spaces.
- Operational constraints avoid incidents leading to water quality or quantity problems.
- Completion of all maintenance tasks.
- Closing of work instructions in the Computerised Maintenance Management. System with all required data completed hours worked, spares used, external resources etc.



If something unexpected is noted while undertaking the work, the person responsible for the maintenance is required to raise a breakdown maintenance order. Work instructions for each asset are regularly reviewed by all maintenance staff.

For efficiency, work instructions are not raised for minor housekeeping items, such as keeping plant clean and tidy, and operational running checks that must be done on a daily basis. These items are managed using Veolia Documents, *TEM-3778-2 Daily SCADA Checks* and *TEM-3777-2 Operator Rounds*.

10.2 **Maintenance program optimisation**

Initially, the preventative maintenance program has been developed on the basis of vendor recommendations and Veolia Maintenance Standards. This program is reviewed regularly and in the event of reliability issues occurring. To this end, Veolia will apply an initial maintenance review and optimisation process, as well as ongoing selective application of analysis in accordance with the principles of reliability centred maintenance (RCM). For more detail refer to the Veolia Document, *PRO-327-2 Criticality and Condition Grading Procedure*.

RCM provides a rigorous analysis framework for ensuring that the most cost-effective maintenance activities are employed to manage an asset's failure modes. There are a number of different versions of RCM, but the key elements of any RCM process are defined in SAE Standard JA1011 Evaluation Criteria for Reliability Centered Maintenance. Consistent with this standard is the 'RCM-2' framework, which Veolia Water has successfully used in a number of applications, particularly in North America.

When properly applied, RCM typically results in a reduced amount of routine maintenance work, while introducing more inspections and diagnostic activities to identify hidden failures and enable a greater degree of maintenance that is condition-based.

Application of RCM is most effective when a 'review group' approach is employed. To achieve this, a well-trained facilitator will conduct workshops with relevant plant-based technical experts. Software is used to document the steps taken and the resulting actions.

Although it can be time-consuming to perform, the outcome of RCM will usually be not only improved reliability and cost, but also an audit trail for maintenance changes, and a much deeper understanding of the assets by all participants. This last point contributes very positively to developing a proactive asset management culture within the operations team.

On the RRWS, Veolia will apply selective use of the comprehensive RCM framework for critical assets where there are major reliability issues or excessive maintenance costs.

10.3 **Preventative Maintenance**

10.3.1 General preventative maintenance

Maintenance of the RRWS is predominantly a planned activity, with the emphasis on regular inspection, routine servicing and timely replacement or repair of asset components. Excessive maintenance is to be avoided, but each asset and asset component should be capable of reaching its economic life.

The preventative maintenance requirements of the RRWS are initially dictated by vendor recommendations and Veolia Maintenance standards. These in turn will be designed to ensure maximum reliability of plant items and developed on the basis of information provided from a variety of sources, including manufacturer's recommendations, equipment operation and maintenance manuals and operational experience from other plants. In general they fall into two groups:

1. Time-based preventative maintenance – this is applied where the operation of equipment is fairly consistent over time and is scheduled in the Computerised Maintenance Management



System on the basis of fixed intervals of time (such as monthly, quarterly or annually). This includes regular inspections and checks of all process equipment

2. Running hours-based preventative maintenance – this is applied where operation of equipment is highly variable, for which maintenance investigations and/or actions are triggered by running hours

For more detail refer to the Veolia Document, **PRO-3826-2** Conducting Preventive Maintenance **Procedure**.

10.4 **Corrective maintenance**

In addition to planned preventative maintenance, there is a need to perform on-condition, or 'corrective', maintenance. This is essentially maintenance conducted on the basis of sub-optimal condition, with the aim of preventing further loss of performance or running to failure.

Corrective maintenance may come about as a result of a discovery from a condition inspection or test, or during the conduct of a preventative maintenance routine. Alternatively it may be triggered by online condition or performance monitoring parameters, which give early indication of deterioration.

10.5 **Condition Monitoring**

While many corrective maintenance activities cannot themselves be easily planned, the inspections, diagnostic checks and condition monitoring activities that trigger them can be. In this way, Veolia employ a number of 'predictive' maintenance activities as part of the preventative maintenance plan for the Rosehill Recycled Water Scheme.

Condition monitoring and inspections are planned to be an integral part of the maintenance strategy for the RRWS. These include:

- Online monitoring of efficiency, performance and condition indicators.
- Vibration analysis.
- Oil analysis.
- Thermographic imaging, (where possible).
- Corrosion monitoring.
- Visual inspection and condition grading.

10.6 Breakdown Maintenance

In contrast to the more organised structure of preventative maintenance, emergency and breakdown maintenance is unpredictable and requires operations and maintenance personnel to be reactive.

Since one of the primary objectives of maintenance is to ensure that equipment is able to meet the required performance standard at all times, then all breakdowns must be attended to.

Breakdowns that constitute an 'incident' are to be addressed as outlined in the Veolia Document, *MAN-3935-4 Incident and Emergency Management Manual*.

When a breakdown is discovered, operator-maintainer personnel identify the item and a decision is made as to how the item is addressed. This decision takes into account a number of different factors, including: the risks and consequences of not rectifying the problem; the costs and complexity of



rectifying the problem; the criticality of the item that failed and its impact on operations; and the overall priorities of the client and operations team.

Information about the breakdown maintenance activity is then entered into the CMMS at the earliest opportunity, and this includes the type/mode of failure, as well as details about the suspected cause, the results of follow-up investigations and the impact on operations, personnel and equipment safety and/or the environment. In the process, the item will be automatically added to the outstanding work list with an appropriate response time along with any tools or spares required.

If the breakdown maintenance item is an emergency, maintenance staff may repair the selected asset on the spot, ensuring all WH&S procedures are undertaken and input into the CMMS at the completion of the works.

In addition to providing historical information, capture of the failure information also provides input into planning activities. Where, for example, equipment is identified with unusually low mean time between failures (MTBF) and/or is incurring unexpectedly high maintenance costs, the whole of life costs of the asset will be reviewed with a view to revising the preventative maintenance and routine checks associated with that item.

For more detail refer to the Veolia Document, **PRO-3827-2** Conducting Breakdown Maintenance **Procedure**.

10.7 Outage Planning

Veolia plan carefully for maintenance that requires taking plant out of service. At all times, the operations and maintenance team act to ensure a balance between servicing equipment without compromising availability of plant.

As much as possible outages are scheduled to ensure minimum impact or risk to operations. An understanding of the criticality of the assets is essential to ensure that if maintenance is performed on equipment that is normally in standby, then there is still sufficient system redundancy to mitigate against the key risks.

For this reason, it is expected that outages for major preventative items and repairs as much as practical are planned to coincide with periods of reduced output.

10.8 Spare Parts

10.8.1 Management of Spare Inventory

Initially spare parts have been purchased in accordance with Veolia's process for identification of critical spares as well as suppliers' recommendations. The spare parts inventory is established in the CMMS.

Spare parts are linked to assets and maintenance activities and be identified as used when they are removed from the store. This in turn automatically adjusts stock levels left in the CMMS.

Minimum stock levels are be allocated for each spare part. Once reached reorder reports can be produced for maintenance personnel. The minimum stock level are be based on lead time of replacement, frequency of used, price and criticality of the spare part. Each spare is linked to a preferred supplier to assist in purchasing of new stock.

The CMMS is capable of producing the following reports:

- Monthly reports with average spare part values to determine:
 - Volume and value of spare parts on shelf



- Volume and value of spare parts used during the month
- Volume and value of spare parts purchased during the month
- Stocktake audits are conducted yearly to determine the accuracy of the system.

10.8.2 **11.7.2 Critical spares identification**

The criticality of the spare parts is an indication on how important it is to have a spare part on site. Having the right spare parts at the right time can save the plant from a long-term loss of production. However, having expensive and poorly chosen spare parts on site can be considered as unutilised capital and a waste of space in the plant's storeroom.

The criticality assessment for spares is a decision making tool to help decide, according to the suppliers' recommendations and the team's experience, whether a spare should be purchased or not.

The spare parts criticality is assessed on a figure calculated from asset criticality and lead time. The result of the assessment is the spare criticality and can be used to assist with the decision to hold an item.

For more detail refer to the Veolia Document, PRO-3828-2 Spare Parts Management Procedure.

11. Criticality Assessment

11.1 **Priorities**

Evaluating asset criticality is one of the most important asset management activities that Veolia conduct on the Rosehill Recycled Water Scheme.

As an indicator of the 'consequence' of asset failure, criticality grading enables assets and associated management activities to be prioritised based on risk. At the Fairfield Recycled Water Plant, Veolia use criticality for the following:

- Monitoring asset risk levels. Performing asset assessment, based on combining the results of criticality with the latest condition grade (see condition assessment below).
 Asset risk levels are then used to set priorities for renewals.
- Listing critical spares. Identifying critical spares required to be held on site, based on asset criticality and lead time.
- Prioritising reliability analysis. Setting priorities for analysing assets to improve maintenance costs or reliability, including analysis for reliability centred maintenance (RCM).

11.2 **Criticality Grading**

Veolia defines an asset as critical if a significant adverse impact is expected in the event of total failure. When determining the criticality grade, the assessor must understand how the asset fits into the larger process, and how its failure will impact overall operational performance, operator and customer safety, and the environment.

The grading is conducted in accordance with the Veolia Document, *PRO-327-2 Criticality and Condition Assessment Procedure*.

Criticality grading of assets in the Plant has been conducted following commissioning of the Plant. Since criticality is determined by plant configuration, future criticality assessment will be performed as



required by the asset team and involve site staff or when modifications are undertaken or if high risk events occur.

12. Condition Grading and Asset Assessment

12.1 Purpose

The purpose of the condition grading and asset assessments is to provide a structured and consistent approach to review the condition and expected life of the asset, maintenance and renewal requirements, and the management of risk which feeds into the asset renewal plan.

A risk-based approach represents best practice in determining the method of assessment, and the frequency of monitoring activities. Asset condition rating and criticality factor are determined to produce an asset risk level assessment.

12.2 **Condition Grading**

The condition grade for an asset is an indicator of the likelihood of total asset failure within 12 months of the assessment.

Operational staff is required to perform the assessment in groups of two as a minimum to reduce the level of error from subjectivity. The assessment is based on factoring in multiple criteria, taking into account the dominant failure modes of each asset and the signs of deterioration in condition that best predict where the asset lies in its life-cycle as per the Veolia Document, *PRO-327-2 Criticality and Condition Grading Procedure*.

12.3 Inspection frequency and records

Asset condition inspections are programmed on an annual basis as a minimum and opportunistically carried out with repairs and scheduled works.

12.4 Asset Assessment

The asset assessment is conducted using the condition and criticality gradings in accordance with Veolia Document, *PRO-327-2 Criticality and Condition Grading Procedure*.

12.4.1 Low Asset Risk Level

For assets with a 'low' score (1-4) the assessment has determined that given the criticality and the condition, they are of minimum current risk to the treatment plant operation.

If it turns out that renewals are planned for a given period, then a low score suggests that the renewal is not required if the main justification is on the basis of condition. Therefore, such activities, in the right circumstances can be delayed.

12.4.2 Moderate Asset Risk Level

For assets with a 'moderate' score (5-6), the criticality and condition are such that there is not high enough risk to clearly justify a renewal (although it could be considered), but sufficient risk to warrant closer monitoring of the asset's performance and condition. If the condition deteriorates further, then it is incumbent of Veolia to then address the 'high' risk level.

12.4.3 High Asset Risk Level

For assets with a 'high' score (8-10), the asset risk must be immediately and actively managed. The Operator must investigate the asset more thoroughly then determine whether to plan a renewal for the earliest opportunity or put in place a failure contingency strategy. The latter may involve purchasing a spare part or arrange for a work-around in the event of asset failure.



12.4.4 Extreme Asset Risk Level

Only critical assets can have an 'extreme' score (12-15), which is designed to set the priority of action above assets with a 'high' level. In reality having an extreme score means that failure of the asset will result in adverse consequences and the likelihood is possible or expected. Immediate intervention or a failure management plan is required to be in place.

12.5 Asset Assessment Reporting

Gradings for criticality and condition will be recorded in time-series data in the CMMS to enable trending and review of historical indicators.

13. Asset Renewal and Durability

13.1 Forecasting challenges

The main asset management system at the Plant will be the CMMS. However, it should be noted that a CMMS is primarily designed as a maintenance transaction system, to schedule and record details of maintenance as it is carried out.

Such systems are not suitable for long term forecasting of capital renewal requirements, since these items will depend heavily on individual failure patterns and deterioration curves that apply for different assets. At any plant, the number of different failure patterns is as varied as the number of assets themselves, and to deal with this complexity, it is necessary to use a separate planning system.

13.2 Planning and Managing Renewals

To manage the expenditure on asset replacement and refurbishment and ensure that they are planned in such a way as to minimise operational risks while remaining cost-effective, Veolia will implement its Contract Asset Renewal Management System (Sinapse).

Employed at a number of sites, Sinapse is a decision support system (DSS) that combines a structured process with a simple user interface for developing and managing the asset renewal program.

At its heart is a methodology for combining the results of the asset risk level assessment, as well as a historical renewal summary and a future renewal strategy, consisting each of a renewal 'profile' based on the following parameters:

- renewal intervention frequency;
- number of refurbishments per life-cycle of the asset;
- replacement cost; and
- refurbishment cost.

Key information is presented in a structured format to enable the maintenance team to make decisions about how to best manage risk and renewal. This information includes:

- Risk level. The results of the last criticality, condition and asset assessments. If the risk level is high or extreme, the manager is required to make comments about what is being done to address this, including a failure contingency strategy if applicable.
- Historical summary. A list of historical renewals carried out on the asset, as well as a summary of the actual past renewal profile, determined by averaging the data in the list. The more renewals that are carried out the more accurate this data becomes.
- Renewal strategy. A strategy for managing renewals moving forward is based on Veolia's projection of the above four renewal profile parameters. This strategy may be



altered at any time based on review of the historical summary as well as the current asset risk level.

• Future renewals. The planned renewal strategy will automatically produce a list of all upcoming renewals based on the renewal strategy and the date and type of the last renewal carried out.

Veolia use the Sinapse system not only to determine whether renewals for low risk-level assets should be delayed and for high risk-levels brought forward, but also to track and report past expenditure, as well as prepare future budgets and long term models.

13.3 Handover and Residual Life

The SINAPSE system has been designed in such a way as to accommodate plants in which the assets are handed over at the end of the contract term.

Where assets have a stipulated handover life requirement. Where the system identifies that the normal program could lead to the asset not meeting this requirement, it will automatically program an extra intervention at the end of the contract to ensure this requirement is met. The Operations Manager may then bring this extra intervention to the second last or third last years of the contract to ensure that the workload is manageable.

This value will be used in the SINAPSE to assist the Operations Manager in determining whether planned replacement of the asset needs to be brought forward to avoid unplanned failure.

13.4 Analysis of Whole Life Costs

The SINAPSE is a planning system based on combining simplified predictive modelling of failure with assessment of the asset risk level. It can be used to generate both short-term budgets and long-term forecasts. However, when it comes time to perform major interventions, more investigation is required.

The methodology to be adopted by the Operations Team in the decision to create, renew or dispose of an asset will be based on the 'whole of the life' costs associated with the asset, using discounted cash flows and economic evaluation.

Whole of life costing analysis brings together all the costs of ownership and operation over the whole life of an asset. An example of the type of costs involved with whole life cycle costing is shown in the following table:



When planning to renew assets, Veolia will consult as required all relevant contract and technical documents, in particular as-built drawings, manufacturer-supplied information and the durability plan.



This will ensure that material selection, and other factors that influence asset durability, are properly addressed during the Operations phase.

The outcomes of the condition grading and asset assessment are to identify critical and non-critical areas of operation and review the type of future asset maintenance or replacement that is required.

The analysis of the assessment score is linked to a whole life cycle cost analysis. Each asset is evaluated for risk and whole of life cost for its specific future maintenance needs.

Part of the analysis and review is to determine the actions required to be undertaken. The options available include:

- Current preventative maintenance activities are reviewed and increased or decreased;
- Pre-emptive asset replacement or refurbishment is employed;
- Increased condition monitoring;
- Purchasing of critical spares to mitigate this risk;
- Run to failure (for assets that are not critical)

A continuing emphasis is to be placed on utilising information collected and analysed to review the breakdown maintenance expenditure, preventative maintenance expenditure and asset renewal program.

Properly organised maintenance takes into account economic aspects and operating constraints. Increasingly, non-repairable components are used for basic equipment. The cost of repairing these components is often very high, and therefore a cost-benefit analysis must be undertaken to justify whether such a repair is economically viable compared with replacement of the component.

As a general rule, replacement of small items of equipment is preferred with the faulty item being removed and repaired in specialised workshops. Certain repairs are more economically performed by specialists who have advanced training and specialised tools at their disposal and are able to complete the work faster and cheaper. This brings about the need to subcontract selected maintenance work. This practice takes account of experience acquired in other applications and increases operational security.

13.5 Asset Disposal

In instances where a decision is made to dispose of an asset, then the disposal activity will be conducted in accordance with the Veolia Document, *PRO-3823-2 Asset Creation and Renewal Procedure*.

For the infrastructure assets within the RRWS, the owner will be AquaNet. Disposal will necessitate that the Operations Manager takes responsibility, obtains the appropriate approvals and conducts, as required, a risk assessment to ensure that the means of disposal is not only cost-effective, but also safe and environmentally friendly.

If the asset includes any data stored within it, then it will be the Operations Manager's responsibility to ensure that the information is properly erased prior to, or in conjunction with the disposal.

14. Asset Review and Planning

14.1 General

Following a review of preventative maintenance tasks or an asset assessment, maintenance may be increased to reduce risk and prolong asset lives and ultimately reduce expenditure. The decrease in maintenance on a specific asset is only undertaken if there is no increase in risk to plant operation.



Maintenance may also be decreased or ceased and the asset may be run to failure if it does not affect plant operation.

Any decisions made on changes to maintenance requirements on a specific asset initiate a review of maintenance requirements of assets of similar type across the plant. All assets of similar types will be re-evaluated with specific emphasis on the effect of the changes on risk to operations.

14.2 Asset Review and Reporting Program

A tapered review process is utilised to minimise plant resources and to implement a process that accurately reflects the rate of change in condition of the asset and associated risk of failure.

Where practical ongoing condition based monitoring and review will be undertaken. The Veolia Document, *PRO-3829-2 Asset Reporting and Analysis of Maintenance Procedure*, details the reporting and asset review process that will be undertaken.

Over time, the review period for individual assets, or groups of assets, is optimised based on asset history data, and appropriate techniques for decay and risk analysis.

15. Capital Investment Strategy

15.1 Asset Renewal

Veolia has developed schedules for asset renewal. In the process it has identified the estimated costs associated with all asset overhaul and replacement activities through the life of the Contract.

15.2 Initial Planning

Planning for future capital investment needs and options aim to focus on the objectives and investment categories shown in the following table:

Objective	Capital Investment Category
Estimate the investment needed over time to maintain the serviceability of existing assets	Renewal: Capital - Maintenance investment for assets
Meet higher water quality and environmental standards	Water Quality: Capital - Water quality investment Environment: Capital - Environmental investment
Meet higher service levels and performance standards	Improvements: Capital - Service levels investment
Meet growth in demand	Growth and New Demand: Capital - growth and demand investment

Adopting an integrated approach to asset management planning establishes the appropriate links between investment needs and outputs to:

- Identify the current level of service, performance, condition and serviceability of the assets
- Establish appropriate targets, standards and forecasts of service levels
- Establish planned and justified investments by priorities
- Balance investment, operational and maintenance needs with outputs



The outcome of the iteration process is to identify the preferred investment needs and options.

15.3 **Project Appraisal and Investment Studies**

When needs have been identified, the resulting capital investment needs are evaluated, justified and prioritised as part of the project appraisal process.

Investment studies should be undertaken to deal with strategic options, while project appraisals focus on individual schemes and projects. Investment studies will cover:

- Investment strategy
- Investment justification
- Unit costs
- Investment compilation by asset type/investment category
- Assessment of outputs
- Assessment of total investment

Project study and appraisal reports will cover:

- Justification of need
- Statement of facts (including current situation and forecasts)
- Design criteria (including planning horizon)
- Options consideration
- Investment costs
- Operating costs/ operating method
- Whole of life cycle cost/net present value options summary of all options and costs
- Investment type, allocation and priority ranking
- Investment program and profiling

15.4 **Capital Program – Compilation and Priority Ranking**

The capital investment proposals and options derived from the asset management planning studies have to be expressed in varied formats to assist the priority ranking of projects. Using an integrated format to collate the Asset Renewal Plan allows sensitivity analyses to be undertaken to determine the effects of varying and re profiling investment needs with outputs.

The effect of sensitivity tests on the various investment categories could include the following.

- Maintenance of assets: changes in asset maintenance and replacement policies could be assessed and linked to service levels, standards and asset lives. Performance criteria could be reviewed
- Growth development: forecast rates of growth and new development could be reassessed



Rosehill Network Pty Ltd – Infrastructure Operating Plan RRWS-IMS-DOC-002

Compilation of projects into a Capital Investment Program would begin at the project appraisal stage, where project need, justification and benefits (both technical and financial) would all be subject to scrutiny. Within each investment category (i.e., Renewal, Water Quality, Environment, Improvement, Growth and New Demand, and Other), projects would be graded by priority. This would involve various techniques including whole of life cycle analysis and timed targets.

Investment category is prioritised by analysing investment levels by category and asset type to a capital investment expenditure ceiling. Scenarios examined would include least cost options, economic appraisal, maintenance options and establishing hurdle grades to supplement the serviceability and actual performance criteria.

The final preferred Capital Investment Program derived from the investment review and iteration process leads into the Asset Renewal Plan.

The systematic structured approach to asset management planning integrates key aspects into an overall strategy to operate the system effectively and economically.

By introducing an integrated process to justify the investment needs, economic optimisation comes from ensuring that resources are effectively directed at assets to achieve their maintenance, operation and service outputs.

The Asset Renewal Plan is an integral part of the asset management system and ensures that the performance of assets provide the service level objectives in the longer term.

By establishing the condition and performance of existing assets, a benchmark can be established to justify asset investment needs in conjunction with funding threshold and priorities.

Asset management planning is an important part of Veolia's management strategy to support the efficient and effective operation and maintenance of the Plant.

16. Membrane Management

16.1 General

Having effective management and maintenance of the membrane system will ensure that the water quality objectives are met and the most cost effective operation of system from an energy, chemical consumption and membrane replacement perspective is achieved.

A clearly defined membrane maintenance programme involves a number of clearly defined processes. These include performance monitoring and process testing.

Another key component of monitoring fouling rates is the ability to autopsy the membrane modules. In addition to using the resources of the membrane supplier, or a third party provider, the membrane modules can be sent to Veolia Water's Research centre in Paris, Centre de Recherche Maison Laffitte (CRML).

Autopsy diagnostics allow identification of the cause of potential membrane degradation and fouling problems as well as optimisation of the CIP solutions depending on the fouling characteristics.

16.2 Membrane Types

Two types of membranes are used in the FRWP's process:

- Ultrafiltration UF Membranes, Memcor/Evoqua S10N
- Reverse Osmosis RO Membranes, Hydranautics ESPA 2LD



16.3 Membrane Management

A key aspect of optimising the asset lives is the effective management of the Plant's membrane inventory.

In Australia, Veolia manages successfully ultrafiltration (UF) and reverse osmosis (RO) membranes in several plants the largest being:

- For UF membranes Bendigo plant with average output capacity 126 ML/day
- For RO membranes Sydney Desalination Plant with average output capacity 250 ML/day.

For detailed information regarding membrane management refer to the Veolia Document, *PRO-3821-2 Membrane Maintenance and Replacement Procedure*.



Annexure A – Overview of the Rosehill Scheme









Annexure C – Key Veolia Personnel





Rosehill Network Pty Ltd

ACN 131 213 691

RRWS-IMS-DOC-003 Water Quality Management Plan



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1. Introduction

Rosehill Network Pty Ltd ('**Rosehill Network**') holds Network Operator's Licence number 09_002 issued under the *Water Industry Competition Act 2006* (NSW) ('**WICA**') under which it owns water infrastructure that forms part of the Rosehill Recycled Water Scheme ('**Rosehill Scheme**'). This document, Rosehill Network's Water Quality Management Plan ('**WQMP**'), has been developed to satisfy the requirements of the *Water Industry Competition (General) Regulation 2008* (NSW).

1.1 **Rosehill Scheme Overview**

The Rosehill Scheme involves:

- extracting secondary treated effluent from Sydney Water's Liverpool to Ashfield Pipeline ('LAP');
- treating the effluent to produce high quality recycled at the Fairfield Advanced Water Treatment Plant ('Plant'); and
- transporting recycled water from the Plant, through a distribution network ('**Network**') to customers in the Fairfield, Cumberland, and Parramatta local government areas ('**Customers**').

The scope of the Rosehill Scheme is shown in **Annexure A**.

The Rosehill Scheme is underpinned by a 20-year Project Agreement between AquaNet Sydney Pty Ltd ('**AquaNet**') and Sydney Water and is capable of delivering up to 25 million litres of recycled water per day to Customers.

Under the Project Agreement, AquaNet delivers recycled water to Sydney Water for the sale to its own customers ('**Foundation Customers**'). Sydney Water has retail contracts with the Foundation Customers. Sydney Water supplies up to 32ML/d of treated effluent (according to an effluent specification in the Project Agreement) to the Plant from the LAP. AquaNet may sell any water in excess of that required to supply the Foundation Customers directly to its own customers ('**Non-Foundation Customers**').

AquaNet owns the Plant and has entered into an Operation and Maintenance Agreement with Veolia Water Australia Pty Ltd (**'Veolia**' or **'VWA**') who is responsible for maintaining and operating the Plant.

Rosehill Network and its sister company, AquaNet, have entered into a Pipelines Agreement whereby Rosehill Network constructed and owns the Network. Rosehill Network has entered into an Operation and Maintenance Agreement with Veolia who is responsible for maintaining and operating the Network.

Both Rosehill Network and Veolia hold Network Operator Licences under WICA.

The contractual structure of the Rosehill Scheme is depicted in **Annexure B**.

AquaNet and Rosehill Network are both part of the Water Utilities Australia group of companies ('**WUA**') and through its various subsidiaries, WUA provides the resources, skills and expertise required for AquaNet and Rosehill Network to deliver the Rosehill Scheme.



2. **Executive Summary**

2.1 Purpose

This WQMP has been developed for the Rosehill Scheme and is to be read in conjunction with the Veolia Document, *MAN-3954-4 Operations Management Plan – Rosehill Recycled Water Scheme* (OMP), which provides an overview of the plant's Integrated Business Management System (IBMS).

This WQMP together with OMP address the 12 elements of the framework for the management of recycled water quality and use, as detailed in the Australian Guidelines for Water Recycling.

Throughout both of the documents specific references are provided to relevant procedures, work instructions and other documents that all together form the FAWTP Management System.

Detailed references are provided in the Veolia Document, *TEM-3978-1 WICA Requirements Reference Table*.

2.2 Expertise in producing and maintaining recycled water quality

2.2.1 **Design, Management and Regulation**

At the commencement of the scheme AquaNet oversaw the RRWS through two major subcontracts for the Plant and Network as follows:

- Plant Agreement: Veolia was responsible for owning, designing, constructing, maintaining and operating the Plant under a 20 year (2011) agreement with AquaNet Sydney Pty Ltd (AquaNet).
- Pipelines Agreement: Rosehill Network Pty Limited (Rosehill Network) was responsible for owning, designing, constructing, maintaining and operating the Network under a 20 year (2011) agreement with AquaNet.

In 2019 the ownership of AquaNet and Rosehill Network was transferred to Water Utilities Australia (WUA), and consequently the scheme management changed, whereby:

- AquaNetand Rosehill Network, subsidiaries of Water Utilities Australia, wholly owns and is responsible for the overall delivery of the RRWS. Rosehill Network holds the WICA Network Operator's Licence number 09_002 for the operation of the RRWN and AquaNet holds the WICA Retail Supplier's Licence 10_01R for the operation of the RRWS.
- Veolia Water is responsible for the Operation and Maintenance of the Scheme, including both the Plant and Network. Veolia holds the WICA Network Operator's Licence number 09_001 for the operation of the Plant.

Veolia Water is a world leader in water reuse, with over 40 water reuse projects worldwide, recycling over 600 megalitres a day, producing high quality treated water. Veolia Water has extensive experience in creating alternative water resources that will be used for:

- Irrigation for agriculture
- Irrigation of recreational areas, including golf courses and sports fields
- Toilet flushing
- Car washing
- Increasing environmental and river flows
- Industrial reuse: make up water for boilers & cooling towers, process water, cleaning & manufacturing.

2.2.2 **Design & Construction**

AquaNet engaged Parsons Brinkerhoff (PB), a highly experienced water industry design consultant, to complete the detailed Network design and associated hydraulic modelling. Highly experienced contractors were utilised for construction such as CLM Infrastructure Pty Ltd to install the Network, Tasman Tanks to install the reservoirs and KSB to supply the pumps.



Veolia Water Australia utilised the resources of Veolia Water Solutions and Technologies, to manage the design and construction of the Plant.

Veolia Water Solutions and Technologies has unique technologies that can treat wastewater, bore water, sea water, contaminated water or process water to produce high quality water essential for industrial reuse applications. Veolia Water Solutions and Technologies has designed and built water recycling plants to meet customers' site requirements in the oil & gas, mining, power, food & beverage, municipal and pharmaceutical market sectors.

2.2.3 **Operation**

Across Australia, Veolia has over 20 long term water operations contracts, involving more than 60 water and wastewater treatment plants. Veolia has more than 865 employees providing water and wastewater services to up to 4 million people in Australia and New Zealand.

2.2.4 Independent Verifier

Sydney Water and AquaNet engaged an independent verifier, Kellogg Brown & Root Pty Limited (KBR), to ensure that the design and construction of the RRWS was delivered according to the specifications that form part of the Project Agreement.

3. Analysis of the Recycled Water

3.1 **Recycled Water Quality**

3.1.1 Source of Water

The RRWS sources secondary effluent from the Sydney Water Liverpool to Ashfield Pipeline (LAP) as described in the Veolia Document, *TEM-3819 FAWTP Source Water Characterisation*.

3.1.2 Recycled Water Quality

The Plant treats the secondary effluent from the LAP to produce high quality recycled water to meet the Recycled Water Specification before it is stored in the recycled water storage tank on the Plant site.

Refer to the Veolia Document, **TEM-3898-1 Recycled Water Specification**, for the parameters that are measured and their targets. The specification also identifies which parameters are monitored online and which parameters are tested in the laboratory.

On-line parameters are measured on a continuous basis. All other parameters are measured by the internal and / or external laboratory on a daily, weekly, or monthly basis as specified in the Veolia Document, *TEM-3799-4 Laboratory Analysis Schedule*.

The recycled water must meet the target parameters 95% of the time as measured on an annual basis. The recycled water must never exceed the limit to trigger product failure.

3.1.3 End Uses

The RRWS supplies Recycled Water to industrial, commercial and residential uses as described in the Veolia Document, *PRO-3820-3 Rosehill Recycled Water Scheme Overview*.

3.1.4 **Routes of Exposure**

Routes of exposure include airborne spray from cooling towers, firefighting spray, physical contact with water during manufacturing, inadvertent drinking and contact with finished products.

The routes of exposure for each of these customers have been assessed and are documented in the Veolia Document, *EXT-3877-1 Customer Exposure Assessment and Health Performance Targets*.



3.1.5 **Receiving Environment**

The receiving environments of the RRWS include:

- Recycled water customer sites and processes
- The natural environment through irrigation or mains break
- The Sydney Water sewer system through Plant waste stream
- Scour points along the Network that are used to drain or flush the Network during an emergency or a water quality event.

Other end points include air valves and reservoir overflows.

3.2 Recycled Water System

3.2.1 Key Characteristics

The RRWS has the following key components and is depicted in the general diagram below:

- Effluent collection and treatment by Sydney Water and supply to the LAP
- Effluent extraction at the LAP
- Plant (including treatment by reverse osmosis, ultrafiltration, chlorination and other processes)
- Trade waste pumped to the Sydney Water sewerage system
- Network (consisting of pipes, reservoirs and pump stations)
- Potable water connection points
- Customers

A detailed description of the RRWS is provided in the Veolia Document, *PRO-3820-3 Rosehill Recycled Water Scheme Overview*, and shown in the images below.









Image 2.2 - RRWN Schematic

Key Components of the Network include:

- Pipelines (PVC, PE, Ductile Iron and Stainless Steel).
- Pump stations (Fairfield & Rosehill).
- Reservoirs (Fairfield, Woodville & Rosehill).
- Online Water Quality monitoring units (Fairfield, Woodville and Smithfield).
- Isolation valves at approximately 1km intervals.
- Air valves at high points in the pipeline.
- SCADA monitoring and control system.
- Communication systems.
- Potable Water connections.
- Scours at low points approximately every 1km along the pipeline.
- Customer meter sets including back flow protection.

3.2.2 System Analysis

Screening Level Risk Assessment

In 2008, in partial fulfilment of the requirements of the 2006 Australian Guidelines for Water Recycling (AGWR) a screening-level (microbial) risk assessment (SLRA) was undertaken by Sydney Water to quantify potential health risks associated with recycled water for the proposed recycled water uses of the RRWS.

The risk assessment did not identify any human health risks that exceeded the acceptable annual risk benchmark of 10-4 (1 additional infection per 10,000 persons per annum), either by the gastrointestinal (ingestion) or respiratory (inhalation) route.

As part of this study a desktop assessment of the required log reductions of microbial pathogens was also undertaken. It was found the predicted log reductions based on the proposed design exceeded those required in the 2006 Australian Guidelines for Water Recycling for industrial, municipal and fire-fighting use, in most cases by many orders of magnitude.





Values of 14 log reduction were estimated for bacteria (target 5.3), 10.55 log for viruses (target 6.5) and greater than 7.25 log reduction for protozoa (target 5.1), ensuring that recycled water was treated fit for its intended application in industry and irrigation as well as fire-fighting.

The SLRA study was undertaken by Dr Michael Storey of Sydney Water, Science and Technology.

Preliminary Risk Assessment and Critical Control Point Identification

Following the SLRA, a Preliminary Risk Assessment was held on the 19th September 2008. Attendees included:

- Narelle Berry IPART
- Jameel Bhana, Lisa Currie, Paul Dixon Veolia
- Troy Walker, Annalie Roux Veolia (Western Corridor)
- Kim Hardy, Catherine Stokes Jemena
- Richard Shuil, Darren Atkins Sydney Water
- Linda Gyzen AquaNet
- Samson Tam Veolia Water Solutions and Technologies (VWS)

A Preliminary Risk Assessment TEM-3830 was developed as an outcome of this workshop.

As part of the workshop held on 19th September 2008 preliminary Critical Control Points (CCP's) were also identified.

The preliminary risk assessment and CCP identification were used to engineer controls into the RRWS.

A second series of Risk Assessment and CCP workshops were held in September / October 2010. The purpose of these workshops was to confirm the CCP's within the whole RRWS and to identify residuals health and environmental risks that have not been eliminated through Plant design.

The first of the workshops was to confirm the CCP's within the scheme.

Attendees included:

- Narelle Berry IPART
- Phil Narezzi, Andrew Richardson, Kate Simpson Veolia
- Charles Edmiston, John McGuinness, Ronald Bean, Melanie Blake VWS
- Arthur McAuley, Rajesh Gobel Jemena
- Colin Thompson AquaNet
- Ron Bouwman– South West Health

The purpose of the second of the two workshops was to undertake a risk assessment to identify any outstanding health and environmental risks.

Attendees included:

- Narelle Berry IPART
- Ron Bouwman South West Health
- Phil Narezzi, Andrew Richardson, Kate Simpson Veolia
- Charles Edmiston, John McGuinness, Ronald Bean, Melanie Blake VWS



- Rajesh Gobel Jemena Operations
- Colin Thompson AquaNet
- Frank Vidovic Sydney Water

Results of the workshops were recorded in the Veolia Document, CRA-VW-ROS-2000-D1 Risk Assessment and Confirmation of CCP.

3.2.3 **Review of System Analysis**

The recycled water system analysis will be reviewed annually in conjunction with AquaNet in order to identify and incorporate any changes.

The analysis will also be reviewed following any major scheme expansion or change in end user requirements.

3.3 **Recycled Water Quality Data**

3.3.1 Historical Data

The source water for the RRWS comes from the catchments of Liverpool and Glenfield STPs, which form part of the Malabar Wastewater System. The two STPs receive both domestic and industrial waste (trade waste).

The design of the plant was based on the analysis of historical operational data from these two catchments.

3.3.2 Assessment of Data

The database generated using the historical data of the raw water sources has been supplemented by the implementation of an onsite data historian. This historian is linked to the plant SCADA system and provides long term storage of plant process data.

4. Preventative Measures for Water Quality Management

4.1 **Preventative Measures**

4.1.1 Multiple Barrier Approach

In accordance with the AGWR, the RRWS uses a multiple barrier approach to manage hazards in recycled water. Under this approach, a number of sequential processes are used, each of which provides a barrier to one or more hazardous parameters. The multiple barrier approach has a number of advantages:

- Reduced performance of one barrier does not result in a total loss of management;
- It may be possible to temporarily increase the performance of the remaining barriers while remedial action is taken to restore function of the faulty barrier;
- As a combination, multiple barriers produce less variability in performance than single barriers (AGWR).

There are several barriers in the RRWS to ensure that recycled water that does not meet the Quality Specification is not supplied to customers. They are:

- Trade Waste Agreements Sydney Water effluent collections are covered by trade waste agreements (Sydney Water responsibility)
- Secondary Effluent Feed Sydney Water treats the effluent to secondary treated effluent standard (Sydney Water responsibility)
- Monitoring of Feed Quality Effluent is not be allowed into the Plant if the quality falls outside the effluent specification (Veolia responsibility)
- Plant Unit Processes Unit process barriers within the Plant are such that contaminants are removed in order to meet the Quality Specification (Veolia responsibility). Unit process barriers



are summarised in Table 4.1 below. Full details are given in Table 4.2.

	Ultrafiltration	Reverse osmosis	lon exchange	Chlorination
Bacteria	Ø	Ŋ	Ŋ	Ø
Viruses	Ø	Ŋ	Я	Ø
Parasites	Ø	ß	K	Ø

- Quality at Plant Outlet Recycled water that does not meet the Quality Specification is not allowed to transfer from the Plant into the Recycled Water tank. (Veolia responsibility)
- Network Monitoring Quality is re-tested as it enters the Network to ensure that it still meets the Quality Specification (Veolia Responsibility). Recycled water that does not meet the Quality Specification is not delivered to the Customers. (Veolia Responsibility).

In all cases SCADA systems are used to monitor water quality and alarms are triggered when quality parameters are drifting towards the limits. This provides operators with time to take corrective action prior to the recycled water falling outside the Quality Specification.



Critical Process	Hazard Controlled	Virus	Bacteria	Protozoa	Validation Information Source	Expected Performance
1.SWC STP's	Virus, Bacteria, Protozoa	0	0	0	Awaiting correlation from SWC of STP performance vs log removals achieved. Will not claim credit for log removals until data is received.	Raw water quality within Table A of contract specification.
2. UF	Virus, Bacteria, Protozoa	1.5	4	4	Memcor studies, GAP scheme trail (SA) Memcor studies Memcor studies	Target PDT to be set based on commissioning parameters at a level which equates to Bacteria / Protozoa log removal of 4 across the process.
3. RO	Virus, Bacteria, Protozoa	1.1	1.1	1.1	Membrane supplier, Western Corridor Scheme	Gives 1.1 log credit for bacteria, viruses and protozoa based on 1.1 log reduction in conductivity
4. pH Adjustment	Suitable pH for industry. Incorrect pH for disinfection	0	0	0	Process modelling software Published information on disinfectant chlorine vs. pH. pH range setpoint from contract	The pH of the recycled water contractually must be between 6 and 9. The target for pH is 6.6-8.5.
5.Chlorine dosing	Virus, Bacteria, Protozoa	4			Published information (GC White, 2004) on log reduction vs CT*	Log removal for bacteria is 4 log for CT = 50mins.
			4	0	Residual chlorine setpoint set by the Contract.	Residual chlorine setpoint target of 1.0mg/L. Limits to product failure are <0.7mg/L and >5.0mg/L.
Total		7.6	9.1	5.1		
Required		6.5	5.3	5.1		

Table 4-2 Summary of CCP Targets and	Validation	Information	Sources,	and Expected	Performance
	for the F	AWTP.			

*CT = concentration * contact time



4.1.2 Additional Preventative Measures

A risk assessment workshop was held in September / October 2010. The purpose of the workshop was to confirm the preventive measures and barriers within the plant and to identify any residual health and environmental risks that were not eliminated through plant design.

The first step of the risk assessment process was to identify hazards and their existing controls in accordance with the Veolia Document, *PRO-263-5 Risk Management Procedure*.

Following identification, the hazard was assessed with existing controls in place. Based on this, a risk score was generated which was used to assess the adequacy of existing controls.

This procedure was undertaken for each process step in the RRWS.

Results were recorded in the Veolia Document, CRA-VW-ROS-2000-D1 Risk Assessment and Confirmation of CCP.

4.1.3 **Document Preventative Measures and Strategies**

The definition of process limits for the process barriers is defined in the Veolia Document, **TEM-3836 HACCP Register**. This document details the alarm and alert limits for each barrier and the corrective actions to be taken if these limits are reached.

4.2 **Critical Control Points**

4.2.1 Identification of Critical Control Points

A CCP workshop was held in September / October 2010. The purpose of the workshop was to confirm the CCPs within the plant, create critical limits and to develop response plans if these limits are breached.

After completion of the hazard assessment, each treatment step was assessed for its criticality in controlling a specific health or other hazard.

Three types of control points were adopted:

- Critical Control Points (CCP): process points identified to control water quality health hazards.
- Critical Operational Points (COP): points identified to control hazards affecting continuity of supply.
- Quality Control Points (QCP): points identified as impacting on the process train but cannot be monitored online or monitoring point for final product quality where the control may be to dispose of or reprocess non-conforming product.

CCPs and COPs are managed using the same protocol except for reporting of exceedances. CCPs and COPs monitor and identify failures of the barriers that would result in the residual risk of a hazard increasing above the level identified in the risk assessment.

Each barrier that was identified as a control in the risk assessment was assessed for its criticality in controlling the specific hazard.

A full description of critical control points for the plant is given in document HACCP Register TEM-3836.

For more details refer to the Veolia Document, *MAN-3941-2 Process Operations Plan – Fairfield Recycled Water Plant*.

4.2.2 Establish Mechanisms for Operational Control

Following the identification of CCPs, alert and alarm levels were developed.



The purpose of an alert level is to advise the plant operator that a critical limit is being approached and that corrective action needs to be undertaken to ensure that the critical limit is not breached. Corrective procedures have been developed for alert levels for each CCP identified.

The purpose of an alarm level is to advise the plant operator that a critical limit has been reached and that corrective actions will immediately be undertaken. Corrective procedures have been developed for alarm levels for each CCP identified. These procedures will typically include automatic shutdown of plant equipment to minimise the impact of the CCP breach.

Summary screens on SCADA allow the plant operator to readily review the status and set points of CCP alert and alarm limits.

Details of the critical controls points along with their alert and alarm limits are given in the Veolia Document, *TEM-3836 HACCP Register*.

5. Verification of Recycled Water Quality

5.1 **Recycled Water Quality Monitoring**

5.1.1 **Characteristics to be monitored**

The characteristics to be monitored throughout the Plant have been identified and defined by several documents and studies. These include:

- Project Agreement
- O&M Agreement
- Water Quality Risk Assessment
- HACCP analysis

5.1.2 **Operational plan**

Based on the requirements of the documents listed in Section 4.1.1 an overarching Veolia Document has been developed, *MAN-3941-2 Process Operations Plan – Fairfield Recycled Water Plant*.

The Veolia Document, **TEM-3799-4** Laboratory Analysis Schedule, details the location and frequency of sampling to be undertaken on site. The Process Operations Plan also details how analysis results will be managed to ensure that it is representative and reliable.

IPART will be notified in the event of any significant changes being made to this sampling plan.

5.1.3 **Documentation and training**

A number of procedures and work instructions have been developed to support the implementation of the Process Operations Plan, and to ensure consistency in sampling and reporting.

All VWA Operators have been trained in these procedures.

5.2 **Recycled Water Users**

5.2.1 Enquiry and Response for Customers

Customer enquiries are handled in accordance with the Veolia Document, *PRO-3915-3 Stakeholder Engagement and Evaluation Procedure*.

Veolia customer complaints are handled in accordance with the Veolia Document, *PRO-3916-2 Handling Complaints Procedure*.



5.2.2 **Customer Satisfaction and Communication**

A quarterly report covering water quality is provided to Customers. Customer participation in the RRWS is optional. The RRWS is dependent on Customers continuing to use Recycled Water as the sole source of revenue for the Scheme.

Regular communication with Customers is undertaken by AquaNet in accordance with the agreed terms of the recycled water supply agreement.

Any feedback from individual Customers is considered seriously by Veolia and AquaNet and improvements implemented to the extent that they are commercially viable and fit in with requirements of the other Customers.

5.3 **Recycled Water Quality Reporting**

Internal and External Reporting takes place on a regular basis in accordance with the Veolia Document, *PRO-3816-2 Internal and External Reporting Procedure*.

6. Validation, Research and Development

6.1 Validation Processes

Validation of the Fairfield Advanced Water Treatment Plant was undertaken in accordance with the Veolia Document, *PL-FAI-20-2924-1 Validation Plan for Rosehill Recycled Water Treatment Plant*.

The objective of the validation was to ensure that hazards originally identified by the HACCP team were complete and correct and that they were being effectively controlled under the proposed HACCP plan.

The following HACCP principles were validated:

Hazard Analysis	Validate that all major risks have been identified Validate that the risks have been correctly rated and ranked Validate the efficiency of the process barriers as control measures
Identification of Control Points	Validate that there are CCPs for all significant hazards Validate that the CCPs are at appropriate stages of the process
Critical limits	Validate that the critical limits control the hazards
Monitoring of Control Points	Validate that the monitoring system will ensure that the control measure at the CCP is efficient
Corrective Actions	Validate that the Corrective Action procedures will prevent non- conforming water from reaching the consumer.

6.2 **Change in Conditions and New Equipment**

Processes are revalidated when changes to conditions, process equipment or operating protocol occur in accordance with the Veolia Document, *PRO-3807-1 NSW Water – Change Management Procedure*.

In the event of significant changes, a new process validation plan will need to be developed if it has any effect on the integrity and reliability of the process.



6.3 **Design of equipment**

Validation of the Fairfield Advanced Water Treatment Plant was undertaken in accordance with the Veolia Document, *PL-FAI-20-2924-1 Validation Plan for Rosehill Recycled Water Treatment Plant*.

6.3.1 Validation of Equipment and Infrastructure

This procedure outlines a 4 step approach to the validation of new equipment and infrastructure:

1. Desktop Validation

The FAWTP process was validated at the desk top level to quantify its ability to achieve the required water quality objectives.

2. Validation of the Process by Pilot Plant Testing

A pilot plant representative of the Fairfield Advanced Water Treatment Plant was built prior to the plant design and construction to validate the choice of process technologies.

The pilot plant studies allowed confirmation that the FAWTP process could achieve the required recycled water quality based on the design basis feed effluent quality.

3. Validation of the Process Efficiency from the Literature

Further supporting the pilot plant results, sources of information available from literature and manufacturers were compiled in order to validate the efficiency of each treatment barrier and CCP at the FAWTP. This information will be submitted to the Validation team during the validation workshop for review.

4. Design Review

The FAWTP design was also reviewed by an independent reviewer with experience in water treatment. The consulting company selected for the independent review was KBR.

6.3.2 Validation of Process

The validation of the efficiency of the barriers for the FAWTP was undertaken using a two part process:

1. Process Proving

The first part consisted of the individual Process Unit Proving Tests which was conducted during the commissioning phase of the FAWTP during April to June 2011.

The Process proving was conducted between 14 August and 25 August 2011. During the performance trial, the plant was required to operate under normal operating conditions to produce 20 ML/d or a lower pro-rata volume if insufficient feed was available to the plant to produce 20 ML/d. The performance trial was scheduled to take place over 10 consecutive days.

The Product water quality was monitored during these periods to validate the efficiency of the process steps to remove satisfactorily contaminants and hazards identified in the risk assessment.

2. Validation Workshop

A validation workshop was held on Wednesday 14 September 2011 at the FAWTP and was facilitated by the AWTP plant manager, Andrew Richardson. The purpose of the workshop was to review the HACCP process and to validate the effectiveness of the HACCP system in place.

The members of the validation team were Anne Caillon (Design and Construction Process Engineer), Kate Simpson (Operations Process Engineer), Andrew Richardson (Operations Manager), Colin Thompson (AquaNet Representative), Paul Cousins (Design and Construction Control Systems Engineer), and Troy Walker (Technical Manager).

After the workshop, it was concluded that:



- All major risks to human health and/or the environment posed by the recycled water have been identified, rated and ranked and that control measures have been put in place to control these.
- A system of critical control points has been put in place to control recycled water quality and ensure that it is of a quality that does not pose a hazard to human health and/or the environment.
- The critical limits selected are appropriate to the hazards and will ensure control of recycled water quality.
- The plant, operating normally, will not breach the critical limits, as demonstrated during the plant performance trial.
- Systems are in place to ensure that if the plant operating conditions approach the critical limits, automated corrective actions will take place to ensure that no water produced with any critical limit breached will reach the recycled water network.

6.4 Investigation studies and research monitoring

Following commissioning of the plant, process data from the SCADA is being recorded to a plant historian database.

This data is analysed to identify any emerging trends, and to develop improved operating protocols to treat the LAP secondary effluent.

A dedicated process engineer is a member of the plant team. A key part of that role is process optimisation based on process data review. The site process engineer is supported by the Engineering department at VWA's corporate offices in Pyrmont and more broadly by the extensive technical knowledge of recycling available within VWA and in Veolia Water worldwide.

VWA implements a variety of knowledge transfer techniques to ensure that the staff at each of its operations can benefit from pertinent knowledge from other sites and from research and development projects. In 2010, for example, a "lessons learned" workshop in water recycling was conducted at the Bundamba Advanced Water Treatment Plant in Brisbane, gathering technical staff from eight reuse and membrane plants to share lessons in water recycling.

Technical staff from Veolia's operations worldwide also frequently visit Australia and present technical information from other sites. Technical information sharing is also available through an on-line knowledge transfer network.

Veolia Water also has an extensive research and development program worldwide, with Australia being a key hub for research in recycling and membrane processes. This includes the co-funding of a Chair of Water Recycling at the University of Queensland.

7. **Operator, Contractor and User Awareness**

7.1 **Recycled Water Quality Awareness**

7.1.1 **Operator and Contractor Awareness**

Base level process and operations training provides new operators with a minimum level of training required to understand and operate the Fairfield plant.

All contractors are required to undertake a site specific induction providing awareness and outlining the requirements for water quality. The contractors are engaged with the Fairfield site in accordance with the Veolia Document, *MAN-3954-4 Operations Management Plan – Rosehill Recycled Water Scheme*.

7.1.2 End User Awareness

Sydney Water conducted a training and awareness forum for foundation customers in September 2010. The forum included Jemena, Veolia Water and specialists in implementation of recycled water guidelines.



AquaNet also held a breakfast for potential customers that included a detailed description of the RRWS, and overview of the recycled water treatment process and case studies from the foundation customers.

Further one on one enquiry and response meetings were conducted between AquaNet and potential customers during the process of negotiating recycled water supply agreements.

During the process of finalising the recycled water supply agreements, customers were provided with the following information:

- Recycled water quality specification,
- Approved end uses list and
- RO Water Briefing paper (technical paper on RO recycled water), it's uses and precautions needed in relation to materials being used.

7.2 User Consultation Strategy

AquaNet, ensures that customers are actively involved in water quality issues through the initial water quality education process that forms part of the recycled water supply agreement negotiation process and through the regular quarterly reporting that forms part of the recycled water supply agreements.

Individual customers have limited ability to influence a change in the Quality Specification, however constructive suggestions are taken on board and all customers will be consulted before any proposed change to the Quality Specification by the RRWS proponents. Customers confirmed agreement with the Quality Specification and the terms of supply through execution of their recycled water supply agreement.

Ongoing communication with customers is in accordance with Communication Protocol that forms part of the recycled water supply agreements and in accordance with the Veolia Document, *PRO-3915-3 Stakeholder Engagement and Evaluation Procedure*.

7.3 **Promotion of Benefits of Recycled Water Use**

The RRWS is an innovative project in which both Aquanet and Veolia are actively marketing in public forums, seminars, and through brochures and company websites. Any opportunity to promote the RRWS is welcomed by Aquanet and Veolia.

Listing of the benefits of recycled water use forms part of all promotional opportunities.

7.4 Unintended Use

All recycled water equipment in the RRWS and on customer sites is clearly and permanently labelled with safety signs that follow the current version of the Safety Signs for the Occupational Environment standard AS/NZS 1319.

Recycled water pipe work has colour coding that conforms to the guidelines for recycled water in the NSW Code of Practice for Plumbing and Drainage 2006. Signs advising of the use of recycled water on site and induction training help prevent unauthorised use. These measures ensure that customer employees, site visitors and other stakeholders are aware that the recycled water is 'not for drinking'.

7.5 Unauthorised Uses

The recycled water supply agreements clearly state authorised specific end uses for each customer. It is a condition of the agreements that customers take responsibility for ensuring that:

- They restrict recycled water use to these specific uses
- Take the backflow and cross connection precautions as defined by the Water Supply Code of Australia (WSA).



Unintended and unauthorised end uses are most likely to be as a result of accidental cross connection of the Network or Customer recycled water systems with the potable water network. This risk is mitigated through measures such as

- Dial Before You Dig (DBYD) providing advice to workers working in the vicinity of the Network
- Customer site inductions and signs at the entrance to Customer Sites informing visitors (including plumbers) that recycled water is in use
- A requirement in the recycled water supply agreements for installation of recycled water systems by customers to comply with the NSW Plumbing and Drainage code

Licensed plumbers are used for all new connections to ensure that cross contamination does not occur in the Network.

Term	Definition
Consequence	The outcome of an event expressed qualitatively or quantitatively, being a loss, injury, disadvantage or gain. There may be a range of possible outcomes associated with an event.
Codes	Mandatory industry codes, and voluntary industry codes with which the organisation chooses to comply.
Compliance	Ensuring that the requirements of laws, regulations, industry codes and organisational standards are met.
Organisational standards	Any code of ethics, codes of conduct, good practices and charters that an organisation may deem to be appropriate standards for its day-to-day operations.
Project	The complete project.
Hazard	A source of potential harm or a situation with a potential to cause loss.
Likelihood	A qualitative description of probability or frequency
Risk	The chance of something happening that will have an impact upon objectives. It is measured in terms of consequence and likelihood.
Risk assessment	The overall process of risk analysis and risk evaluation
Risk management	The culture, processes and structures that are directed towards the effective management of potential opportunities and adverse effects.

8. Terms and Definitions

9. Veolia Reference Documents

Document Code Reference	/ Document Name
TEM-3978	WICA Requirements Reference Table
PRO-3819	FRWP Source Water Characterisation
TEM-3899	Feed Water Specification
TEM-3898	Recycled Water Specification


TEM-3799	Laboratory Analysis Schedule	
PRO-3820	Rosehill Scheme Overview	
TEM-3830	Preliminary Risk Assessment and Critical Control Point Identification	
MAN-3954	Operations Management Plan	
PRO-263	Risk Management	
TEM-3836	HACCP Register	
MAN-3941	Process Operations	
MAN-3935	I & E Management Manual	
PRO-3915	Stakeholder Engagement and Evaluation	
PRO-3916	Handling Complaints	
PRO-3816	Internal and External Reporting	
MAN-3813	Validation	
PRO-3817	Change Management	

10. Abbreviations

AGWR	Australian Guidelines for Water Recycling	
AquaNet	AquaNet Sydney Pty Ltd	
FAWTP	Fairfield Advanced Water Treatment Plant	
НАССР	Hazard analysis and critical control point	
IBMS	Integrated Business Management System	
LAP	Liverpool to Ashfield Pipeline	
PLC	Programmable logic controller	
RO	Reverse osmosis	
Rosehill Network	Rosehill Network Pty Ltd	
RRWS	Rosehill Recycled Water Scheme	
RRWN	Rosehill Recycled Water Network	
SCADA	Supervisory Control and Data Acquisition system	
SLRA	Screening Level Risk Assessment	
STP	Sewerage Treatment Plant	
swc	Sydney Water Corporation	
VWA	Veolia Water Australia	
vws	Veolia Water Technologies and Solutions	



Annexure A – Overview of the Rosehill Scheme





Annexure B – Rosehill Scheme Contractual Framework

Appendix C.12 Regulatory Approvals

Rosehill Network Pty Ltd – WICA Application



NEW SOUTH WALES GOVERNMENT

WATER INDUSTRY COMPETITION ACT 2006 (NSW)

NETWORK OPERATOR'S LICENCE

SGSP Rosehill Network Pty Ltd

ACN 131 213 691



New South Wales

Water Industry Competition Act 2006

Grant of Network Operator's Licence Licence No.09_002

I, Phillip Costa MP, Minister for Water, under section 10 of the *Water Industry Competition Act 2006*, grant a network operator's licence to

SPI Rosehill Network Pty Limited (ACN 131 213 691) and

to construct, maintain and operate water industry infrastructure.

Subject to:

- a) the conditions imposed by the Water Industry Competition Act 2006,
- b) the conditions imposed under clause 9(a) and set out in Parts 1 and 2 of Schedule 1 of the *Water Industry Competition (General) Regulation 2008*,
- c) the conditions imposed by the Minister in the attached Schedule A, and
- d) the standard conditions imposed by the Minister in the attached Schedule B being standard Ministerially-imposed licence conditions for network operators in the water industry.

day of April

Minister for Water

Dated this 27

2009



New South Wales

Water Industry Competition Act 2006 Section 15

Notice of Decision Variation of Licence Conditions Licence No. 09_002

I, The Hon. Niall Blair MLC, Minister for Lands and Water, under section 15 of the *Water Industry Competition Act 2006*, have considered and accept the recommendations made by the Independent Pricing and Regulatory Tribunal of New South Wales (IPART) in its report to me on the 5-year review of the network operator's licence granted to SGSP Rosehill Network Pty Ltd (ACN 131 213 691) (licence no. 09_002), to vary the existing conditions of the licence and impose new conditions on the licence. I attach a copy of IPART's report (**Attachment A**).

I have had regard to the licensing principles set out in section 7 of the Act in considering whether to vary the existing conditions of the licence or impose new conditions on the licence.

I have therefore determined to vary the conditions of and impose new conditions on the network operator's licence no. 09_002. I hereby attach a copy of the licence (**Attachment B**).

Minister for Lands and Water

2015

Dated this MM day of July



New South Wales

Water Industry Competition Act 2006

Variation of Network Operator's Licence Licence No. 09_002

I, the Hon. Niall Blair MLC, Minister for Lands and Water, under section 15 of the *Water Industry Competition Act 2006*, make the following variation to the licence conditions of the network operator's licence no. 09_002 granted to:

SGSP Rosehill Network Pty Ltd (ACN 131 213 691)

- i) Delete Schedule A and replace with new Schedule A (attached to this notice).
- ii) Delete Schedule B and replace with new Schedule B (attached to this notice).
- iii) Replace any reference in the licence to "SPI Rosehill Network Pty Limited" with "SGSP Rosehill Network Pty Ltd".

Minister for Lands and Water

Dated this $\mathcal{W}^{\mathcal{K}}$ day of 20 15

SCHEDULE A - SPECIAL MINISTERIALLY-IMPOSED LICENCE CONDITIONS FOR SGSP ROSEHILL NETWORK PTY LTD'S NETWORK OPERATOR'S LICENCE

This schedule sets out the conditions which the Minister imposes pursuant to section 13(1)(b) of the Act. In addition to these special Ministerially-imposed conditions, the Licensee is subject to obligations imposed by the Act, the Regulation and the standard Ministerially-imposed licence conditions set out in Schedule B. The Minister may vary the conditions in this schedule or impose new conditions, provided there is no inconsistency with the conditions imposed on the Licensee by the Act or the Regulation.

A1 Activities authorised - non-potable water

A1.1 This Licence authorises the Licensee and any authorised persons specified in Table 1.1:

- a) to construct, maintain and operate the water industry infrastructure specified in Table 1.2;
- b) for the authorised purposes specified in Table 1.3;
- c) within the area of operations specified in Table 1.4,
- subject to the conditions imposed by or under the Act, the Regulation and this Licence.

Table 1.1 Authorised persons

Jemena Limited (ACN 052 167 405) and its subsidiary Jemena Asset Management Pty Ltd (ACN 086 013 461)

Table 1.2 Water industry infrastructure

Infrastructure used for the treatment, storage, conveyance or reticulation of non-potable water

Table 1.3 Authorised purposes

Cooling tower make-up, industrial process, wash-down, fire-fighting, irrigation, toilet flushing and washing machine (cold water tap only).

Table 1.4 Area of operations

The Local Government Area of each of the following:

- a) Auburn City Council;
- b) Bankstown City Council;
- c) Fairfield City Council;
- d) Holroyd City Council;
- e) Liverpool City Council; and
- f) Parramatta City Council.

A2 Activities authorised – drinking water [Not applicable]

Table 2.1 Authorised persons

[Not applicable]

Table 2.2 Water industry infrastructure

[Not applicable]

Table 2.3 Authorised purposes

[Not applicable]

Table 2.4 Area of operations

[Not applicable]

A3 Activities authorised – sewerage services

[Not applicable]

Table 3.1 Authorised persons

[Not applicable]

Table 3.2 Water industry infrastructure

[Not applicable]

Table 3.3 Authorised purposes

[Not applicable]

Table 3.4 Area of operations

[Not applicable]

INTERPRETATION AND DEFINITIONS

Interpretation

In this Schedule A, unless the context requires otherwise:

- i) the singular includes the plural and vice versa;
- ii) headings are used for convenience only and do not affect the interpretation of this Schedule A;
- iii) a reference to a document includes the document as modified from time to time and any document replacing it;
- iv) a reference to a person includes a natural person and any body or entity whether incorporated or not;
- v) a reference to a clause is to a clause in this Schedule A;
- vi) a reference to a schedule is to a schedule to this Licence;

- vii) a reference to a law or statute includes regulations, rules, codes and other instruments under it, and consolidations, amendments, re-enactments or replacements of them; and
- viii) explanatory notes do not form part of this Licence, but in the case of uncertainty may be relied on for interpretation purposes.

Definitions

Expressions used in this Schedule A that are defined in the Act or the Regulation have the meanings set out in the Act or the Regulation.

In this Schedule A:	
Act	means the Water Industry Competition Act 2006 (NSW).
Local Government Area	has the same meaning as area has in the <i>Local Government Act 1993</i> (NSW).
Licence	means this network operator's licence granted under section 10 of the Act.
Licensee	means the person to whom this Licence is granted under section 10 of the Act.
Minister	means the Minister responsible for Part 2 the Act.
Regulation	means the Water Industry Competition (General) Regulation 2008 (NSW).

SCHEDULE B - STANDARD MINISTERIALLY-IMPOSED LICENCE CONDITIONS FOR ALL LICENSED NETWORK OPERATORS UNDER THE ACT

This schedule sets out the standard conditions which the Minister imposes on the Licensee and all other licensed network operators pursuant to section 13(1)(b) of the Act. In addition to these standard Ministerially-imposed conditions, the Licensee is subject to obligations imposed by the Act, the Regulation and the special Ministerially-imposed licence conditions set out in Schedule A. The Minister may vary the conditions in this schedule or impose new conditions, provided there is no inconsistency with the conditions imposed on the Licensee by the Act or the Regulation.

B1 Ongoing capacity to operate

B1.1 The Licensee must have the technical, financial and organisational capacity to carry out the activities authorised by this Licence. If the Licensee ceases to have this capacity, it must report this to IPART immediately in accordance with the Reporting Manual.

B2 Obtaining appropriate insurance

- B2.1 Before commencing to commercially operate the Specified Water Industry Infrastructure under this Licence, the Licensee must:
 - a) obtain insurance that is appropriate for the size and nature of the activities authorised under this Licence;
 - b) provide a copy of each certificate of currency of the insurance obtained to IPART; and
 - c) demonstrate that the insurance obtained is appropriate for the size and nature of the activities authorised under this Licence by providing a report to IPART from an Insurance Expert that:
 - i) certifies that in the Insurance Expert's opinion, the type and level of the insurance obtained by the Licensee is appropriate for the size and nature of the activities authorised under the Licence; and
 - ii) is in the form prescribed by the Reporting Manual.
- B2.2 [Not applicable]

B3 Maintaining appropriate insurance

- B3.1 The Licensee must maintain insurance that is appropriate for the size and nature of the activities authorised under this Licence.
- B3.2 The Licensee must provide a copy of each certificate of currency of the insurance maintained by the Licensee to IPART in accordance with the Reporting Manual.
- B3.3 If there is to be a change in:
 - a) the insurer or underwriting panel in respect of an insurance policy held by the Licensee; or
 - b) the type, scope or limit on the amount of insurance held by the Licensee,

in relation to the activities authorised under this Licence, the Licensee must provide a report to IPART in accordance with the Reporting Manual.

B3.4 From time to time when requested in writing by IPART, the Licensee must provide a report to IPART, in the manner, form and time specified by IPART, from an Insurance Expert certifying that in the Insurance Expert's opinion the type and level of the

insurance held by the Licensee is appropriate for the size and nature of the activities authorised under this Licence.

[Note: The situations in which IPART may request a report under clause B3.4 include (but are not limited to) the following:

- when IPART has reason to believe that there may be a change in the type or level of insurance held by the Licensee in relation to activities authorised under this Licence;
- where there is a change in the type or extent of activities authorised under this Licence; or
- when IPART or an approved auditor has reason to believe that the type or level of insurance held by the Licensee may not be appropriate for the size and nature of the activities authorised under this Licence.]

B4 Complying with NSW Health requirements

- B4.1 The Licensee must carry out the activities authorised by this Licence in compliance with any requirements of NSW Health that:
 - a) IPART has agreed to; and
 - b) are notified from time to time to the Licensee by IPART in writing.

B5 Complying with Audit Guidelines from IPART

B5.1 The Licensee must comply with any Audit Guidelines issued by IPART.

B6 Reporting in accordance with the Reporting Manual

B6.1 The Licensee must prepare and submit reports in accordance with the Reporting Manual.

B7 Reporting information in relation to the Register of Licences

- B7.1 Within 14 days of any change in relation to the following, the Licensee must notify IPART, and provide details, of the change in accordance with the Reporting Manual:
 - a) any source from which the water handled by the Specified Water Industry Infrastructure is derived;
 - b) the Authorised Purposes of the water handled by the Specified Water Industry Infrastructure;
 - c) the identity of each licensed retail supplier or public water utility that has access to the infrastructure services provided by the Specified Water Industry Infrastructure for the purpose of supplying water to its customers;
 - d) any other water infrastructure to which the Specified Water Industry Infrastructure is connected;
 - e) [Not applicable]
 - f) [Not applicable]
 - g) the arrangements for the disposal of waste from the Specified Water Industry Infrastructure.

B8 Monitoring

- B8.1 The Licensee must undertake any monitoring that is required for the purposes of this Licence, any Plan, the Act or the Regulation in accordance with this clause B8.
- B8.2 The Licensee must keep the following records of any samples taken for monitoring purposes specified in the Water Quality Plan:
 - a) the date on which the sample was taken;
 - b) the time at which the sample was collected;
 - c) the point or location at which the sample was taken; and
 - d) the chain of custody of the sample (if applicable).
- B8.3 The Licensee must ensure that analyses of all samples taken for the purposes of Verification Monitoring are carried out by a laboratory accredited for the specified tests by an independent body that is acceptable to NSW Health, such as the National Association of Testing Authorities or an equivalent body.

B9 Provision of copy of Plan

B9.1 Whenever the Licensee makes a significant amendment to a Plan, the Licensee must provide a copy of the amended Plan to IPART at the same time that it provides a copy to the approved auditor engaged to prepare a report as to the adequacy of the amended Plan, as required under the Regulation.

B10 Delineating responsibilities - interconnections

- B10.1 If a code of conduct has not been established under clause 25 of the Regulation, the Licensee must (by a date specified by IPART) establish a code of conduct (Licensee's Code of Conduct) in accordance with this clause B10.
- B10.2 The Licensee's Code of Conduct must set out the respective responsibilities of:
 - a) the Licensee; and
 - b) each licensed network operator, licensed retail supplier and/or public water utility that:
 - i) supplies water or provides sewerage services by means of; or
 - ii) constructs, maintains or operates,

any water industry infrastructure that is connected to the Specified Water Industry Infrastructure,

- by, at a minimum, providing for:
- c) who is responsible for repairing, replacing or maintaining any pipes, pumps, valves, storages or other infrastructure connecting the Specified Water Industry Infrastructure to the other water industry infrastructure;
- d) who is responsible for water quality;
- e) who is liable in the event of the unavailability of water;
- f) who is liable in the event of failure of the Specified Water Industry Infrastructure;
- g) the fees and charges payable in respect of the use of the Specified Water Industry Infrastructure; and
- h) who is responsible for handling customer complaints.

- B10.3 Before the Licensee brings the Specified Water Industry Infrastructure into commercial operation or by a later date specified by IPART (if any), the Licensee's Code of Conduct must be agreed in writing between the Licensee and the other licensed network operators, licensed retail suppliers and/or public water utilities referred to in clause B10.2.
- B10.4 Within 6 months of the date on which this Licence is granted or by a later date specified by IPART (if any), the Licensee's Code of Conduct must be agreed in writing between the Licensee and the other licensed network operators, licensed retail suppliers and/or public water utilities referred to in clause B10.2.
- B10.5 The Licensee must not contravene the Licensee's Code of Conduct to the extent that it makes the Licensee responsible or liable for the matters set out in it.

B11 Notification of changes to end-use

B11.1 If the Licensee proposes to operate the Specified Water Industry Infrastructure to supply water for an end-use which is not set out in the most recent Water Quality Plan provided to IPART, the Licensee must notify IPART in writing at least 3 months before commencing such operation.

B12 Notification of changes to Authorised Person

B12.1 If an Authorised Person ceases, proposes to cease, or receives notification to cease providing any of the services relating to the activities authorised by this Licence, the Licensee must provide IPART with written notice as soon as practicable but no later than 28 days before the date of cessation of the services. The written notice must include details of how the services previously undertaken by the Authorised Person will continue to be undertaken.

B13 Notification of commercial operation

- B13.1 This clause B13 applies each time the Licensee has brought any of the Specified Water Industry Infrastructure into commercial operation.
- B13.2 The Licensee must:
 - a) notify IPART in accordance with the Reporting Manual that it has brought the relevant Specified Water Industry Infrastructure into commercial operation; and
 - b) provide such notification within 10 days after it has brought the relevant Specified Water Industry Infrastructure into commercial operation.

INTERPRETATION AND DEFINITIONS

Interpretation

In this Schedule B, unless the context requires otherwise:

- i) the singular includes the plural and vice versa;
- ii) headings are used for convenience only and do not affect the interpretation of this Schedule B;
- iii) a reference to a document includes the document as modified from time to time and any document replacing it;

- iv) a reference to a "person" includes a natural person and any body or entity whether incorporated or not;
- v) a reference to a clause is to a clause in this Schedule B;
- vi) a reference to a schedule is to a schedule to this Licence;
- vii) a reference to a law or statute includes regulations, rules, codes and other instruments under it, and consolidations, amendments, re-enactments or replacements of them; and
- viii) explanatory notes do not form part of this Licence, but in the case of uncertainty may be relied on for interpretation purposes.

Definitions

Expressions used in this Schedule B that are defined in the Act or the Regulation have the meanings set out in the Act or the Regulation.

In this Schedule B:

Act	means the Water Industry Competition Act 2006 (NSW).		
Audit Guidelines	means the document entitled "Audit Guideline – Water Industry Competition Act 2006" which is prepared by IPART and is available on IPART's website at <u>www.ipart.nsw.gov.au</u> , and any other guidelines issued by IPART in relation to audits under the Act.		
Authorised Person	 means the authorised persons specified in, as applicable: (i) Schedule A, clause A1, Table 1.1; (ii) Schedule A, clause A2, Table 2.1; and (iii) Schedule A, clause A3, Table 3.1. 		
Authorised Purposes	 means the authorised purposes specified in, as applicable: (i) Schedule A, clause A1, Table 1.3; (ii) Schedule A, clause A2, Table 2.3; and (iii) Schedule A, clause A3, Table 3.3. 		
Insurance Expert	means an insurance broker which holds an Australian financial services licence under Part 7.6 of the <i>Corporations Act 2001</i> (Cth) that authorises the broker to provide financial product advice for, and deal in, contracts of insurance within the meaning of Chapter 7 of that Act.		
IPART	means the Independent Pricing and Regulatory Tribunal of New South Wales established under the <i>Independent Pricing and Regulatory Tribunal Act 1992</i> (NSW).		
Licence	means this network operator's licence granted under section 10 of the Act.		
Licensee	means the person to whom this Licence is granted under section 10 of the Act.		
Minister	means the Minister responsible for Part 2 of the Act.		
NSW Health	means the Water Unit of NSW Ministry of Health and any of the local health districts as defined by the NSW Ministry of Health.		
Plan	means any infrastructure operating plan, water quality plan or sewage management plan that the Licensee is required to prepare under the		

	Regulation.	
Regulation	means the Water Industry Competition (General) Regulation 2008 (NSW).	
Reporting Manual	means the document entitled "Network Operator's Reporting Manual" which is prepared by IPART and is available on IPART's website at <u>www.ipart.nsw.gov.au</u> .	
Specified Area of Operations	 means the area of operations specified in, as applicable: (i) Schedule A, clause A1, Table 1.4; (ii) Schedule A, clause A2, Table 2.4; and (iii) Schedule A, clause A3, Table 3.4. 	
Specified Water Industry Infrastructure	 means the water industry infrastructure specified in, as applicable: (i) Schedule A, clause A1, Table 1.2; (ii) Schedule A, clause A2, Table 2.2; and (iii) Schedule A, clause A3, Table 3.2. 	
Verification Monitoring	means verification monitoring as described in the document entitled "Australian Drinking Water Guidelines" or the document entitled "Australian Guidelines for Water Recycling" as the case may be.	
Water Quality Plan	means the water quality plan that the Licensee is required to prepare under the Regulation.	

Appendix C.13

1-6

Development Consents

Rosehill Network Pty Ltd – WICA Variation Application

confidential ames Roberts

Project Approval

Section 75J of the Environmental Planning and Assessment Act 1979

I, the Minister for Planning, approve the project referred to in Schedule 1, subject to the conditions in Schedule 2.

These conditions are required to:

- prevent, minimise, and/or offset adverse environmental impacts;
- set standards and performance measures for acceptable environmental performance;
- · require regular monitoring and reporting; and
- provide for the ongoing environmental management of the project.

The Hon. Kristina Keneally MP Minister for Planning

Svdnev m

2009

File No: 9043378

SCHEDULE 1

Application No:

Proponent:

Approval Authority:

Land:

Project:

07_0121

Aquanet Sydney Pty Ltd

Minister for Planning

Land required for the construction and operation of the proposal, including surface infrastructure and pipeline corridor generally within Fairfield, Parramatta, Bankstown and Holroyd Local Government Areas.

Construction and operation of the Camellia and Rosehill Recycled Water Scheme in Western Sydney which comprises:

- recycled water treatment plant, pumping station, water storage tanks and other equipment at North Street, Fairfield;
- a connection to the existing Liverpool to Ashfield pipeline;
- one elevated surface water storage reservoir at Woodville Golf Course, Barbers Road, Guildford;
- two surface reservoirs and one pumping station on Durham Street and Grand Ave, Rosehill;
- approximately 20km of water distribution pipelines.

The project is a Major Project under *State Environmental Planning Policy (Major Projects) 2005* being development for the purpose of sewage and related wastewater treatment plants that has a capital investment value of more than \$30 million (Schedule 1, Group 8, Clause 26).

NSW Government Department of Planning

Major Project:

confidential James Roberts Flagstaff Partners Jun 13, 2019 00:54

confidential James Roberts KEY TO CONDITIONS Jun 13, 2019 00:54

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Act, the	Environmental Planning and Assessment Act, 1979.		
Conditions of Approval	The Minister's conditions of approval for the project.		
Councils	Fairfield City Council, Bankstown City Council, Parramatta City Council and Holroyd City Council.		
DECC	Department of Environment and Climate Change.		
Department, the	Department of Planning.		
Director-General, the	Director-General of the Department of Planning (or delegate).		
Director-General's Approval	A written approval from the Director-General (or delegate) where the Director-General's Approval is required under a condition. The Director-General may ask for additional information if the approval request is considered incomplete.		
Director-General's Report	The report provided to the Minister by the Director-General of the Department under section 75I of the EP&A Act.		
Dust	Any solid material that may become suspended in air or deposited		
EA	Rosehill Recycled Water Scheme, Environmental Assessment, prepared by Parsons Brinckerhoff and dated January 2009.		
EPL	Environment Protection Licence issued under the Protection of the Environment Operations Act, 1997		
Pipelines	The drinking water, recycled water and wastewater pipelines detailed in the EA.		
Minister, the	Minister for Planning		
Proponent	Aquanet Sydney Pty Ltd (with Jemena Asset Management Pty Ltd acting on behalf of the Proponent)		
Publicly Available	Available for inspection by a member of the general public (for example available on an internet site or at a display centre).		
Site	Land to which Major Projects Application 07_0121 applies.		
Preferred Project Report	Camellia and Rosehill Recycled Water Scheme Preferred Project Report, prepared by Jemena Asset Management and dated 19 March 2009.		

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1. ADMINISTRATIVE CONDITIONS

Terms of Approval

- 1.1 The Proponent shall carry out the project generally in accordance with the:
 - a) Major Project Application 07_0121;
 - b) Rosehill Recycled Water Scheme, Environmental Assessment, prepared by Parsons Brinckerhoff and dated January 2009;
 - c) Camellia and Rosehill Recycled Water Scheme Preferred Project Report, prepared by Jemena Asset Management and dated 19 March 2009; and
 - d) the conditions of this approval.

1.2 In the event of an inconsistency between:

- a) the conditions of this approval and any document listed from condition 1.1a) to 1.1c) inclusive, the conditions of this approval shall prevail to the extent of the inconsistency; and
- b) any document listed from condition 1.1a) to 1.1c) inclusive, and any other document listed from condition 1.1a) to 1.1c) inclusive, the most recent document shall prevail to the extent of the inconsistency.
- 1.3 The Proponent shall comply with any reasonable requirement(s) of the Director-General arising from the Department's assessment of:
 - a) any reports, plans or correspondence that are submitted in accordance with this approval; and
 - b) the implementation of any actions or measures contained in these reports, plans or correspondence.

Limits of Approval

- 1.4 This project approval shall lapse five years after the date on which it is granted, unless the works the subject of this approval are physically commenced on or before that time.
- 1.5 The peak output operating capacity of the recycled water treatment plant is 25 megalitres per day.

Statutory Requirements

1.6 The Proponent shall ensure that all applicable licences, permits and approvals are obtained and maintained as required throughout the life of the project. No condition of this approval removes the obligation for the Proponent to obtain, renew or comply with such licences, permits or approvals. The Proponent shall ensure that a copy of this approval and all relevant environmental approvals are available on the site at all times during the project.

2. SPECIFIC ENVIRONMENTAL CONDITIONS

Noise Impacts

Vibration Impacts

2.1 The Proponent shall meet the requirements of Assessing Vibration: A Technical Guideline (DECC, February 2006) during the construction and operation of the project.

Construction Noise

- 2.2 The Proponent shall only undertake construction activities associated with the project that would generate an audible noise at the nearest sensitive receiver and at any residential premises during the following hours:
 - a) 7:00 am to 6:00 pm, Mondays to Fridays, inclusive;
 - b) 7:00 am to 1:00 pm on Saturdays; and
 - c) at no time on Sundays or public holidays.

This condition does not apply in the event of a direction from police or other relevant authority for safety reasons, to prevent environmental harm or risk to life.

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- 2.3 Notwithstanding condition 2.2 of this approval, the Proponent may undertake construction activities during the following additional periods, provided that those activities are detailed in an approved Construction Noise and Vibration Management Plan (refer to condition 6.3c)):
 - a) evening work: 6:00 pm to 10:00 pm, Mondays to Fridays; and
 - b) night-time work: 10:00 pm to 7:00 am, Mondays to Fridays
- 2.4 Notwithstanding conditions 2.2 and 2.3 of this approval, the construction hours specified under those conditions may be varied with the prior written approval of the Director-General. Any request to alter specified construction hours shall be:
 - a) considered on a case-by-case basis;
 - b) accompanied by details of the nature and need for activities to be conducted during the varied construction hours; and
 - c) accompanied by any information necessary for the Director-General to reasonably determine that activities undertaken during the varied construction hours will not adversely impact on the acoustic amenity of receivers in the vicinity of the relevant construction site.

Operational Noise

2.5 The Proponent shall design, construct, operate and maintain the project to ensure that the noise contributions from the project to the background acoustic environment do not exceed 40 dB(A) (measured as L_{Aeq(15-minute)}) at the most-affected residential receiver. This maximum allowable noise contribution applies under wind speeds up to 3 ms⁻¹ (measured at 10 metres above ground level), and under temperature inversion conditions of up to 3 °C/ 100 metres.

Air Quality Impacts

Dust Generation

- 2.6 The Proponent shall construct and operate the project in a manner that minimises dust emissions from the site, including wind-blown and traffic-generated dust. All activities on the site shall be undertaken with the objective of preventing visible emissions of dust from the site, including the following:
 - a) staged construction work to expose only one area at a time, where practical;
 - b) stabilisation of exposed areas as soon as possible following completion of construction works; and
 - c) scheduling of work to avoid generation of dust during unfavourable meteorological conditions.
- 2.7 Should visible dust emissions occur at any time, the Proponent shall identify and implement all practicable dust mitigation measures, including cessation of relevant works, as appropriate, such that emissions of visible dust cease.

Odour

2.8 The Proponent shall not cause or permit the emission of offensive odours from the site in accordance with the provisions of Section 129 of the *Protection of the Environment Operations Act 1997*.

Traffic and Transport Impacts

- 2.9 Upon determining the haulage route(s) for the construction, the Proponent shall:
 - a) commission a qualified person to undertake a Road Dilapidation Report of all roads proposed to be used for construction activities in consultation with relevant road authorities. The Report shall assess the current condition of the relevant roads.
 - b) following completion of construction a subsequent Road Dilapidation Report shall be prepared to assess any damage that may have resulted due to traffic and transport related to the construction and ongoing operation of the project.

The Proponent shall commit to restore the relevant roads to a state described in the original Road Dilapidation report. The cost of any restorative work described in the subsequent Report

or recommended by the relevant road authorities after review of the subsequent Report, shall be funded by the Proponent. Such work shall be undertaken at a time as agreed upon between the Proponent and the relevant road authorities. In the event of a dispute between the parties with respect to the extent of restorative work that may be required under this condition, any party may refer the matter to the Director-General for resolution. The Director-General's determination of any such dispute shall be final and binding on the parties.

- 2.10 The Proponent shall undertake all works affecting a public road or road reserve in consultation with and to meet the requirements of the RTA and relevant Council.
- 2.11 The Proponent shall ensure that all pipeline crossings of roads are constructed using construction methods and depth covered determined in consultation with the relevant road authority.
- 2.12 All works associated with the project are to be at no cost to the RTA or relevant road authority. The Proponent shall, prior to construction, liaise with the RTA to determine whether a Works Authorisation Deed is required.
- 2.13 Where directional drilling/boring is proposed under roads or where trenching is proposed within road reserves, prior to the commencement of construction of pipelines, the Proponent shall consult with the relevant road authority and prepare a report to their reasonable satisfaction, the following matters:
 - detailed plans of the pipeline including vertical and horizontal alignment;
 - b) plant and equipment proposed to be used and construction compound locations;
 - c) construction schedule and hours of construction;
 - d) proposed lane closures of the road network prior to commencement of work;
 - e) specific plans required prior to submission of road occupancy licence applications;
 - f) mitigation measures proposed to reduce impacts to traffic and pedestrian safety; and
 - g) indicative maintenance arrangements during operation.

Contamination and Remediation

- 2.14 The Proponent shall ensure that contaminated areas of the recycled water treatment plant site and other work areas are appropriately remediated, if necessary, prior to the commencement of construction works associated with the project in those areas. All remediation work shall be conducted in accordance with the requirements of the *Contaminated Land Management Act 1997* and *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites (1997)*.
- 2.15 Prior to any construction or excavation works adjacent to Norris Street, Loftus Road, Dursley Road, Fairfield Road and Pine Road, in the Holroyd City Council area, the Proponent shall conduct a preliminary contamination assessment to identify any areas affected by contamination.
- 2.16 Prior to the commencement of site preparation and construction works associated with the project that may directly disturb known contaminated areas of the site, the Proponent shall submit to the Director-General a Site Audit Statement(s) Construction prepared by an accredited Site Auditor under the Contaminated Land Management Act 1997, verifying that the contaminated areas have been remediated to a standard consistent with the intended land use.

Hazards, Risk and Land Use Safety

- 2.17 All demolition work shall be carried out in accordance with AS 2601-2001 The Demolition of Structures.
- 2.18 The Proponent shall store and handle all Dangerous Goods, as defined by the Australian Dangerous Goods Code, strictly in accordance with:
 - a) all relevant Australian Standards;

- b) a minimum bund volume requirement of 110% of the volume of the largest single stored volume within the bund: and
- DECC guidelines entitled: Storing and Handling Liquids: Environmental Protection c) Participants Manual and Environmental Compliance Report: Liquid Chemical Storage Handling & Spill Management.

In the event of an inconsistency between the requirements listed from a) to c) above, the most stringent requirement shall prevail to the extent of the inconsistency.

2.19 The Proponent shall implement all the mitigation and control measures listed in section 3.5 of the Preliminary Hazard Assessment (PHA) of the EA. The Proponent shall submit an update on the implementation status of these measures to the Director-General prior to the commencement of construction, and again prior to the commencement of commissioning of the project.

Pre-Commissioning Hazards Studies

- 2.20 Prior to the commencement of commissioning of the project the Proponent shall prepare and submit for the approval of the Director-General the following studies:
 - a) an Emergency Plan for the project. The Plan shall be prepared in accordance with the Department's publication Hazardous Industry Planning Advisory Paper No. 1 - Industry Emergency Planning Guidelines. The plan shall include detailed procedures for the safety of all people outside of the development who may be at risk from the project; and
 - a Safety Management System, covering all operations at the project and any associated b) transport activities involving hazardous materials. The System shall clearly specify all safety-related procedures, responsibilities and policies, along with details of mechanisms for ensuring adherence to safety procedures. The System shall be developed in accordance with the Department's publication Hazardous Industry Planning Advisory Paper No. 9 - Safety Management.

Flooding Impacts

- 2.21 Prior to the commencement of construction, the Proponent shall prepare engineering drawings in consultation with Fairfield Council for relocation of St Elmo's Drain to account for potential flooding impacts at the site of the recycled water treatment plant. The engineering drawings shall be submitted for the approval of the Director-General prior to the commencement of construction.
- 2.22 The Proponent shall include specific design features for bulk chemicals tanks and chemical container storage areas at the recycled water treatment plant to prevent impacts beyond the boundary of the site in the case of a flood event. The chemical storage and handling area shall be designed to meet the requirements of AS 3780-1994.
- 2.23 Prior to finalising the design of the recycled water treatment plant and the commencement of construction works, an overland flood risk analysis for the site, including modelling of overland flows during the 100 year ARI overland flow design flood, shall be undertaken. A copy of the overland flow modelling results shall be provided to Fairfield City Council and to the Department upon completion.

Ecological Impacts

2.24 The Proponent shall define predicted minor impact by the project on River-flat Eucalypt Forest, Cumberland Plain Woodland, Shale Gravel Transition Forest and Castlereagh Swamp Woodland in accordance with the documents referred to in condition 1.1 and prepare a strategy to offset such vegetation losses or impact, to the satisfaction of the Director-General. Details of the offset strategy shall be submitted for the approval of the Director-General prior to the commencement of construction.

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- 2.25 The Proponent shall ensure prompt restoration of drainage channels, which may provide Green and Golden Bell Frog habitat and movement corridors along creek lines, during construction works to minimise potential ecological impacts.
- 2.26 All work, including waterway crossings, undertaken within 40 metres of waterways shall be conducted in accordance with the Department of Water and Energy *Guidelines for Controlled Activities*.

Heritage Impacts

- 2.27 Prior to the commencement of construction, all project personnel shall undergo project induction, covering education in protocols and offences relating to knowingly disturbing or destroying non-Aboriginal heritage items or Aboriginal relics, and including the potential for uncovering non-Aboriginal and/or Aboriginal relics in the project work areas.
- 2.28 In the event of uncovering any previously unidentified Aboriginal objects or relics, work shall cease immediately in the vicinity of the site and the event shall be reported immediately to the DECC. This requirement shall be included in the project induction and the Construction Environmental Management Plan.

Soil and Water Quality Impacts

- 2.29 The Proponent shall comply with section 120 of the *Protection of the Environment Operations Act 1997* which prohibits the pollution of waters.
- 2.30 The Proponent shall install and maintain for the duration of construction works associated with the project, erosion and sedimentation control measures consistent with *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004).
- 2.31 The Proponent shall investigate options for the collection, storage and reuse of stormwater which may include the installation of rainwater tanks to capture stormwater from the roof of station buildings or the construction site buildings and use of this water for preparing concrete, dust suppression and establishing and maintaining revegetated areas and landscaping. Such options shall be incorporated into the Construction Environmental Management Plan required under condition 6.2 of this approval.

Waste Generation and Management

- 2.32 All waste materials removed from the site shall only be directed to a waste management facility lawfully permitted to accept the materials.
- 2.33 The Proponent shall maximise the treatment, reuse and/or recycling on the site of any excavated soils, slurries, dusts and sludges associated with the project, to minimise the need for treatment or disposal of those materials outside the site.
- 2.34 The Proponent shall not cause, permit or allow any waste generated outside the site to be received at the site for storage, treatment, processing, reprocessing, or disposal on the site, except as expressly permitted by a licence under the *Protection of the Environment Operations Act 1997*, if such a licence is required in relation to that waste.
- 2.35 The Proponent shall ensure that all liquid and/or non-liquid waste generated and/or stored on the site is assessed and classified in accordance with *Environmental Guidelines: Assessment, Classification and Management of Liquid and Non-Liquid Wastes* (DEC, 2004), or any future guideline that may supersede that document.
- 2.36 The Proponent shall manage any asbestos or asbestos-contaminated materials that may be uncovered during remediation or construction works strictly in accordance with the requirements of *Protection of the Environment Operations (Waste) Regulation 2005* and any guidelines or requirements issued by DECC in relation to these materials.

Visual Amenity and Urban Design

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2.37 The Proponent is permitted to construct surface facilities and associated infrastructure at the recycled water treatment plant generally located and configured consistent with the preliminary designs presented in the documents referred to in condition 1.1 of this approval and in particular, Figure 2.1 of the document referred to under condition 1.1c). Heights of surface facilities will be limited as specified in Table 1.

ltem	Height Limit (m AHD)	Height Limit with access ladders & 1.2m high sàfety rails (m AHD)
Recycled Water Storage Tank	15.1	16.3
Feed Balance Tank	14.7	16.0
Detention Tank	14.9	16.2
Filtration (Reverse Osmosis) Building	17.1	18.4
Degasser	15.9	17.2
Flocculation Tank	13.5	14.7
Reverse Osmosis Tank	13.6	14.9
Reverse Osmosis Permeate Collection Tank	12.0	13.2

2.38 Prior to the construction of surface facilities at the recycled water treatment plant, the Proponent shall submit final designs to the Director-General, demonstrating consistency with the requirements of condition 2.37.

3. ENVIRONMENTAL MONITORING AND AUDITING

Noise Monitoring

- 3.1 Within 90 days of the commencement of operation of the pumping station at the recycled water treatment plant and the Rosehill pumping station, or as may be otherwise agreed by the Director-General, and during a period in which the pumping station and the recycled water treatment plant are operating under design loads and normal operating conditions, the Proponent shall review the noise emission performance of the pumping station and the recycled water treatment plant site. The review shall include, but not necessarily be limited to:
 - a) methodologies for noise monitoring;
 - b) location of noise monitoring;
 - c) frequency of noise monitoring;
 - identification of monitoring sites at which pre-operational and operational noise levels can be ascertained; and
 - e) details of any entries in the Complaints Register (condition 5.3 of this approval) relating to noise impacts.

A report providing the results of the program shall be submitted to the Director-General within 28 days of completion of the testing required under this condition.

3.2 In the event that the program undertaken to satisfy condition 3.1 of the approval indicates that the operation of the pumping stations and the recycled water treatment plant site, under design loads and normal operating conditions, will lead to greater noise impacts than permitted under condition 2.5 of this approval, then the Proponent shall provide details of remedial measures to be implemented to reduce noise impacts to levels required by that condition. Details of the remedial measures and a timetable for implementation shall be submitted to the Director-General for approval within such period as the Director-General may require.

4. COMPLIANCE TRACKING

4.1 Prior to each of the events listed below, the Proponent shall certify in writing to the satisfaction of the Director-General that it has complied with all conditions of this approval applicable prior to that event:

- a. commencement of any construction works on the land subject of this approval; and
- b. commencement of operation of the project.
- 4.2 The Proponent shall develop and implement a **Compliance Tracking Program** for the project, prior to commencing operations, to track compliance with the requirements of this approval and shall include, but not necessarily limited to:
 - a) provisions for periodic review of the compliance status of the project against the requirements of this approval and the Statement of Commitments detailed in the document referred to in condition 1.1 of this approval;
 - b) provisions for periodic reporting of the compliance status to the Director-General;
 - c) a program for independent environmental auditing in accordance with AS/NZ ISO 19011:2003 Guidelines for Quality and/or Environmental Management Systems Auditing;
 - d) procedures for rectifying any non-compliance identified during environmental auditing or review of compliance;
 - e) mechanisms for recording environmental incidents and actions taken in response to those incidents;
 - f) provisions for reporting environmental incidents to the Director-General during construction and operation; and
 - g) provisions for ensuring all employees, contractors and sub-contractors are aware of, and comply with, the conditions of this approval relevant to their respective activities.

The Compliance Tracking Program shall be implemented prior to operation of the project with a copy submitted to the Director-General for approval within four weeks of commencement of the project, unless otherwise agreed by the Director-General.

- 4.3 Nothing in this approval restricts the Proponent from utilising any existing compliance tracking programs administrated by the Proponent to satisfy the requirements of condition 4.2. In doing so, the Proponent must demonstrate to the Director-General how these systems address the requirements and/or have been amended to comply with the requirements of the condition.
- 4.4 The Proponent shall meet the requirements of the Director-General in respect of the implementation of any measure necessary to ensure compliance with the conditions of this approval, and general consistency with the documents listed under condition 1.1 of this approval.

5. COMMUNITY CONSULTATION

5.1 Subject to confidentiality, the Proponent shall make all documents required under this approval available for public inspection on request.

Complaints Procedure

- 5.2 Prior to the commencement of construction of the project, the Proponent shall ensure that the following are available for community complaints for the life of the project (including construction and operation):
 - a) a telephone number on which complaints about construction and operational activities at the site may be registered;
 - b) a postal address to which written complaints may be sent; and
 - c) an email address to which electronic complaints may be transmitted.

The telephone number, the postal address and the email address shall be published in a local newspaper circulating in the local areas prior to the commencement of construction and prior to the commencement of operation. This information shall also be provided on the Proponent's website.

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- 5.3 The Proponent shall record details of all complaints received through the means listed under condition 5.2 of this approval in an up-to-date Complaints Register. The Register shall record, but not necessarily be limited to:
 - a) the date and time, where relevant, of the complaint;
 - b) the means by which the complaint was made (telephone, mail or email);
 - c) any personal details of the complainant that were provided, or if no details were provided, a note to that effect;
 - d) the nature of the complaint;
 - e) any action(s) taken by the Proponent in relation to the complaint, including any follow-up contact with the complainant; and
 - f) if no action was taken by the Proponent in relation to the complaint, the reason(s) why no action was taken.

The Complaints Register shall be made available for inspection by the Director-General upon request.

6. ENVIRONMENTAL MANAGEMENT

Environmental Representative

- 6.1 Prior to the commencement of any construction or operational activities, or as otherwise agreed by the Director-General, the Proponent shall nominate for the approval of the Director-General a suitably qualified and experienced Environmental Representative(s) independent of the design, construction and operation personnel. The Proponent shall engage the Environmental Representative(s) during any construction activities, and throughout the life of the project, or as otherwise agreed by the Director-General. The Environmental Representative(s) shall:
 - a) oversee the implementation of all environmental management plans and monitoring programs required under this approval, and advise the Proponent upon the achievement of these plans/programs;
 - b) have responsibility for considering and advising the Proponent on matters specified in the conditions of this approval and the Statement of Commitments as referred to under condition 1.1c) of this approval;
 - c) oversee the implementation of the environmental auditing of the project in accordance with the requirements of condition 4.2 of this approval and all relevant project Environmental Management System(s); and
 - d) be given the authority and independence to recommend to the Proponent reasonable steps to be taken to avoid or minimise unintended or adverse environmental impacts, and, failing the effectiveness of such steps, to recommend to the Proponent that relevant activities are to be ceased as soon as reasonably practicable if there is a significant risk that an adverse impact on the environment will be likely to occur.

Construction Environmental Management Plan

- 6.2 The Proponent shall prepare and implement a **Construction Environmental Management Plan** (CEMP) to outline environmental management practices and procedures to be followed during construction of the project. The CEMP shall be consistent with *Guideline for the Preparation of Environmental Management Plans* (DIPNR, 2004) and shall include, but not necessarily be limited to:
 - a) a description of all relevant activities to be undertaken on the site during construction;
 - b) statutory and other obligations that the Proponent is required to fulfil during construction including all relevant approvals, consultations and agreements required from authorities and other stakeholders, and key legislation and policies;
 - c) details of how the environmental performance of the construction works will be monitored, and what actions will be taken to address identified potential adverse environmental impacts. In particular, the following environmental performance issues shall be addressed in the Plan:
 - i) measures to manage dust emissions;
 - ii) measures to monitor and minimise soil erosion and the discharge of sediment and other pollutants to lands and/ or waters during construction activities;

- iii) measures to monitor and control noise emissions during construction works;
- iv) measures to minimise the impact of construction on local flora and fauna and threatened species;
- v) measures to implement in the case of uncovering previously unidentified soil and groundwater contamination during project excavations, including management of uncovered asbestos-contaminated sheeting and/or Acid Sulphate Soils.
- d) a description of the roles and responsibilities for all relevant employees involved in the construction of the project;
- e) the additional studies listed under condition 6.3 of this approval; and
- f) complaints handling procedures during construction.

A separate CEMP may be prepared for each stage of the project. The relevant CEMP shall be submitted for the approval of the Director-General no later than one month prior to the commencement of any relevant construction works associated with the project, or within such period otherwise agreed by the Director-General. Construction works shall not commence until written approval has been received from the Director-General.

- 6.3 As part of the Construction Environmental Management Plan required under condition 6.2 of this approval, the Proponent shall prepare and implement the following in consultation with the relevant Councils and for approval by the Director-General:
 - a) an Acid Sulphate Soil Management Plan, if the mottled-clay soils at a depth of 1.0 m 2.5 m below ground level along Berry Street (Granville) to Thackeray Street (Camellia) are to be disturbed during pipeline construction activities. The Plan shall be prepared in accordance with Acid Sulfate Soil Manual (Acid Sulfate Soil Management Advisory Committee, 1998);
 - b) a **Flora and Fauna Management Plan** to manage flora and fauna impacts during construction and include appropriate revegetation of impacted area. The Plan shall be prepared in consultation with DECC and the Councils and shall include, but not necessarily be limited to:
 - i) details of all potentially affected threatened flora and fauna species and specific management procedures for the Green and Golden Bell Frog habitat;
 - ii) weed control mechanisms and controls for the spread of disease and animal injury;
 - iii) general management procedures for the construction of pipelines within vegetated corridors, and the rehabilitation of any disturbed vegetation.
 - c) a Construction Noise and Vibration Management Plan to manage noise and vibration impacts during construction of the pipeline, recycled water treatment plant, Woodville reservoir and Rosehill pumping station and to identify all feasible and reasonable noise and vibration mitigation measures. The Plan shall include, but not necessarily be limited to:
 - i) details of all potentially affected sensitive receivers;
 - ii) the construction noise and vibration goals identified in the EA for construction periods greater than 26 weeks;
 - iii) specific activities to be conducted during the first hour of construction on Saturdays (7am to 8am) and measures to be incorporated to reduce noisey work during this specific time;
 - iv) where the objectives are predicted to be exceeded, an analysis of feasible and reasonable noise and vibration mitigation measures that will be implemented to reduce construction noise and vibration impacts; and
 - v) procedures for notifying residents of construction activities that are likely to affect their noise and vibration amenity.

The Construction Noise and Vibration Management Plan shall be referred to the Department of Environment and Climate Change for comment prior to Director-General approval to ensure mitigation of impacts, particularly during evening and night-time works.

d) a **Traffic Management Plan** for all works to be carried out within public areas, or where construction activity impacts on traffic flow and bicycles or pedestrian access, in compliance with the requirements of *AS 1742.3 Traffic Control Devices for Works on Roads*. The Plan shall be prepared in consultation with the Councils, the relevant road

authority, bus companies and private property owners to address potential impacts which shall include, but not necessarily be limited to:

- i) details of how construction of the project will be managed in proximity to local and regional roads;
- ii) details of traffic routes for heavy vehicles, including any necessary route or timing restriction for oversized loads;
- iii) provision for pedestrian access in the vicinity of construction areas, including disabled and pram access, cyclists, and provision for access to private properties;
- iv) provision of vehicle parking in areas where existing parking spaces will be lost;
- v) provisions to minimise impact on school traffic zones, including limited hours of work during school hours, compliance with speed limits by construction vehicles in school zones and where possible scheduling of construction work during school holiday periods;
- vi) details of bus routes in the vicinity of construction areas, including proposed changes to existing routes; and
- vii) demonstration that all statutory responsibilities with regard to road traffic impacts have been complied with.

Operation Environmental Management Plan

- 6.4 The Proponent shall prepare and implement an **Operation Environmental Management Plan** to detail an environmental management framework, practices and procedures to be followed during operation of the project. The OEMP shall be consistent with *Guideline for the Preparation of Environmental Management Plans* (DIPNR 2004) and shall include, but not necessarily be limited to:
 - a) identification of all relevant statutory and other obligations that the Proponent is required to fulfil in relation to operation of the project, including all relevant approvals, licences, approvals and consultations;
 - b) a description of the roles and responsibilities for all relevant employees involved in the operation of the project;
 - c) overall environmental policies and principles to be applied to the operation of the project;
 - d) relevant standards and performance measures to be applied to the project, and a means by which environmental performance can be periodically reviewed and improved, where appropriate;
 - e) management policies to ensure that environmental performance goals are met and to comply with the conditions of this approval; and
 - f) the additional plans listed under condition 6.5 of this approval.

A separate Operation Environmental Management Plan (OEMP) may be prepared for each stage of the project. The relevant OEMP shall be submitted for the approval of the Director-General no later than one month prior to the commencement of operation of the project, or within such period otherwise agreed by the Director-General. Operation shall not commence until written approval has been received from the Director-General.

- 6.5 As part of the Operation Environmental Management Plan required under condition 6.4 of this approval, the Proponent shall prepare and implement the following:
 - a) a Landscape Management Plan including but not limited to:
 - i) measures to minimise and manage the use of herbicides for weed control;
 - a plan for the replacement of plants in accordance with Fairfield Council's Urban Creeks Master Plan in riparian areas affected by the project. This may include any need for establishment of access paths within the creek corridor area for maintenance or other works;
 - iii) procedures for the removal of trees from Woodville Golf Course and rehabilitation plans for the visual impact of Woodville Reservoir;
 - iv) planting of additional screening plants in the area of North Street to provide visual screening for local residents, using native shrubs.

- b) an **Air Quality and Odour Management** Plan to outline measures to minimise impacts from the project on local and regional air quality. The Plan shall include, but not necessarily be limited to:
 - i) identification of all major sources of odour that may be emitted from the project;
 - ii) pro-active management and response mechanisms for odour emissions, with specific reference to measures to be implemented and actions to be taken to minimise and (where practicable) prevent potential odour impacts on surrounding land uses as a consequence of meteorological conditions, upsets within the project, or the mode of operation of the project;
 - iii) provision for review of air quality monitoring data, with comparison of monitoring data with that assumed and predicted in the documents listed under condition 1.1 of this approval, including verification of air quality modelling and predictions, as may be relevant;
 - iv) plans for regular maintenance of process equipment to minimise the potential for odour emissions; and
 - v) a contingency plan should an incident, process upset or other initiating factor lead to elevated odour impacts, whether above normal operating conditions or environmental performance goals/ limits.
- c) a **Noise Management Plan** to detail measures to mitigate and manage noise during operation of the recycled water treatment plant site, and Rosehill pumping station. The Plan shall include, but not necessarily be limited to:
 - i) identification of noise-generating activities and/or sources in relation to the Rosehill pumping station and the recycled water treatment plant site;
 - ii) identification of all relevant receivers and the applicable criteria at those receivers commensurate with the noise limits referred to in condition 2.4 of this approval;
 - iii) procedures to ensure that all reasonable and feasible noise mitigation measures are applied during operation of the Rosehill pumping station and the recycled water treatment plant site; and
 - iv) procedures to generate suitable documentation for environmental auditing, that demonstrates that best practice noise control operations are being implemented.

7. ENVIRONMENTAL REPORTING

Environmental Incident Reporting

- 7.1 The Proponent shall notify the Director-General of any environmental incident within 12 hours of becoming aware of the incident. The Proponent shall provide full written details of the incident to the Director-General within seven days of the date on which the incident occurred.
- 7.2 The Proponent shall meet the requirements of the Director-General to address the cause or impact of any environmental incident, as it relates to this approval, reported in accordance with condition 7.1 of this approval, within such period as the Director-General may require.

Annual Performance Reporting

- 7.3 The Proponent shall, throughout the life of the project, prepare and submit for the approval of the Director-General, an **Annual Environmental Management Report** (AEMR). The AEMR shall review the performance of the project against the Operation Environmental Management Plan (refer to condition 6.6 of this approval) and the conditions of this approval. The AEMR shall include, but not necessarily be limited to:
 - a) details of compliance with the conditions of this approval;
 - b) a copy of the Complaints Register (refer to condition 5.3 of this approval) for the preceding twelve-month period (exclusive of personal details), and details of how these complaints were addressed and resolved;
 - c) identification of any circumstances in which the environmental impacts and performance of the project during the year have not been generally consistent with the environmental impacts and performance predicted in the documents listed under condition 1.1 of this approval, with details of additional mitigation measures applied to the project to address recurrence of these circumstances;

- d) results of all environmental monitoring required under conditions 3.1 to 3.2 of this approval, including interpretations and discussion by a suitably qualified person; and
- e) a list of all occasions in the preceding twelve-month period when environmental goals/objectives/impact assessment criteria for the project have not been achieved, indicating the reason for failure to meet the crtieria and the action taken to prevent recurrence of that type of failure.

The Proponent shall submit a copy of the AEMR to the Director-General every year, with the first AEMR to be submitted no later than twelve months after the commencement of operation of the project. The Director-General may require the Proponent to address certain matters in relation to the environmental performance of the project in response to review of the Annual Environmental Report. Any action required to be undertaken shall be completed within such period as the Director-General may require. The Proponent shall make copies of each AEMR available for public inspection on request.

Appendix C.14

1:4

Environmental Impact Assessments

Rosehill Network Pty Ltd – WICA Variation Application

confidential James Roberts Flagstaff Partners Jun 13, 2019 00:56



SITE VALIDATION REPORT ROSEHILL RECYCLED WATER PROJECT CORNER DURHAM STREET AND GRAND AVENUE ROSEHILL NSW 2142

Prepared for:

Jemena Asset Management 100 Bennelong Parkway Sydney Olympic Park NSW 2127

Report Date: 8 June 2012 Project Ref: ENVIRHOD01225AA

Written by:

Craig Cowper Senior Associate

Reviewed by:

Sam Gunasekera Principal

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8 June 2012

Jemena Asset Management 100 Bennelong Parkway Sydney Olympic Park NSW 2127

Attention: Mr Chris Butler

Dear Chris

RE: Site Validation Report Rosehill Recycled Water Project Corner Durham Street and Grand Avenue Rosehill NSW 2142

Coffey Environments is pleased to provide this Site Validation Report for the subject site.

Please refer to the "Important Information About Your Coffey Environmental Report" at the end of the document.

Jun 13, 2019 00:56

Please do not hesitate to contact the undersigned should you have any questions.

For and on behalf of Coffey Environments Pty Ltd

Craig Cowper Senior Associate
RECORD OF DISTRIBUTION

No. of copies	Report File Name	Report Status	Date	Prepared for:	Initials
1	ENVIRHOD01225AA-R03	Final	8 June 2012	Jemena Asset Management	
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Important Information about your Coffey Environmental Report

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- Table LR1: Soil Laboratory Results Table
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Figure 1:	Site Location Plan
Figure 2:	Site Layout Plan
Figure 3:	Estimated Soil Remediation Depths
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- Appendix A: Friable Asbestos Removal Work Permits
- Appendix B: Material Tracking Records
- Appendix C: Geotextile Marker Layer Specification
- Appendix D: VENM Classification
- Appendix E: Laboratory Certificates of Analysis and Chain of Custody

ABBREVIATIONS

ASS	Acid Sulfate Soils
bgs	below ground surface
COC	Chain of Custody
DECC	Department of Environment and Climate Change (NSW)
DECCW	Department of Environment, Climate Change and Water (NSW)
ERM	Environmental Resources Management
LOR	Limit of Reporting
mg/kg	milligrams per kilogram
NATA	National Association of Testing Authorities
NEPM	National Environment Protection Measure
NSW EPA	Environment Protection Authority of New South Wales
OEH	Office of Environment and Heritage (NSW)
РАН	Polycyclic Aromatic Hydrocarbon
PASS	Potential Acid Sulfate Soils
PIL	Phytotoxicity Investigation Level
PPE	Personal Protective Equipment
QA	Quality Assurance
QC	Quality Control
RAC	Remediation Acceptance Criteria
RAP	Remediation Action Plan
RPD	Relative Percent Difference
SIL	Soil Investigation Level
SVR	Site Validation Report

EXECUTIVE SUMMARY

confidential James Roberts Flagstaff Partners Jun 13, 2019 00:56

Coffey Environments Australia Pty Ltd (Coffey) was commissioned by Jemena Asset Management (Jemena) to prepare a site validation report (SVR) for the property at the corner of Durham Street and Grand Avenue, Rosehill, NSW (the site).

The site is owned by Shell and leased by Jemena. It was previously a portion of the broader Clyde Shell Refinery site. Jemena was proposing to to re-develop the site, including construct a recycled water facility, following remediation and management of asbestos and PAH contaminated soil present on site. The remediation and management was undertaken as a part of the construction of the recycled water facility.

The objective of this SVR is to assess the suitability of the site for commercial / industrial land use, following remediation works undertaken at the site.

The scope of works undertaken in preparing this SVR included:

- project planning and management;
- desktop review;
- a review of available historical contamination assessment reports for the site;
- site walkover;
- preparation of a summary of the site identification, history and condition as well as the surrounding environment;
- fieldwork, including remediation activity observations and validation soil sampling;
- laboratory analysis; and
- data assessment and reporting.

Soils not complying with the adopted RAC were generally excavated across the Site (with the exception of small areas along the southern and western boundaries which are discussed below). The results of the laboratory analysis undertaken on the validation samples collected from the base of the excavation indicated that PAH and asbestos impacted soils had been successfully remediated.

The results of the laboratory analysis undertaken on the validation samples collected from the retained fill on the western and southern walls of the excavation, indicated that PAH and asbestos impacted soils had not been successfully remediated during remediation works.

The PAH and asbestos impacted soils retained along the southern boundary of the site were retained beneath a capping layer (comprised of a concrete slab).

The PAH and asbestos impacted soils retained along the western boundary of the site were retained beneath a marker layer (comprised of an orange geotextile marker layer) and a capping layer (comprised of a concrete slab).

No further assessment or remediation of soil contamination on the site is considered necessary for the proposed land use.

Based on a review of available desktop data, observations made during the remediation activity and assessment of laboratory analytical data, Coffey concludes that:

- the PAH and asbestos impacted materials have been remediated by a combination of excavation and offsite disposal, and containment beneath a concrete slab (with portions of the concrete slab across the southern boundary also topped with asphalt). Given the presence of the capping layer across these contained soils, the contained contaminated soil is assessed as not presenting an unacceptable risk to human health or the environment;
- the remediation goal has been achieved; and
- site soils are considered suitable for commercial / industrial land use, subject to the implementation of an environmental management plan (EMP), which addresses maintenance of proper containment of the PAH and asbestos impacted materials on the western and southern boundaries of the site.

Coffey notes that groundwater has not been assessed for beneficial use. Any future groundwater abstraction would require assessment of the groundwater resource and approval from the NSW Office of Water.

We draw your attention to the attached sheet entitled "Important Information about your Coffey Environmental Site Assessment" which must be read in conjunction with this report.

1 INTRODUCTION

Coffey Environments Australia Pty Ltd (Coffey) was commissioned by Jemena Asset Management (Jemena) to prepare a site validation report (SVR) for the property at the corner of Durham Street and Grand Avenue, Rosehill, NSW (the site).

This report was commissioned by Mr Matthew Berry (Commercial Manager, Major Projects) on behalf of Jemena, in response to Coffey's proposal dated 28 March 2011 (ref: ENVIRHOD01225AA-P01).

The site is owned by Shell and leased by Jemena. It was previously a portion of the broader Clyde Shell Refinery site. Jemena was proposing to to re-develop the site, including construct a recycled water facility, following remediation and management of asbestos and PAH contaminated soil present on site. The remediation and management was undertaken as a part of the construction of the recycled water facility.

1.1 Objective

The objective of this SVR is to assess the suitability of the site for commercial / industrial land use, following remediation works undertaken at the site.

1.2 Scope of Work

The scope of works undertaken in preparing this SVR included:

- project planning and management;
- desktop review;
- a review of available historical contamination assessment reports for the site;
- site walkover;
- preparation of a summary of the site identification, history and condition as well as the surrounding environment;
- fieldwork, including remediation activity observations and validation soil sampling;
- laboratory analysis; and
- data assessment and reporting.

2 SITE SUMMARY

2.1 Site Identification

The site to which this assessment applies is the property located at the corner of Durham Street and Grand Avenue, Rosehill, NSW. The site is registered as part of Lot 1 in DP109739.

The site covers an area of approximately 2,360m².

A site location plan is provided in Figure 1. A site layout plan is provided in Figure 2.

2.2 Site History

The following history summary is based on information provided in the ERM report (2008).

The refinery adjacent to the site was built during the 1920s and has operated as a fuel refinery by Shell since 1928. Shell purchased the property in 1964. Specific historical land use information for the subject site was not reported in ERM (2008). However, ERM (2008) did note that no information was available that indicated that the site was used for petroleum storage. ERM (2008) also reported that there was a decommissioned tank storage area 10m to the east of their investigation area, which included the site and land to the north.

2.3 Regional Geology & Soils

The 1:100,000 Sydney Geological Series Sheet (9130) indicates that the site is underlain by man-made fill overlying Tertiary-aged estuarine sand, clay and peat.

ERM (2008) reported that the Shell refinery is located within an area of reclaimed floodplain and that the site comprises fill consisting of silty loam, gravelly clay, silty gravel and some sand to depths up to 0.8m bgs, overlying alluvial clay. Some anthropogenic material including ash and suspected asbestos containing material (ACM) was also identified in the fill material encountered on-site.

2.4 Regional Hydrogeology

Based on the site conditions described in Section 2.5, it is anticipated that groundwater underlying the site would flow generally in a northerly direction towards Parramatta River.

ERM (2008) reported that a shallow unconfined water bearing zone is present within the fill material underlying the site at depths between 1m and 2m bgs. A semi-confined water bearing zone is located within the gravelly clays at depths between 4m and 8m bgs.

A review of the 1:2,000,000 *Groundwater in New South Wales Assessment of Pollution Risk* map indicates that groundwater underlying the site is expected to have a salinity of between 0-1,000mg/L which suggests that beneficial uses for groundwater include stock watering, domestic purposes and some irrigation uses.

ERM (2008) reported that one groundwater monitoring well is located just outside the northern boundary of the site and was installed by Groundwater Technology in 1991. No groundwater data from this well was available at the time of preparation of this RAP.

Based on information reported in Coffey Geotechnics (2010), it is understood that groundwater lies at depths between about 2m-3m bgs.

2.5 Regional Topography & Drainage

The site is a relatively level parcel of land located at an elevation of between 0-10m Australian Height Datum (AHD) (1:25,000 Parramatta Topographic Map (9130-3-N).

The site is located approximately 260m south of Parramatta River which flows in a broadly easterly direction, eventually discharging into Sydney Harbour.

Duck River, a tributary of Parramatta River, is located approximately 980m to the southeast of the site. Duck River discharges into Parramatta River approximately 1km to the east of the site.

2.6 Acid Sulphate Soils

NSW Department of Land and Water Conservation 1997, 'Prospect/Parramatta River Acid Sulfate Risk Map – Edition Two' indicates that the site is located on an area of disturbed terrain that may include filled areas, which often occur during reclamation of low lying swamps for urban development. Other disturbed terrain includes areas which have been mined or dredged, or have undergone heavy ground disturbance through general urban development or construction of dams or levees.

ERM (2008) reported that the results of samples analysed indicated that potential acid sulphate soils (PASS) and acid sulphate soils (ASS) did not warrant further assessment on this site.

2.7 Adjacent Land Uses

Potential sensitive receptors nearby to the site (with respect to contamination on the site) are presented in Table 2.7

Direction	Adjacent Land Uses	
North	Commercial / industrial land users adjacent to the site	
	Parramatta River freshwater aquatic ecosystem	
East	Commercial / industrial land users adjacent to the site	
West	Commercial / industrial land users adjacent to the site	
South	Commercial / industrial land users adjacent to the site	

Table 2.7 Potential Nearby Sensitive Receptors

3 PREVIOUS CONTAMINATION ASSESSMENT

A number of contamination assessment reports were previously undertaken for the site, including:

- ERM 2008, 'Environmental Site Assessment, Rosehill Recycled Water Scheme (Alinta Site Lease), Clyde Refinery', dated 3 July 2008, ref: 0084527 Final.
- Coffey Environments 2010a, 'Remediation Action Plan, Rosehill Recycled Water Scheme, Durham Street, Rosehill NSW', dated 21 May 2010, ref: ENVIRHOD01012AA-R02.
- Coffey Environments 2010b, 'Waste Classification of Material proposed to be Excavated from Shell Clyde Refinery, Durham Street, Rosehill', dated 28 October 2010, ref: ENAURHOD04047AA-L01.
- Coffey Environments 2010c, 'Occupational Health and Safety (OH&S) Advice Shell Clyde Refinery, Durham Street, Rosehill', dated 1 November 2010, ref: ENAURHOD04047AA-L02.
- Coffey Environments 2011a, 'Revised Remedial Action Plan, Rosehill Recycled Water Scheme, Cnr Durham Street and Grand Avenue, Rosehill NSW', dated 20 April 2011, ref: ENVIRHOD01225AA-R01.

3.1 ERM (2008)

ERM was engaged to

- identify all past and present potentially contaminating activities;
- identify potential contamination types;
- discuss the site condition;
- provide a preliminary assessment of site contamination; and
- assess the need for further investigation.

ERM reported the presence of asbestos fibres and concentrations of benzo(a)pyrene, in the fill material, exceeding the adopted human health assessment criteria for commercial/industrial land use. Based on this, the report identified a potential risk of harm to human health for personnel involved in subsurface excavation works.

As the proposed water recycling plant was to be unmanned and limited excavation was to be involved during construction works, it was further concluded that the site was considered suitable for the proposed development where appropriate management plans were implemented for subsurface work at the site.

ERM also reported that, for the purposes of waste classification, fill soils containing asbestos waste would be classified as 'Special Waste'. ERM also reported that fill soils in some areas would also classify as Restricted Solid Waste, while remaining fill soils would classify as General Solid Waste.

3.2 Coffey Environments (2010a)

The objective of Coffey Environments (2010a) was to develop a remediation strategy and validation plan to render the site suitable for the proposed commercial/industrial land use.

Following a review of the available remediation options, Coffey's recommendation for remediation of the site is on-site capping of the impacted soils using a physical barrier to protect human health.

Based on the nature of the proposed development, it is considered likely that it would be necessary to install a concrete slab across the site area as a platform for construction works and an asphalt or concrete pavement across the access roadway and parking areas in the western part of the site. Capping is also required in proposed unsealed landscaped areas in the western area of the site where contamination has been identified but the proposed development will not entail constructing a concrete slab or an asphalt pavement.

3.3 Coffey Environments (2010b)

The objective of Coffey Environments (2010b) was to provide a waste classification for soils that were to be excavated and disposed off site.

Coffey reported that:

- the fill material on the site (to a depth of 0.8m below ground level) classified as General Solid Waste to be managed as Asbestos Waste
- the natural fine grained sandy clays greater then 0.1m below the fill material classified as Virgin Excavated Natural Material (VENM).

3.4 Coffey Environments (2010c)

The objective of Coffey Environments (2010c) was to assess potential risks to construction workers at the site, arising from identified soil contamination and to outline the appropriate OH&S monitoring and management requirements including personal protective equipment (PPE) to be used during construction works.

Advice was provided on requirements for site establishment, onsite management of asbestos impacted fill material, airborne fibre monitoring, decontamination of plant and equipment, dust management, training and review.

3.5 Coffey Environments (2011a)

The objective of Coffey Environments (2011a) was to prepare a remedial action plan (RAP) to address previously identified benzo(a)pyrene and asbestos in soil contamination on the site.

The remediation goal was to remediate asbestos and benzo(a)pyrene impacted soils at the site to a level that would render the site suitable for commercial / industrial land use.

The preferred remedial option was excavation and off-site disposal of material that does not comply with the adopted remediation acceptance criteria (RAC).

4 REMEDIATION STRATEGY

4.1 Remediation Goal

The goal was to remediate asbestos and benzo(a)pyrene impacted soils at the site to a level that will render the site suitable for commercial / industrial land use.

Management of groundwater has been excluded from the objective and scope of this Site Validation Report.

4.2 Key Stakeholders

The stakeholders directly involved in the remediation project are listed in Table 4.2.

Table 4.2 Remediation Project Stakeholders

Role	Organisation
Site Owner	Shell
Site Lessee	AquaNet
Client Project Manager	Jemena Asset Management
Environmental Consultant	Coffey Environments
Remediation Contractor	CLM Infrastructure
Planning Authority	NSW Department of Planning

4.3 Remediation Acceptance Criteria

To assist with assessing whether the remediation goal has been achieved, Remediation Acceptance criteria (RAC) were adopted. These RAC were developed using the following guidance documents:

- enHealth 2005, 'Management of asbestos in the non-occupational environment', ISBN 0 642 82696X.
- National Environment Protection Council (NEPC) 1999, Schedule B(1) Guideline on Investigation Levels for Soil and Groundwater, National Environment Protection (Assessment of Site Contamination) Measure (NEPM), ISBN 0 642 32312 7.
- NSW DEC 2006, Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd Edition)', ISBN 1 74137 859 1.
- Western Australian (WA) Department of Health (DOH) 2009, 'Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia', dated May 2009.

Selection of criteria is discussed in the following sections and values for RAC are listed in Table 4.3 at the end of this section.

4.3.1 Human Health Criteria

4.3.1.1 PAH (including benzo(a)pyrene)

The NSW EPA endorsed assessment criteria for assessment of soil analytical results for PAHs are listed in Appendix II of NSW DEC (2006) and are based on guidance provided in NEPC (1999). These guidelines present a range of Health-Based Soil Investigation Levels (HILs) for soils which are considered to be appropriate for four broad classes of land use on urban sites in NSW.

Given the intended ongoing use of the site for commercial / industrial activities, the adopted assessment criteria for the Site are those for commercial / industrial land use (Column 4 in Appendix II of NSW DEC (2006)).

4.3.1.2 Asbestos

There are currently no national or NSW DECCW endorsed guidelines relating to human health or environmental assessment of material containing asbestos on sites. NSW DEC (2006) requires that auditors exercise their "professional judgement when assessing whether a site is suitable for a specific use in light of evidence that asbestos may be a contaminant of concern". In enHealth (2005), guidance is provided on the assessment and management of asbestos in soil which recommends that where fragments of asbestos cement are found, the type of asbestos present will be confirmed by microscopy and that the whole area where fragments are located will be regarded as contaminated and action taken. The enHealth (2005) guidelines also state that, dependant on where fragments are located and the proportion of fragments present, it may not be necessary to measure the actual concentration present, however, in New Zealand and Western Australia, a guideline of an average of 0.001% asbestos fibres by weight in soil (friable) and 0.01% asbestos fibres by weight in asbestos containing materials has been applied.

The laboratory method for analysis of asbestos in bulk materials is based on AS 4964-2004. Consequently, a practical quantification limit equal to or less than 0.001% by weight is not adopted and the limit is 0.1 g/kg (equivalent to 0.01% w/w). For the purposes of this project, an RAC of "no asbestos fibres in soil and asbestos containing materials less than 0.01% (0.1g/kg)" was adopted .

4.3.2 Aesthetic Criteria

The decision making process in Appendix I of NSW DEC (2006) requires that aesthetic issues, including the generation of odours from the site (as a result of contamination), are considered.

It is noted that NSW DEC (2006) does not require soil discolouration to be considered on commercial or industrial sites.

It is noted that Section 3.5 of NEPC (1999a) requires that "soils should not be discoloured, malodorous (including when dug over or wet) nor of abnormal consistency", and that "the natural state of the soil should considered". Subsequently, the following RAC have been adopted when considering aesthetic contamination of soils:

• no odours observable in soils after remediation, taking into consideration the natural state of the soil.

4.3.3 Ecological Criteria

The provisional phytotoxicity based investigation levels (PILs) provided in NSW DEC (2006) relate to the protection of plants, and are designed to be applied as single number criteria indicative of environmental effect. Their use has significant limitations because phytotoxicity depends on soil and species parameters in ways that are not fully understood. They are intended for use as a screening guide and may be assumed to apply to sandy loam soils or soils of a closely similar texture for pH 6-8.

The "Decision-making Process" listed in NSW DEC (2006) for assessing urban redevelopment sites stipulates that PILs need to be considered on sites used for residential purposes, parks, recreational open space and schools. As the land use proposed for the site is commercial / industrial, it is considered that PILs do not need to be adopted for this site.

Table 4.3 RAC Summary

Contaminant	Human Health RAC (mg/kg)	
Benzo(a)pyrene	5	
PAH	100	
Asbestos	no asbestos fibres in soil and asbestos containing materials less than 0.01% (0.1g/kg)	
Aesthetics	no odours observable in soils after remediation, taking into consideration the natural state of the soil	

4.4 Location and Extent of Remediation Required

Based on the available data for the site, Table 4.4 lists the minimum extent of remediation that was assessing as being required for the site. The horizontal and vertical extent of contamination was further delineated during excavation works as sub-surface soils are exposed. Visual indicators of fill material included the presence of anthropogenic material, including fragments of potential asbestos containing material, ash and charcoal materials, in the soils.

Table 4.4 Location and Extent of Remediation Required

Contamination	Location	Approximate Extent
---------------	----------	--------------------

Contamination	Location	Approximate Extent
PAH and asbestos impacted fill soils	On site	All fill material to the horizontal boundaries of the site, with the exception of areas along the western and southern boundaries which will be retained to support existing site infrastructure (fence footings and stormwater drainage). All fill material to its vertical extent (a nominal 0.8m below ground surface).

4.5 Adopted Remediation Option

A review of options was reported in Coffey Environments (2011a) and the remediation option adopted for the site was excavation and off-site disposal of material that did not comply with the adopted RAC.

5 REMEDIATION

The sequence of works undertaken for the remediation activity is presented in Sections 5.1 to 5.6. Remediation works commenced in March 2011 and were generally completed in May 2011. Additional onsite contamination management works (capping layer) were generally completed in May 2012.

5.1 Preliminaries

A project approval was issued by the NSW Department of Planning on 1 June 2009 under Section 75J of the Environmental Planning and Assessment Act 1979 (ref: 07_0121).

Work Site Permits for friable asbestos removal works were obtained by:

- ATS Australasian Technical Services Pty Ltd; and
- Australian Asbestos & Industrial Services Pty Ltd.

Copies of permit documentation are presented in Appendix A.

5.2 Site Establishment

Site establishment works included setting out of site boundaries, placement of shade cloth on perimeter fencing and posting of signage on perimeter fencing (refer Image 5.2.1).



Image 5.2.1 Site establishment, south west corner

5.3 Excavation

Fill soils across the site were excavated and removed by CLM. Fill soils were excavated using hydraulic excavation equipment.

Where validation activities (i.e. visual, olfactory or lab analysis) indicated the potential for contamination to be present above the RAC, additional excavation works were undertaken in these areas.

The horizontal extent of excavation across the site included removal of fill material to the northern and eastern limits of the site boundary (refer Image 5.3.1 to 5.3.2).



Image 5.3.1 Northern extent of excavation, exposing natural soils



Image 5.3.2 Eastern extent of excavation, exposing natural soils

The horizontal extent of excavation towards the west was to the site boundary in some areas and to within a 1m to 2m radius in the vicinity of aboveground structures on the site, which included footings for boundary fence stay footings, a light pole and fire water main infrastructure (refer Image 5.3.3 to 5.3.4.



Image 5.3.3 Western extent of excavation (fence stays footings and light pole)



Image 5.3.4 Western extent of excavation (fire water main infrastructure)

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The horizontal extent of excavation towards the south was to the site boundary in some areas and to within approximately 1m to 2m of the boundary in the vicinity of aboveground structures on the site, which included a security camera pole, a concrete driveway and a concrete slab overlying storm water infrastructure (refer Image 5.3.5 to 5.3.6).



Image 5.3.5 Southern extent of excavation (security camera pole)



Image 5.3.6 Southern extent of excavation (retained concrete slab and driveway)

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The horizontal extent of fill excavation and locations of retained fill are presented in Figure 3

The vertical extent of broad excavation works across the site appeared to be generally to a depth of between 0.6m and 0.9m below surrounding ground level, with the exception of retained fill areas on the western and southern boundaries. Retained fill on the western boundary was excavated to a depth of between 0.2 and 0.3m below surrounding ground surface. Retained fill on the southern boundary was not excavated due to the presence of a concrete slab and concrete driveway.

The general depths of the final excavation are presented in Figure 4.

Excavated fill soils were placed in trucks for transport off the site. Given the vertical and horizontal extent of excavation works observed by Coffey on the site, it is considered likely that approximately 3,000 to 4,000T of soil would have been removed from the site during remediation. Material tracking documentation provided by CLM indicates that 547.9 tonnes of soil was removed from the site and disposed to the Envirogaurd landfill in Erskine Park. A copy of this documentation is presented in Appendix B. Coffey understands that the transport and disposal of the majority of soil from the site (and the associated documentation) was placed under investigation by regulatory authorities.

5.4 Onsite Containment

Fill material retained on the eastern and southern boundaries was reported to contain asbestos fibres and elevated concentrations of PAH (including benzo(a)pyrene). Coffey understands that excavation of this material was not practical, given the presence of above and below ground infrastructure in these areas.

Subsequently, the remediation contingency plan in Coffey Environments (2011a) was generally implemented, with some amendment, to manage the potential risk to human health presented by the presence of asbestos and PAH.

5.4.1 Marker Layer

An orange geotextile marker layer was placed over the retained fill, with the exception of surfaces already covered with concrete slab (i.e. along southern boundary). At these locations, the marker layer placement was limited to the excavated walls of the retained fill. It was noted that the horizontal extent of the marker layer extended along the entire length of the western boundary (including those areas where excavation works had extended to the site boundary), to facilitate installation of the layer. The marker layer was a high visibility (orange) geotextile, selected because it allows infiltration of moisture and is not susceptible to biodegradation. A specification sheet for the geotextile selected for the marker layer, is presented in Appendix C. Images 5.4.1 to 5.4.6 show the installation of the marker layer.

Site Validation Report Corner Durham Street and Grand Avenue Rosehill NSW 2142



Image 5.4.1 Marker layer - north western corner



Image 5.4.2 Marker layer – western boundary

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Image 5.4.3 Marker layer – western boundary (light pole)



Image 5.4.4 Marker layer – western boundary (fire water main)

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Image 5.4.5 Marker layer – south western corner



Image 5.4.6 Marker layer – southern boundary

5.4.2 Capping Layer

Imported material (VENM) was placed against the walls of the retained fill material to retain the marker layer in place and facilitate backfilling of the remedial excavation (refer Images 5.4.7 to 5.4.11).

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Image 5.4.7 Western boundary – backfill against marker layer



Image 5.4.8 Western boundary – backfill against marker layer

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Image 5.4.9 Southern boundary – backfill against marker layer



Image 5.4.10 Southern boundary – backfill against marker layer

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Image 5.4.11 South west corner – backfill against marker layer

A concrete capping layer of 100mm minimum thickness (advice from Haley Short of Jemena Major Projects) was placed over the horizontal exposed surfaces of the retained fill material along the western boundary and south west corner of the site. A concrete slab (already in-situ) was located across the top of the retained fill material along the southern boundary (including along the existing gate entry, refer Image 5.4.10). Portions of the in-situ slab along the southern boundary were topped with asphalt, (eastern end and along the existing gate entry).

The capping layer had been labelled at regular intervals, using spray paint and a "CAPPING LAYER" stencil.

Evidence of the capping layer is presented in Images 5.4.12 to 5.4.11).

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Image 5.4.12 South western boundary looking north – capping layer over retained fill material



Image 5.4.13 North western boundary looking north - capping layer over retained fill material

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Image 5.4.14 North western boundary looking south - capping layer over retained fill material



Image 5.4.15 South west boundary looking south - capping layer over retained fill material

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Image 5.4.16 Southern boundary looking east – capping layer over retained fill material



Image 5.4.17 Southern boundary looking west – capping layer over retained fill material

Site Validation Report Corner Durham Street and Grand Avenue Rosehill NSW 2142



Image 5.4.18 Example of capping layer labelling

The locations of the capping layer over retained fill material are presented in Figure 5

5.5 Validation

Following excavation works, validation of residual soils was undertaken by Coffey. The validation strategy implemented is discussed in Section 6.

5.6 Backfilling

At the completion of validation activities, the excavation was backfilled with imported material, consisting of blue-grey weathered shale. The imported material was sourced from Brandown Quarry, Lot 90 Elizabeth Drive, Kemps Creek NSW (the source site). The material was classified as Virgin Excavated Natural Material (VENM) in Coffey Environments (2011b) and a copy of the VENM classification is presented in Appendix B.

A Coffey environmental scientist observed the material being imported to the site on 9 May 2011 and the material was consistent with the material reported in Coffey Environments (2011b) (refer Image 5.6.1 to 5.6.4).

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Image 5.6.1 Imported VENM on site - looking north



Image 5.6.2 Imported VENM on site - looking south

Site Validation Report Corner Durham Street and Grand Avenue Rosehill NSW 2142



Image 5.6.3 Imported VENM on site - stockpile



Image 5.6.4 Imported VENM on site - stockpile

Based on the remediation contractor's VENM tracking records, 3,291.72 tonnes of VENM was imported and spread across the Site. Coffey understands the placed material was compacted to a depth of approximately 0.2m below surrounding ground level.

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A copy of the VENM tracking record is presented in Appendix B.

6 VALIDATION STRATEGY

The validation strategy adopted for the Site was based on the strategy presented in Coffey Environments (2010). A summary of the strategy implemented on the Site is presented in Section 6.1 to 6.4.

6.1 Soil Sampling

Soil samples were collected by scooping directly (grab sample) into laboratory prepared containers or zip lock plastic bags, using a fresh pair of nitrile gloves for each sample. The soil sample was lightly packed into the laboratory prepared container with headspace minimised to avoid the loss of volatiles. The containers and bags were labelled with a project number, sample location, sample depth (where applicable) and the date the sample was collected.

Where soil excavation works extended to the boundary of the Site, samples of the excavation wall in those areas were generally not collected.

Composite sampling methods were not used.

Disposable sampling equipment was used between sampling events to minimise the possibility of cross contamination between samples and minimise the risk of impacting sample integrity.

Sample storage and preservation was undertaken in accordance with Table 6.1.

Analyte Sample Volume and Container		Sample Preservative	Storage / Transport
PAH	1 x 250ml glass & Teflon lined lid	Nil	Cool to 4°C
Asbestos	1 x zip lock bag	Nil	Nil

Table 6.1 Sample Preservation and Storage

The sample containers were transported to the NATA accredited analytical laboratory with the Chain of Custody form recording the following information:

- project reference;
- date of sampling;
- sample identification;
- matrix and container details
- preservation method;
- name of sampler;
- required analysis;
- turnaround times required; and
- signatures of sender and receiving laboratory.

A copy of the Chain of Custody was kept in the project file. Samples were transported to the laboratory with sufficient time to perform analysis within the applicable holding period.
Intra and inter laboratory field duplicates were collected on an average frequency of 10% and 20% respectively. Duplicates were collected by splitting the sample between sample containers. The sample was not homogenised or mixed prior to splitting, to minimise the potential for loss of volatiles. Duplicates for asbestos analysis were not collected.

As disposable sampling equipment was used (i.e. nitrile gloves), rinsate samples were not collected.

As volatiles were not a contaminant of concern, trip blanks and trip spikes not used.

6.2 Laboratory Analytical Schedule

The validation samples were analysed in accordance with the analytical schedule presented in Table 6.2.

Table 6.2 Sample Analytical Schedule

Analyte	Quantity of Primary Samples Analysed
РАН	29
Asbestos	35

6.3 Marker and Capping Layers

Observations were made of:

- the marker layer placement, including general coverage and overlap; and
- the thickness of concrete slab capping layers.

6.4 Aesthetics and Odour

Observations were made to assess the potential for odours to be present in residual soils, taking into consideration the natural state of the soil. The potential for odours to be present was assessed using olfactory methods.

7 RESULTS

7.1 Fieldwork

7.1.1 Soils

Observations made during the validation soil sampling program indicated that residual soils on the site were generally comprised of natural clays.

Validation samples of the natural insitu soils (underlying the fill that was excavated for remediation of the site) were collected at the sampling points presented in Figure 4 and Figure 5. A register of the samples collected, description and odour observations, is presented in Table 7.1.1 and 7.1.2.

Sample ID	Sample Description	Depth (m) below original ground surface	Odour
V01	Clay, brown/orange, ironstone fragments	0.8	Not detected
V02	Clay, brown/grey	0.9	Not detected
V03	Clay, brown	0.8	Not detected
V04	Clay, brown	0.8	Not detected
V05	Clay, brown	0.8	Not detected
V06	Clay, brown	0.9	Not detected
V07	Clay, brown	0.9	Not detected
V08	Clay, brown/orange	0.8	Not detected
V09	Clay, brown/grey	0.8	Not detected
V10	Clay, grey/brown	0.8	Not detected
V11	Clay, brown/orange	0.8	Not detected
V12	Clay, brown/orange	0.8	Not detected
V13	Clay, orange/brown	0.6	Not detected

Table 7.1.1 Sample Register (Round 1)

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Sample ID	Sample Description	Depth (m) below original ground surface	Odour
V14	Clay, brown/orange	0.6	Not detected
V15	Clay, brown	0.6	Not detected
V16	Fill, brown/grey clays and sands, rock fragments	0.2-0.4	Not detected
V17	Fill, brown/grey clays and sands, rock fragments	0.3-0.5	Not detected
V18	Fill, brown/grey clays and sands, rock fragments, trace ash	0.2-0.4	Not detected
V19	Fill, brown/grey clays and sands, rock fragments, trace glass and ash	0.2-0.5	Not detected
V20	Fill, brown/grey clays and sands, rock fragments, trace and ash	0.2-0.5	Not detected
V21	Fill, brown/grey clays and sands, rock fragments, trace metal and glass	0.3-0.5	Not detected
V22	Fill, brown/grey clays and sands, rock fragments	0.2-0.4	Not detected
V23	Fill, brown/grey clays and sands, rock fragments, ash	0.1-0.3	Not detected
V24	Fill, brown/grey clays and sands, rock fragments, ash, organics	0.2-0.4	Not detected
V25	Fill, brown/grey clays and sands, rock fragments, tile fragments, concrete fragments	0.1-0.3	Not detected
V26	Fill, gravels, sands, rock fragments	0.4-0.5	Not detected
V27	Fill, gravels, silt, rock fragments, concrete fragments	0.4-0.5	Not detected
V28	Fill, brown/grey clays, rock fragments, sands, silt	0.3-0.4	Not detected
V29	Fill, brown/grey clayey sand, shale fragments, gravels, rock fragments	0.2-0.3	Not detected

Following detection of asbestos in soil samples collected at locations V14 and V15, further excavation was undertaken in this area to remove residual fill soils. This area was subsequently validated with soil sampling. Details of this sampling are presented in Table 7.1.2.

Sample ID	Sample Description		Staining / Odour
V30	Clay, brown/grey, some red/orange mottling, trace organics	0.9	Not detected
V31	Clay, brown/grey, some red/orange mottling, trace organics	0.9	Not detected
V32	Clay, brown/grey, some red/orange mottling, trace organics	0.9	Not detected
V33	Clay, brown/grey, some red/orange mottling, trace organics	0.9	Not detected
V34	Clay, brown/grey, some red/orange mottling, trace organics	0.9	Not detected
V35	Clay, brown/grey, some red/orange mottling, trace organics	0.5	Not detected

Table 7.1.2 Sample Register (Round 2)

7.1.2 Odour

Observations made by Coffey during the remediation activity at each of the soil validation sampling points, indicated that odours (using olfactory assessment methods) were not present in soils retained insitu (following the excavation of contaminated fill).

7.2 Laboratory

Soil laboratory analytical results are presented in the attached Table LR1. Copies of the laboratory certificates of analysis are presented in Appendix F. A summary of the laboratory results is presented in Sections 7.2.1 and 7.2.2.

7.2.1 Polycyclic Aromatic Hydrocarbons

The detected concentrations of PAH, including benzo(a)pyrene in the samples analysed were generally below the adopted RAC, with the exception of two samples.

Sample V19/0.2-0.5 collected from the central portion of the western wall of the excavation in fill material around a retained light pole, reported a benzo(a)pyrene concentration of 6.3mg/kg which exceeds the adopted RAC of 5mg/kg.

Sample V22/0.2-0.4 collected from the southern portion of the western wall of the excavation in fill material around retained fire water services, reported a benzo(a)pyrene concentration of 20mg/kg and PAH concentration of 240mg/kg, which exceeds the adopted RAC of 5mg/kg and 100mg/kg respectively.

7.2.2 Asbestos

The presence of asbestos in the samples analysed was generally below the adopted RAC, with the exception of ten samples.

Sample V14/0.6 and V15/0.6 collected from the southern central portion of the site in the base of the excavation, reported the presence of asbestos.

No asbestos was detected in samples V30 to V35 (Round 2) collected from the southern central portion of the site in the base of the excavation, following a further excavation of 0.3m in the vicinity of sampling points V14 and V15 (previously reporting asbestos).

Samples V16/0.2-0.4, V18/0.2-0.4, V19/0.2-0.5, V20/0.2-0.5, V21/0.3-0.5, V22/0.2-0.4, V23/0.1-0.3 and V24/0.2-0.4, collected from the western wall of the excavation in retained fill material, reported the presence of asbestos.

7.3 Marker and Capping Layer

A Coffey environmental scientist attended the site on 6 May 2011 and observed that:

- the marker layer had been placed to cover the retained fill and generally 0.5m beyond the retained fill, where practical; and
- parallel sheets of marker layer were overlapped generally by 0.2m.

A Coffey environmental scientist attended the site on 4 May 2012 and observed that:

- the thickness of the concrete slab capping layer on the western boundary and south west corner of the site was approximately 150mm thick (advised by Haley Short, Jemena Major Projects); and
- the thickness of the concrete slab capping layer on the southern boundary ranged between 0.15m and 0.45m thick.

8 DATA QUALITY RELIABILITY ASSESSMENT

8.1 Historical Data and Information

The following sources of historical data and information were considered for the purposes of preparing this SVR:

- Coffey Environments 2010a
- Coffey Environments 2010b
- Coffey Environments 2010c
- Coffey Environments 2011a
- Coffey Environments 2011b
- Jemena Asset Management;
- NSW OEH; and
- discussion with Jemena representatives.

The discussions held with Jemena representatives and observations made during the site walkover were generally consistent with the information contained in the contamination assessment reports and third party field data.

The data assessed was considered to be generally representative of the site conditions and suitable for the purpose of preparing this SVR.

8.2 Fieldwork Data

8.2.1 Sampling

Sampling was undertaken in general accordance with

- The sampling, analytical and quality plan (SAQP) presented in Coffey Environments (2011a); and
- Coffey standard operating procedures (SOP), which are based on accepted industry practices.

Soil sampling was undertaken by two different Coffey environmental scientists. As Coffey SOPs were used by both scientists during the sampling event, and both scientists are experienced in the sampling task, this is not considered to affect the reliability of the data.

8.2.2 Sample Storage and Transport

Samples were stored in insulated containers with ice and transported under chain of custody protocols.

8.2.3 Field Intra and Inter Laboratory Duplicates

The primary soil sample to duplicate soil sample analysis ratio was 10.3% (acceptance criteria of 10%). The primary soil sample to triplicate soil sample analysis ratio was 10.3% (acceptance criteria of 5%).

Details of duplicates and analysis are presented in Table 8.2.3.

Table 8.2.3 Field Intra and Inter Laboratory Duplicate

Date	Parent Sample ID	Intra- laboratory Duplicate Sample ID	Intra- laboratory Duplicate Analysed	Inter- laboratory Duplicate Sample ID	Inter- laboratory Duplicate Analysed
01/04/11	V01/0.8	QC1	Yes	QC1A	Yes
19/04/11	V05/0.8	QC2	Yes	QC2A	Yes
19/04/11	V07/0.9	QC3	No	QC3A	No
19/04/11	V10/0.8	QC4	Yes	QC4A	Yes

The relative percent difference (RPD) between the parent samples, duplicates and triplicates analysed for soils were within the acceptance limits.

The RPD calculations are presented in the attached Table LR2.

8.3 Laboratory Data

An assessment of laboratory data quality was undertaken. The results of this assessment indicated the following:

- laboratory analysis of samples was undertaken by NATA accredited environmental testing laboratories;
- samples were analysed within holding times;
- laboratory blanks were below the laboratory LOR;
- relative percentage differences (RPD) between samples and laboratory duplicates, were within acceptance limits;
- surrogate recovery was within acceptance limits;
- laboratory control sample errors were reported as being within acceptance limits;
- certified reference material errors were reported as being within acceptance limits;
- matrix spike recoveries were within acceptance limits; and
- the laboratory limits of reporting (LOR) were below the adopted assessment criteria.

8.4 Data Quality Assessment

Based on an assessment of the quality of historical data, field data and laboratory data, Coffey considers the data quality objectives (DQO) have been addressed and that the data assessed is

- generally accurate, reliable and suitable for interpretative purposes; and
- reasonably representative of the conditions at the sampling locations at the time of sampling.

9 DISCUSSION

Soils not complying with the adopted RAC were excavated across much of the Site. The results of the laboratory analysis undertaken on the validation samples collected from the base of the excavation indicated that PAH and asbestos impacted soils had been successfully remediated.

The results of the laboratory analysis undertaken on the validation samples collected from the retained fill on the western and southern walls of the excavation, indicated that PAH and asbestos impacted soils had not been successfully remediated during remediation works.

The PAH and asbestos impacted soils retained along the southern boundary of the site were retained beneath a capping layer (comprised of a concrete slab). These impacted soils were retained beneath a marker layer (comprised of an orange geotextile marker layer) and a capping layer (comprised of a concrete slab).

No further assessment or remediation of soil contamination on the site is considered warranted.

10 CONCLUSIONS

Based on a review of available desktop data, observations made during the remediation activity and assessment of laboratory analytical data, Coffey concludes that:

- the PAH and asbestos impacted materials have been remediated by a combination of excavation and offsite disposal, and containment beneath a concrete slab (with portions of the concrete slab across the southern boundary also topped with asphalt). Given the presence of the capping layer across these contained soils, the contained contaminated soil is assessed as not presenting an unacceptable risk to human health or the environment;
- the remediation goal has been achieved; and
- the site is considered suitable for commercial / industrial land use, subject to the implementation of an environmental management plan (EMP), which addresses maintenance of the containment of the PAH and asbestos impacted materials on the western and southern boundaries of the site.

Coffey notes that groundwater had not been assessed for beneficial use. Any future groundwater abstraction would require assessment of the groundwater resource and approval from the NSW Office of Water.

We draw your attention to the attached sheet entitled "Important Information about your Coffey Environmental Site Assessment" which must be read in conjunction with this report.

11 LIMITATIONS

No visual observations or sampling and analysis can assess the quality of soil at every point. The findings contained in this report are the result of discrete/specific methodologies used in accordance with industry accepted practices and standards. Coffey considers that they represent a reasonable interpretation of the general conditions of the Site. Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points.

Site suitability conclusions apply only with respect to land contamination. Coffey has not assessed other factors which may impact on site suitability.

12 BIBLIOGRAPHY

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Important information about your Coffey Environmental Report

Uncertainties as to what lies below the ground on potentially contaminated sites can lead to remediation costs blow outs, reduction in the value of the land and to delays in the redevelopment of land. These uncertainties are an inherent part of dealing with land contamination. The following notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report has been written for a specific purpose

Your report has been developed on the basis of a specific purpose as understood by Coffey and applies only to the site or area investigated. For example, the purpose of your report may be:

- To assess the environmental effects of an on-going operation.
- To provide due diligence on behalf of a property vendor.
- To provide due diligence on behalf of a property purchaser.
- To provide information related to redevelopment of the site due to a proposed change in use, for example, industrial use to a residential use.
- To assess the existing baseline environmental, and sometimes geological and hydrological conditions or constraints of a site prior to an activity which may alter the sites environmental, geological or hydrological condition.

For each purpose, a specific approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible, quantify risks that both recognised and unrecognised contamination pose to the proposed activity. Such risks may be both financial (for example, clean up costs or limitations to the site use) and physical (for example, potential health risks to users of the site or the general public).

Scope of Investigations

The work was conducted, and the report has been prepared, in response to specific instructions from the client to whom this report is addressed, within practical time and budgetary constraints, and in reliance on certain data and information made available to Coffey.

The analyses, evaluations, opinions and conclusions presented in this report are based on those instructions, requirements, data or information, and they could change if such instructions etc. are in fact inaccurate or incomplete.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man and may change with time.

For example, groundwater levels can vary with time, fill may be placed on a site and pollutants may migrate with time.

Because a report is based on conditions which existed at the time of the subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time.

Consult Coffey to be advised how time may have impacted on the project and/or on the property.

Interpretation of factual data

Environmental site assessments identify actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from indirect field measurements and sometimes other reports on the site are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions.

Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions.

For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of Coffey through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area.

This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered with redevelopment or on-going use of the site. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.



Important information about your **Coffey** Environmental Report

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. In particular, a due diligence report for a property vendor may not be suitable for satisfying the needs of a purchaser. Your report should not be applied for any purpose other than that originally specified at the time the report was issued.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other professionals who are affected by the report. Have Coffey explain the report implications to professionals affected by them and then review plans and specifications produced to see how they have incorporated the report findings.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel), field testing and laboratory evaluation of field samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Contact Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to land development and land use. It is common that not all approaches will be necessarily dealt with in your environmental site assessment report due to concepts proposed at that time. As a project progresses through planning and design toward construction and/or maintenance, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Environmental reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents.

Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

Tables

Site Validation Report Corner Durham Street and Grand Avenue Rosehill NSW 2142

confidential James Roberts Flagstaff Partners Jun 13, 2019 00:56



confidential James Roberts Flag Table LR1tners Soil Laboratory Results ENVIRHOD01225AA Site Validation Report

Field ID	V01	V02	V03	V04	V05	V06	V07	V08	V09	V10	V11	V12	V13	V14	V15	V16	V17	V18	V19
Sample Depth Range	0.8	0.9	0.8	0.8	0.8	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.6	0.6	0.6	0.2-0.4	0.3-0.5	0.2-0.4	0.2-0.5
Sampled Date Time	1/04/2011	1/04/2011	1/04/2011	1/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Matrix Description																			
SDG	SE86654	SE86654	SE86654	SE86654	SE87120														
																		-	

Method_Type	ChemName	Units	EQL	NEPM 1999 HIL F																			
PAHs in Soil	Acenaphthene	ma/ka	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Acenaphthylene	ma/ka	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.11	12
	Anthracene	ma/ka	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.23	0.21	0.24	1.6
	Benz(a)anthracene	ma/ka	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.79	0.79	0.92	10
	Benzo(a)pyrene	ma/ka	0.1	5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.7	0.79	0.63	6.3
	Benzo(b)fluoranthene	ma/ka	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1	0.9	0.8	9
	Benzo(g,h,i)perylene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.58	0.69	0.46	3.6
	Benzo(k)fluoranthene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.3	0.37	0.34	2.4
	Chrysene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.45	0.45	0.48	5.7
	Dibenz(a,h)anthracene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.11	<0.1	0.96
	Fluoranthene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.4	1.4	1.6	11
	Fluorene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.18
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.45	0.53	0.37	3.4
	Naphthalene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.34
	PAHs (Sum of total)	mg/kg	1.6	100	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<8.4	<8.69	<8.55	<70.57
	Phenanthrene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.66	0.64	0.59	3.2
	Pyrene	mg/kg	0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1.4	1.4	1.6	12

Field ID	V20	V21	V22	V23	V24	V25	V26	V27	V28	V29
Sample Depth Range	0.2-0.5	0.3-0.5	0.2-0.4	0.1-0.3	0.2-0.4	0.1-0.3	0.4-0.5	0.4-0.5	0.3-0.4	0.2-0.3
Sampled Date Time	19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Matrix Description										
SDG	SE87120									

lethod_Type Ch	hemName	Units	EQL	NEPM 1999 HIL F										
AHs in Soil Ac	cenaphthene	mg/kg	0.1		<0.1	0.14	0.62	<0.1	0.15	<0.1	0.13	<0.1	<0.1	<0.1
Ac	cenaphthylene	mg/kg	0.1		0.15	0.47	1.6	0.51	0.56	<0.1	<0.1	<0.1	<0.1	<0.1
Ar	nthracene	mg/kg	0.1		0.32	1.2	4.2	0.8	1.3	<0.1	0.45	0.28	<0.1	<0.1
Be	enz(a)anthracene	mg/kg	0.1		0.98	4.8	21	3.8	4.6	0.24	0.86	0.52	0.18	0.1
Be	enzo(a)pyrene	mg/kg	0.1	5	0.94	3.9	20	3.4	4.6	0.23	0.76	0.5	0.17	0.12
Be	enzo(b)fluoranthene	mg/kg	0.1		1.2	5.4	25	5.3	6.1	0.3	1	0.6	0.2	0.1
Be	enzo(g,h,i)perylene	mg/kg	0.1		0.78	3.6	13	3.9	4.2	0.2	0.65	0.45	0.16	0.12
Be	enzo(k)fluoranthene	mg/kg	0.1		0.41	1.4	4.4	1.5	1.6	0.11	0.26	0.21	<0.1	<0.1
Cł	hrysene	mg/kg	0.1		0.64	2.5	8.7	2	2.9	0.15	0.47	0.29	0.12	<0.1
Di	ibenz(a,h)anthracene	mg/kg	0.1		0.14	0.51	1.9	0.13	0.54	<0.1	<0.1	<0.1	<0.1	<0.1
Flu	uoranthene	mg/kg	0.1		1.9	8.5	54	6.1	10	0.53	2.5	1.4	0.28	0.21
Flu	uorene	mg/kg	0.1		<0.1	0.3	1.5	<0.1	0.29	<0.1	<0.1	0.12	<0.1	<0.1
Inc	deno(1,2,3-c,d)pyrene	mg/kg	0.1		0.62	2.8	10	3	3.2	0.15	0.48	0.33	0.12	<0.1
Na	aphthalene	mg/kg	0.1		<0.1	0.13	0.37	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
PA	AHs (Sum of total)	mg/kg	1.6	100	<11.22	48	240	<39.03	<55.34	<3.23	<10.8	<6.99	<2.34	<1.89
Ph	henanthrene	mg/kg	0.1		0.94	4.8	28	2.4	5.3	0.25	0.58	0.61	<0.1	<0.1
Pv	vrene	ma/ka	0.1		1.9	8	49	5.8	9.7	0.49	2.3	1.3	0.3	0.2



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			SDG Field_ID	SE86654 V01	SE86654 QC1	RPD	SE87120 V05	SE87120 QC2	RPD	SE87120 V10	SE87120 QC4	RPD	SE87120 V10	Interlab_D QC4A	RPD	SE87120 V05	Interlab_D QC2A	RPD	SE86654 V01	Interlab_D QC1A	RPD
			Sampled_Date-Time	1/04/2011	1/04/2011		19/04/2011	19/04/2011		19/04/2011	19/04/2011		19/04/2011	19/04/2011		19/04/2011	19/04/2011		1/04/2011	1/04/2011	
lethod_Type	ChemName	Units	EQL																		
loisture	Moisture	%	1	24.0	25.0	4	29.0	29.0	0	9.0	10.0	11	9.0			29.0			24.0		
AHs in Soil	Acenaphthene	mg/kg	0.1 (Primary): 0.5 (Inter	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.5	0	<0.1	<0.5	0	<0.1	<0.5	0
	Acenaphthylene	mg/kg	0.1 (Primary): 0.5 (Inter	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.5	0	<0.1	<0.5	0	<0.1	<0.5	0
	Anthracene	mg/kg	0.1 (Primary): 0.5 (Inter	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.5	0	<0.1	<0.5	0	< 0.1	< 0.5	0
	Benz(a)anthracene	mg/kg	0.1 (Primary): 0.5 (Inter	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.5	0	<0.1	<0.5	0	< 0.1	< 0.5	0
	Benzo(a)pyrene	mg/kg	0.1 (Primary): 0.5 (Inter	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.5	0	<0.1	<0.5	0	<0.1	< 0.5	0
	Benzo(b)fluoranthene	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1			<0.1			<0.1		
	Benzo(g,h,i)perylene	mg/kg	0.1 (Primary): 0.5 (Inter	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.5	0	<0.1	<0.5	0	<0.1	< 0.5	0
	Benzo(k)fluoranthene	mg/kg	0.1	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1			<0.1			<0.1		
	Chrysene	mg/kg	0.1 (Primary): 0.5 (Inter	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.5	0	<0.1	<0.5	0	<0.1	< 0.5	0
	Dibenz(a,h)anthracene	mg/kg	0.1 (Primary): 0.5 (Inter	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.5	0	<0.1	<0.5	0	<0.1	< 0.5	0
	Fluoranthene	mg/kg	0.1 (Primary): 0.5 (Inter	<0.1	<0.1	0	<0.1	0.14	33	<0.1	<0.1	0	<0.1	<0.5	0	<0.1	<0.5	0	<0.1	<0.5	0
	Fluorene	mg/kg	0.1 (Primary): 0.5 (Inter	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	< 0.5	0	<0.1	< 0.5	0	<0.1	< 0.5	0
	Indeno(1,2,3-c,d)pyrene	mg/kg	0.1 (Primary): 0.5 (Inter	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	< 0.5	0	<0.1	<0.5	0	<0.1	< 0.5	0
	Naphthalene	mg/kg	0.1 (Primary): 0.5 (Inter	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.5	0	<0.1	<0.5	0	<0.1	<0.5	0
	PAHs (Sum of total)	mg/kg	1.6 (Primary): 1 (Interla	<1.6	<1.6	0	<1.6	<1.67	0	<1.6	<1.6	0	<1.6	<1.0	0	<1.6	<1.0	0	<1.6	<1.0	0
	Phenanthrene	mg/kg	0.1 (Primary): 0.5 (Inter	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.1	0	<0.1	<0.5	0	<0.1	<0.5	0	<0.1	<0.5	0
	Pyrene	mg/kg	0.1 (Primary): 0.5 (Inter	<0.1	<0.1	0	<0.1	0.13	26	<0.1	<0.1	0	<0.1	<0.5	0	<0.1	<0.5	0	<0.1	< 0.5	0
	1 11 1 1																				

*RPDs have only been considered where a concentration is greater than 5 times the EQL. *High RPDs are in bold (Acceptable RPDs for each EQL multiplier range are: 100 (5-10 x EQL); 50 (10-30 x EQL); 30 (> 30 x EQL))
**Interlab Duplicates are matched on a per compound basis as methods vary between laboratories. Any methods in the row header relate to those used in the primary laboratory

Figures

Site Validation Report Corner Durham Street and Grand Avenue Rosehill NSW 2142

confidential James Roberts Flagstaff Partners Jun 13, 2019 00:56





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OD01225AA RAP

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MIRHC	PF01	318408.961	625	5932	.298					Contract of
	PF02	318402.775	625	5872	.476	10000-0	Caroland Street, or other	Statement of the local division in which the local division in which the local division in the local division		10000
	PF03	318421.190	625	5868	.376			and the product	2.5 0 5	10
- NVIKI	PF04	318440.381	625	5866	.362					
HOU	PF05	318447.391	625	5920	.752				Ch. Sectore Ch. Sectore Co.	and the second
ENVIR	PF06	318438.730	625	5929	.193				Scale (metres) 1:250	and an a
		14	F						IMAGE SOURCE: GOOGLE EARTH PRO 2011 IMAGE @: SINCLAIR KNIGHT MERZ 2011	5-14
Coffey	Environments Australia Pty	© Ltd						DRAWING SOURC	E: JEMENA ENGINEERING SERVICES, RRW-01-DWG-K-00321	
rev.	description		app.	drn	date	drawn	MV		client: JEMENA ASSET MANAGEMENT	
WV 00:/						approved	СС	coffev	project: ROSEHILL RECYCLED WATER SCHEME, SITE VALIDATION	ON REPORT
212						date	04/05/12	environments	CORNER DURHAM STREET AND GRAND AVENUE, ROS	SEHILL, NSW
. 0/0/						scale	AS SHOWN	SPECIALISTS IN ENVIRONMENTAL, SOCIAL AND SAFETY PERFORMANCE	title: SITE LAYOUT PLAN	
	_		-	-	-	original size	A3	confidential James Roberts	project no: ENVIRHOD01225AA-R03 figure no: FIGU	RE 2 rev.

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Appendix A Friable Asbestos Removal Work Permits

Site Validation Report Corner Durham Street and Grand Avenue Rosehill NSW 2142

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FOR FRIABLE ASBESTOS REMOVAL WORK

Pern	nit Number:	943R-0	00016213-01	Date of Issue	22-Mar-2011
Licence Lice	Holder Name: ence Number:	ATS Au 202389	ustralasian Technical Services I)	Pty Ltd	
Commer Estimated Con	ncement Date: npletion Date:	23-Mar 30-Jun	-2011 -2011		
Wor	k Site Details: Site Name: Site Address:	Shell R Rosehi	cosehill Cnr Durham & Grand Ave II	NSW	2142
Sprayed	Type of Work: limpet asbestos sbestos in soils		Damaged bonded asbestos Pipe lagging	Suspended ce Sound proofing	iling tiles g
Name of Sup Telephone No	o – 24 hr contact	MR 0412	Vong 563901	Chheang	
		MR 04237	Saram 792852	Меу	
		MR 04487	Borom 723449	Ту	
Note to L	icence Holders:				
Approval	granted to carry out friat	ole asbesto	s removal work as per submitted application	and the following condition	is:
1.	All work must be super NSW as one of the non when the work is being	vised by a ninated sup carried out.	person who is an employee of this company ervisors associated with the licence. The sup	y and has been registered pervisor must be on the wo	I with WorkCover orksite at all times
2.	All persons who carry o	ut licensed	work must have had the appropriate training	in friable asbestos remova	al work.
3.	RISK assessment is mo				

4. The safe work method statement is strictly followed.

5. All Department of Environment and Climate Control requirements are adhered to.

You are advised this approval in no way waives or modifies your obligations and duty of care under the NSW Occupational Health & Safety Act.

On behalf of Team Coordinator, Asbestos & Demolition Unit Occupational Health and Safety Division WorkCover NSW

On behalf of State Coordinator, Asbestos & Demolition Occupational Health and Safety Division WorkCover NSW

WorkCover. Watching out for you.

WorkCover NSW ABN 77 682 742 966 92-100 Donnison Street Gosford NSW 2250 Locked Bag 2906 Lisarow NSW 2252 WorkCover Assistance Service 13 10 50

confidential James Roberts Flagstaff Partners Jun 13, 2019 00:56

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a.	ASBPER: Applica Work Site Permi Friable Asbestos	ation for a It to Remove	Licen	ce Details	30
	00017140-01	er: 943R-	Asbest	os & Industrial Ser	an rvices Pty
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Request

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Appendix B Material Tracking Records

Site Validation Report Corner Durham Street and Grand Avenue Rosehill NSW 2142

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ENVIROGUARD PTY LTD

50 QUARRY RD ERSKINE PARK NSW 2759

ABN: 23 060 919 164

Docket List

Print Date & Time: 18/04/2011 - 8:56:31AM

Date is between 15/04/2011 and 16/04/2011 AND Customer equals CLM

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280.98

<u>Date</u>	Time	Docket	Vehicle	<u>Product</u>	Product Rate	<u>App No</u>	Order No	<u>Item Qtv</u>	<u>Tran Gross</u>	<u>Tran Tare</u>	<u>Item Net</u>
Customer:	CLM E	XCAVATIONS	P/L								
16/04/2011	10:10:43AM	EI00470114	AM38LM	ASBCONT	ABAC15	A11116	58110	100.00	44.60	15.48	29.12
16/04/2011	10:29:37AM	EI00470118	AK67VO	ASBCONT	ABAC15	A11116	58110	100.00	40.24	15.66	24.58
16/04/2011	10:42:30AM	EI00470119	AV04CF	ASBCONT	ABAC15	A11116	58110	100.00	41.94	14.96	26.98
16/04/2011	11:21:51AM	EI00470125	AM38LM	ASBCONT	ABAC15	A11116	58110	100.00	43.02	15.48	27.54
16/04/2011	11:43:47AM	EI00470130	AK67VO	ASBCONT	ABAC15	A11116	58110	100.00	38.24	15.66	22.58
16/04/2011	12:00:02PM	EI00470131	AV04CF	ASBCONT	ABAC15	A11116	58110	100.00	43.52	14.96	28.56
16/04/2011	1:44:18PM	EI00470140	AM38LM	ASBCONT	ABAC15	A11116	58110	100.00	51.66	15.48	36.18
16/04/2011	2:08:28PM	EI00470143	AK67VO	ASBCONT	ABAC15	A11116	58110	100.00	50.46	15.66	34.80
16/04/2011	2:44:14PM	EI00470145	AV04CF	ASBCONT	ABAC15	A11116	58110	100.00	47.78	14.96	32.82
16/04/2011	3:25:58PM	EI00470147	AM38LM	ASBCONT	ABAC15	A11116	58110	100.00	33.30	15.48	17.82

10 Transactions listed (10 items)

Report End

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RPT5026.002	James Roberts	Page 1 of 1
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Location:	Duri Rese	ton St, ROSCHILL Evola Site	CLM Job No.:	4933-20	Responsible Manager:	Scort Wells	
Date:	Time Out:	Waste Category: (Inert, Solid, Contaminated or Recyclable)	Quantity: (Volume or Weight)	Mode of Transport	Name of Transport Contractor	Receiving Landfill or Transfer Station	Matched to Receipt / Docket Numbe
6/4/11	9:20	SPECIAL SOLID - ASBEGTOS	24.12T 37 Aprox	TXD	PUS-AM38LM	ENUIROGNARD	E14701141
bluln	9:40	71	24587	4	"-AK67V0	11	\$247-0118/1
h	10:00	10	26.9,8+	4	"-AVOLICE	4	FI47 91
4	10.55	n	27.544	ų	PUS-AM38LM	10	E1470125 1
ч	11:20	и	22.587	10	PUS-AK6710	h	£147013011
4	11:35	4	28.56-	Le .	PVS-AVOLICE	×1.	EI4701111
71	13:20	4	36.18	1	PUS-Am38cm	1.7	EI470140
¢1	13:35	te		, tj	PUS-426746	×I.	E100476143
<i>e</i> 1	14:00	17		4	PUS-AVOLICE	4	EI 00470145
ધ	5.00	K		1.5	PUS-AM38LM	1.4	EI00470447
				1			10-00
				79 			
				÷			

ENVIROGUARD PTY LTD

50 QUARRY RD ERSKINE PARK NSW 2759

ABN: 23 060 919 164

Docket List

Print Date & Time: 4/05/2011 - 9:26:39AM

Date equals 3/05/2011 AND Customer equals CLM

confidential James Roberts Flagstaff Partners Jun 13, 2019 00:56



235.44

<u>Date</u>	<u>Time</u>	<u>Docket</u>	Vehicle	<u>Product</u>	Product Rate	<u>App No</u>	<u>Order No</u>	Item Qty	<u>Tran Gross</u>	<u>Tran Tare</u>	<u>Item Net</u>
Customer:	CLM E	XCAVATIONS P	2/L								
3/05/2011	8:21:40AM	EI00470864	AM38LM	ASBCONT	ABAC15	A11116	58110	100.00	37.06	15.48	21.58
3/05/2011	9:13:31AM	EI00470866	AK80DP	ASBCONT	ABAC15	A11116	58110	100.00	39.02	14.68	24.34
3/05/2011	10:54:33AM	EI00470882	AM38LM	ASBCONT	ABAC15	A11116	58110	100.00	40.16	15.48	24.68
3/05/2011	10:55:45AM	EI00470883	AK80DP	ASBCONT	ABAC15	A11116	58110	100.00	41.62	14.68	26.94
3/05/2011	12:48:38PM	EI00470900	AM38LM	ASBCONT	ABAC15	A11116	58110	100.00	33.76	15.48	18.28
3/05/2011	1:22:51PM	EI00470901	AL96VG	ASBCONT	ABAC15	A11116	58110	100.00	34.04	15.24	18.80
3/05/2011	1:31:22PM	EI00470909	AK80DP	ASBCONT	ABAC15	A11116	58110	100.00	35.92	14.68	21.24
3/05/2011	2:24:26PM	EI00470918	AM38LM	ASBCONT	ABAC15	A11116	58110	100.00	40.44	15.48	24.96
3/05/2011	3:22:19PM	EI00470928	AL96VG	ASBCONT	ABAC15	A11116	58110	100.00	40.46	15.24	25.22
3/05/2011	4:15:18PM	EI00470932	AK80DP	ASBCONT	ABAC15	A11116	58110	100.00	44.08	14.68	29.40

10 Transactions listed (10 items)

Report End

	confidential	
RPT5026.002	James Roberts	Page 1 of 1
	Flagstaff Partners	1 490 1 01 1
\\wprisul\inws\wasteman2G\keports\EnviDockList5026.rpt	Jun 13, 2019 00:56	

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confidential James Roberts Waste Disposate Record Sheet

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02 Environmental Management CLM-FM-02-002

1

Location:	Nose	ance	CLM Job No.:	4933 Mode of Transport	Responsible Manager: Name of Transport Contractor	SCOTT		
Date:	Time Out:	Waste Category: (Inert, Solid, Contaminated or Recyclable)	Quantity: (Volume or Weight)			Receiving Landfill or Transfer Station	Matched to Receipt /	
3/5/11	\$.55	Sotte - Asbestos	21.58T	TXD AM38LM	PNS	ENURDBURRD	E100470864	
'n	8:05	14	24-347	TAD AK BODP	PVS	11	E100470866	
11	10-00	1	24-68-	AM 38 LM	PUS	4	E100470882	
11	10.10	li .	26.947	ALSO DP	PNS	97	E100470883	
١r	12:00	Ŷj	18.287	AL 96VG	Ð	4	E100470900	
4	12-20	13	18-807	AMSBLM	1.1	'1	E100470901	
1.5	2pm	in In	24.967	AM332m	ал Н	1 X 3 J	E100470909 E100470918	
1	2:35,20	11	25.227	AL96VG	N	١,	E100470928	
	3.40	· · · · ·	29-40-	AKSODP	1.	÷ 1	E100470932	
4/5/1162	1200		13.027	AK80DP	N	ι,	5100470779	
5/5/11	500p	NA	18:467	Am 38Lm	PUS	EUIROQUARD	E100471123	
				1				

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ENVIROGUARD PTY LTD

50 QUARRY RD ERSKINE PARK NSW 2759

ABN: 23 060 919 164

Docket List

Print Date & Time: 6/05/2011 - 9:26:47AM

Date is between 4/05/2011 and 5/05/2011 AND Customer equals CLM

confidential James Roberts Flagstaff Partners Jun 13, 2019 00:56



<u>Date</u>	<u>Time</u>	<u>Docket</u>	<u>Vehicle</u>	<u>Product</u>	Product Rate	<u>App No</u>	Order No	Item Qty	<u>Tran Gross</u>	<u>Tran Tare</u>	Item Net
Customer:	CLM EX	XCAVATIONS P	/L								
4/05/2011	11:31:03AM	EI00470979	AK80DP	ASBCONT	ABAC15	A11116	58110	100.00	27.70	14.68	13.02
											13.02
1 Transactions	s listed (1 items)										

Report End

ENVIROGUARD PTY LTD

50 QUARRY RD ERSKINE PARK NSW 2759

ABN: 23 060 919 164

Docket List

Print Date & Time: 9/05/2011 - 8:05:29AM

Date is between 6/05/2011 and 8/05/2011 AND Customer equals CLM

confidential James Roberts Flagstaff Partners Jun 13, 2019 00:56



Date	Time	<u>Docket</u>	Vehicle	<u>Product</u>	Product Rate	<u>App No</u>	Order No	Item Qty	<u>Tran Gross</u>	<u>Tran Tare</u>	<u>Item Net</u>
Customer:	CLM E	XCAVATIONS P	2/L								
6/05/2011	6:12:09AM	EI00471123	AM38LM	ASBCONT	ABAC15	A11116	58110	100.00	33.94	15.48	18.46
											18.46
1 Transactions	s listed (1 items)										

Report End

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Fin Iconfidential James Roberts Myste Disposal Record Sheet Jun 13, 2019 00:56

Location:	RRL	15 Reserver (PS	CLM Job No.:	4933-~	Responsible Manager:	Scott wells		
Date:	Time Out: JN	Waste Category: (Inert, Solid, Contaminated or Recyclable)	Quantity: (Volume or Weight)	Mode of Transport	Name of Transport Contractor	Receiving Landfill or — Transfer Station	Matched to Receipt / Docket Number	
1 6/5/11	7.50	Shalle		AKGT VO	PUS		1.1.1.1	
26/5/11	8-10	Ц		AM 38 Lm 0	tr			
3	955	1	-	AKGTVO	e f			
4	1000	(e		Am 38Lm	t j			
5 4	11.20	t (ZEW 998	× (
6 .1	(1.30	l *		AK67VO	χ.)			
7 11	11.45	li		AM.38.CM	(1			
8 11	12.00	li		Zeu 998	11			
9 11	12:05	11	BOGIE .	AU 20 FP	PVS			
16	13.00	4		A.K67V0	í/			
i y ()	13.30	11		AM38LM®	r			
12 11	13.34	.(25 W998	(1			
3 11	13-42		BOGIE	AU 20 FP.	pvs			
ny n	13:48	A		BD40YF	1)			
6 11	1423	(1		AK67VO	ŧ į			

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Fill James Roberts Waste Disposal Record Sheet Jun 13, 2019 00:56

02 Environmental Management CLM-FM-02-002

Lo	ocation:			CLM Job No.:		Responsible Manager:		
D	ate:	Time Out:	Waste Category: (Inert, Solid, Contaminated or Recyclable)	Quantity: (Volume or Weight)	Mode of Transport Rego	Name of Transport Contractor	Receiving Landfill or Transfer Station	Matched to Receipt / Docket Number
	11	1444	11		AM 38LME	PUS		
7		15.03	1/	BOAIE	AUZO FP	li I		
8		15.12	4		2EW998	11		
19		15:24	4		5D 46 YF	li		
							÷	
					1		1	
		()			*	1		
			4					
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confidential Waste Diames Roberts Pagesterr Patrices Jun 13, 2019 00:56

Location:		CLM Job No.:		Responsible Man	ager:	1
Date:	Waste Category: (Inert, Solid, Contaminated or Recyclable)	Quantity: (Volume or Weight)	Mode of Transport	Name of Transport Contractor	Receiving Landfill or Transfer Station	Matched to Receipt / Docket Number
7/6/11	shale	AK67VO	1+D	PUS		U.
u	(1	AVOUCF	11			
11	u	AM 38 LM	U .	- 11		
(11	ZEW agg	u	U.		
u	11	AK80 D1	(1	(7		
1	u	BD 40 4F	V	,		
(1	()	AL 98 UG	И	11	8.30	
	5	AVOYCE	Ju.	1	P.30	
M	•••	AM382M	Ч	11	8.40	
η.	n	AK 67 VO	11	11	8.45	
ι,	h	AK80 DP	И	n	9.00	
л	ň	BD 40 YF	ų	h	9.06.30	
٩.	n	ZEW 99P	n	:1	9.13	
Ν.	1	AMJELM	n	И	9.50	
r	n	4296 VG	h	и	9.56	

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02 Environment anagement CLM-FM-02-002

Location:		CLM Job No.:		Responsible Mana	ager:	
Date:	Waste Category: (Inert, Solid, Contaminated or Recyclable)	Quantity: (Volume or Weight)	Mode of Transport	Name of Transport Contractor	Receiving Landfill or Transfer Station	Matched to Receipt / Docket Number
7.8-1	Shale	AK 87-00	TR	PVS	10.05	
٦	n	THRODP	и	U	10.22	
И	N	5D40YF	ч	и	10 .28	
e	И	AVOYCE	A	v	10.55	
N	N	AM 38LM	ч	h	11 03	
1	ir	AL96UG	ie	ч	11.19	
	h	AK67VO	h	K	11.30	st
ŀ	3	AK 80DP	٨	M	11 .42	
м	И	BD 40 YF	h	~	11 . 51	
M	n	AVO4 CF	ч	λ.	12.11	
N	М	AM 38 4M	И	ч	12-19	
	Pich ag	BAGTAJ				
11	SMARE	ALG6 VG	THA	PVS	12.56	
K	11	AK67VO	• (15	13-14	
	ť	BD 40 YF	h	• ر	13 . 18	

Authorized General Manager April 2010 James Roberts Flagstaff Partners Jun 13, 2019 00:56



confidential Waste Dispos Record Sheet Jun 13, 2019 00:56

02 Environment anagement 0 111

CLM-FM-02-002

Location:		CLM Job No.:		Responsible Mana	ger:	
Date:	Waste Category: (Inert, Solid, Contaminated or Recyclable)	Quantity: (Volume or Weight)	Mode of Transport	Name of Transport Contractor	Receiving Landfill or Transfer Station	Matched to Receipt / Docket Number
7.5.11	SHALE	AK 80 DP.	T+D	PVS		13:22
11	SHAVE	AV 04 CF	11	91		13:30
IX.	u	AM 38 LM	17	1(13:38
1,	<u>.</u>	AL 96 VG	1.	ι.		14:07
•(11	AK67VO	•1	1.		14:25
Ls.	SHALE	BD 40YF	te	((14:33
X.	SPOIL REMOVAL	BAOT AI	1,	١,		14:33
	SHALE	AK80 DP	ł.	ŝ		19:40.
L	11	AVO4CF	11	1 0		14:45.
n	n	AM382M	ч	n		14.57.
М	И	4246 VG	И	И		15 33
La	Ν	166700	4	n		15 443
11	11	BD 40 YF	"(1		15 55
11	//	AKSODP	il	i 1		
<i>i</i> 1	11	Alloy CF	(1	17		16.30
K		Am38m	"	U		16-32

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Waste Disposition Parties Jun 13, 2019 00:56

02 Environment clm-FM-02-002

Location:		CL	.M Job No.:			Responsible Mana	ger:		
Date:	Waste Category: (Inert, Solid, Contaminated or Recyclable)	Quantity (Volume	y: e or Weight)	Mode of Transport	N	lame of Transport Contractor	Rec	eiving Landfill or ransfer Station	Matched to Receipt / Docket Number
9/5/4	Solio	TRUCK	+ Dog	AM-38-UM	Ve	ella	Dup	han 57	
0915/11	SHAIE	A17-3	38-LM	1+0	V	ella	11	-12 AM	
- 1/5/11	SHALE	An-;	33- LM	X+D	C	erla	12	2.45 07	
1/5/1	SLAR	Am-	58-607	++0	v	ella	2	- Oopy	
9/3/11	Shalk	AK-	67-10	++0	V	ella	2	15pm	
9/5/11	Shale	AL-	96-VG	++0	L	olla	2	· 30 pm	
915/11	shale	4 -0	4-CL	Tto	Ve	ella	2	· 30pr	
. 4/5/11	Shale	AL-9	16-19	TTO	Je	,114	3	- 2207	
· 5/5/11	Shale	Av- a	74 CF	THO	Ve	ella	3	24/7	
915/11	Shole	AU-C	DY CF	1+9	Je	21(9	3	30 pm	
1/5/11	Shake	AM.	38.CM	7+)	L	rella	3	. 40 pm	
\$9/5/11	Shale	AK.	80.JP	772	6	Iella	3	. SO for	-
10/s/il	SHAIR	BJ-1	8-LY	THO	Ve	1/4	7.	IT AT	
10/5/11	Share	BDZ	LO-YF	T+D	Vell	A	7	30 AM	
10/5/11	Shale	AK-S	70.07	イモリ	Ve	LIIA	8-1	F.4SAM	

Authorized General Manager April 2010

James Roberts Flagstaff Partners Jun 13, 2019 00:56



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	Location:		CLM Job No.:		Responsible Mana	ger:	
	Date:	Waste Category: (Inert, Solid, Contaminated or Recyclable)	Quantity: (Volume or Weight)	Mode of Transport	Name of Transport Contractor	Receiving Landfill or Transfer Station	Matched to Receipt / Docket Number
1	10/5/11	SWALE	AV.04.CT	A	VellA	4.55 Am	
	10 5/11	SHAIE	AK 67.00	1+17	Vella	8.15 AM	
	10/5/11	SHAIE	AL -96.26	1+2	Jeila	8:20 Am	
and the second se	10/5/11	Shale	Am. 38. LM	1+)	Vella	8.30AM	
U	10/5/1	Shale	Am. 38. Lm	TED	KIM	10.20 Am	
	10/5/11	Shale	Am. 38. L.M	1+7	VelliA	12.00 km	
	Id 511	Shalle	AK 67 VO	TTD	Vella	14.0500	
	idstu	SHAIE	An . 38. CM	tio	Valley	14.10 00	
	iolst11	SLAIR	AK. 67. JO	Tto	Vella	15.2507	
	(0/5/1)	Shale	Am. 58. Lm	1+0	Vella	15.35Pm	
14	10/5/4	Shale	4× 80 DP	770	Jella	16.60	
	11/5/11	Shale	An. 38.Cm	1+0	Ve114	07.05 mg	
	11/5/11	5421e	AK-67.00	TtD	Jella	07.57 AM	
	11/5/11	Shale	nk-80-0p	TTO	Villy	07-30 AM	
	11/5/11	Shale	AL-96-06	T+D	vella	08.30	

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confidential James Roberts Waste Disport Record Sheet Jun 13, 2019 00:56

Location:		CLM Job No	b.:	Responsible Man	ager:	
Date:	Waste Category: (Inert, Solid, Contaminated or Recyclable)	Quantity: (Volume or Weigh	t) Transport	Name of Transport Contractor	Receiving Landfill or Transfer Station	Matched to Receipt / Docket Number
11/5/11	Shale	AK/80/D.	P 7+D	Vella	08.35	
11/5/11	Shale	Am /38/LI	n TFD	vella	08.44	
11/5/11	Shale	AV-04-6	FTO	Jella	08.52	
11/5/11	Shale	AK -67. Ve	1 THD	Vella	09.39	
11/5/11	Shale	AL 96 VG	THO	Jeila	09.54	
· a/s/a	shale	AK 80.D	P 7+D	vella	10.00	
· u/s/11	shale	Am. 38. 60	m T+D	vella	10.05	
11/5/11	Shale	AV. de CI	C T+D	Vella	10.10	
: 11/s/a	Shale	AL-9616	= 7+0	vella	11.05	
. 1/5/11	Shale	A.F. 67.00	740	vella	11.15	
11/5/11	Shale	Ak. 80.D	P T+D	vella	11.35	
11/5/11	Shale	AM. 38.21	9 770	vella	11.45	
11/5/11	Shale	Am-38.4	n (+)	JellA	232 fm	
11/5/11	Shale	1-m 38.4	- 1FD	VellA	3.55Pm	

Authorized General Manager April 2010 James Roberts Flagstaff Partners Jun 13, 2019 00:56

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JOB ADD	RESS:	CLM		
		Durham Street, Rose Hill Purchase Order No.PU0058586 Shale		
DATE	PH DOC	EMPLOYEE	TON	WEIGHBRIDGE DOCKET NO.
6.5.11	2384	Jamie - supplied 1 x T & D load shale from Brandown	31.88	SOR-327740
6.5.11	2384	Jamie - supplied 1 x T & D load shale from Brandown	32.24	SOR-327757
6.5.11	2384	Brandown	31.78	SOR-327800
6.5.11	2384	Jamie - supplied 1 x T & D load shale from Brandown	30.48	SOR-327824
6.5.11	2384	Brandown	31.14	SOR-327853
6.5.11	0163	Brett - supplied 1 x T & D load shale from Brandown	31.48	SOR-327827
6.5.11	0163	Brett - supplied 1 x T & D load shale from Brandown	31.78	SOR-327863
6.5.11	0393	Sam - supplied 1 x T & D load shale from Brandown	24.30	SOR-327774
6.5.11	0393	Brandown	24.64	SOR-327829
6.5.11	0393	Brandown	25.12	SOR-327856
6.5.11	2470	Trevor - supplied 1 x T & D load shale from Brandown	31.40	SOR-327735
6.5.11	2470	Trevor - supplied 1 x T & D load shale from Brandown	32.18	SOR-327753
6.5.11	2470	Trevor - supplied 1 x T & D load shale from Brandown	32.74	SOR-327785
6.5.11	2470	Trevor - supplied 1 x T & D load shale from Brandown	32.46	SOR-327818
6.5.11	2470	Brandown	32.52	SOR-327843
6.5.11	2470	Frevor - supplied 1 x F & D load shale from Brandown	32.36	SOR-327876
6.5.11	2405	Matt - supplied 1 x Bogie load shale from Brandown	10.98	SOR-327805
6.5.11	2405	Matt - supplied 1 x Bogie load shale from Brandown	11.30	SOR-327833
6.5.11	2405	Matt - supplied 1 x Bogie load shale from Brandown	10.48	SOR-327859
7.5.11	1828	Warren - supplied 1 x T & D load shale from Brandown	32.12	SOR-327913
7.5.11	1828	Warren - supplied 1 x T & D load shale from Brandown	32.66	SOR-327927
7.5.11	1828	Warren - supplied 1 x T & D load shale from Brandown	32.04	SOR-327945
7.5.11	1828	Warren - supplied 1 x T & D load shale from Brandown	31.68	SOR-327960
7.5.11	1828	Warren - supplied 1 x T & D load shale from Brandown	31.80	SOR-327984
7.5.11	1828	Warren - supplied 1 x T & D load shale from Brandown	31.34	SOR-327999
7.5.11	1825	Tony - supplied 1 x T & D load shale from Brandown	25.44	SOR-327901
7.5.11	1825	Tony - supplied 1 x T & D load shale from Brandown	24.70	SOR-327915
7.5.11	0250	Brett - supplied 1 x T & D load shale from Brandown	33.02	SOR-327903
7.5.11	0250	Brett - supplied 1 x T & D load shale from Brandown	32.28	SOR-327918
7.5.11	0250	Brett - supplied 1 x T & D load shale from Brandown	32.46	SOR-327934

	1	Brett - supplied 1 x T & D load shale from	1	1
7.5.11	0250	Brandown	32.18	SOR-327947
7.5.11	0250	Brett - supplied 1 x T & D load shale from Brandown	32.50	SOR-327964
7511	0250	Brett - supplied 1 x T & D load shale from	22.06	SOR 227096
1.3.11	0230	Brett - supplied 1 x T & D load shale from	52.00	SUR-327986
7.5.11	0250	Brandown Gavin - supplied 1 x T & D load shale from	32.12	SOR-328000
7.5.11	2339	Brandown	31.76	SOR-327899
7.5.11	2339	Brandown	32.56	SOR-327912
7.5.11	2339	Gavin - supplied 1 x T & D load shale from Brandown	32.72	SOR-327939
7511	2330	Gavin - supplied 1 x T & D load shale from	20.14	SOB 227052
7.0.11	2000	Gavin - supplied 1 x T & D load shale from	32.14	30R-32/952
7.5.11	2339	Brandown Gavin - supplied 1 x T & D load shale from	32.14	SOR-327969
7.5.11	2339	Brandown	32.10	SOR-327989
7.5.11	2339	Brandown	31.90	SOR-328002
7.5.11	1451	Nicolas - supplied 1 x T & D load shale from Brandown	31.94	SOR-327900
7511	1451	Nicolas - supplied 1 x T & D load shale from	00.00	000 007040
7.5.11	1431	Nicolas - supplied 1 x T & D load shale from	32.30	SUR-32/916
7.5.11	1451	Brandown Nicolas - supplied 1 x T & D load shale from	32.30	SOR-327924
7.5.11	1451	Brandown	32.38	SOR-327941
7.5.11	1451	Brandown	31.70	SOR-327953
7.5.11	1451	Nicolas - supplied 1 x T & D load shale from Brandown	31.38	SOR-327973
7511	1451	Nicolas - supplied 1 x T & D load shale from	21.66	EOR 927004
	1401	Nicolas - supplied 1 x T & D load shale from	31.00	SUR-327991
7.5.11	1451	Jim - supplied 1 x T & D load shale from	32.26	SOR-328006
7.5.11	1512	Brandown	32.00	SOR-327902
7.5.11	1512	Brandown	32.20	SOR-327917
7.5.11	1512	Jim - supplied 1 x 1 & D load shale from Brandown	32.12	SOR-327930
7511	1512	Jim - supplied 1 x T & D load shale from Brandown	32.12	SOR-327046
7.0.11	1012	Jim - supplied 1 x T & D load shale from	02.12	301(-32/340
7.5.11	1512	Jim - supplied 1 x T & D load shale from	31.88	SOR-327965
7.5.11	1512	Brandown	31.98	SOR-327988
7.5.11	1512	Brandown	31.78	SOR-328001
7.5.11	2471	Brandown	31,92	SOR-327908
7511	2471	Trevor - supplied 1 x T & D load shale from Brandown	32.40	SOR-327021
7544	0474	Trevor - supplied 1 x T & D load shale from	02.40	001-027921
7.5.11	2471	Trevor - supplied 1 x T & D load shale from	32.62	SOR-327943
7.5.11	2471	Brandown Trevor - supplied 1 x T & D load shale from	32.22	SOR-327957
7.5.11	2471	Brandown	31.80	SOR-327978
7.5.11	2471	Brandown	31.68	SOR-327998
9.5.11	2473	Trevor - supplied 1 x T & D load shale from Brandown	31.82	SOR-328124
0.5.44	0470	Trevor - supplied 1 x T & D load shale from	04.00	
9.5,11	24/3	Gavin - supplied 1 x T & D load shale from	31.36	SOR-328154
9.5.11	2341	Brandown	32.02	SOR-328123

-	1	Could supplied 1 v T 9 D load shale from		1
9.5.11	2341	Brandown	31.90	SOR-328160
9.5.11	1008	Jim - supplied 1 x T & D load shale from Brandown	32.16	SOR-328141
0.5.11	1009	Jim - supplied 1 x T & D load shale from	01.10	
9.5.11	1008	Jamie - supplied 1 x T & D load shale from	31.18	SOR-328170
9.5.11	2385	Brandown	31.72	SOR-328066
9.5.11	2385	Brandown	32.02	SOR-328083
9.5.11	2385	Jamie - supplied 1 x T & D load shale from Brandown	31.96	SOR-328112
9511	2385	Jamie - supplied 1 x T & D load shale from Brandown	21.62	SOB 229126
0.0.11	2000	Jamie - supplied 1 x T & D load shale from	01.02	301-328136
9.5.11	2385	Jim - supplied 1 x T & D load shale from	31.62	SOR-328168
10.5.11	1009	Brandown	32.52	SOR-328207
10.5.11	1011	Brandown	30.88	SOR-328343
10.5.11	2386	Jamie - supplied 1 x T & D load shale from Brandown	32.22	SOR-328212
10 5 11	0007	Jamie - supplied 1 x T & D load shale from	02.12	
10.5.11	2387	Jamie - supplied 1 x T & D load shale from	32.16	SOR-328240
10.5.11	2387	Brandown	32.12	SOR-328266
10.5.11	2387	Brandown	31.44	SOR-328301
10.5.11	2387	Jamie - supplied 1 x T & D load shale from Brandown	32.12	SOR-328329
10511	1151	Brett - supplied 1 x T & D load shale from	20.00	000 200000
10.5.11	1151	Gavin - supplied 1 x T & D load shale from	30.98	SOR-328203
10.5.11	2342	Brandown Trevor - supplied 1 x T & D load shale from	32.10	SOR-328208
10.5.11	2474	Brandown	32.42	SUR-328209
10.5.11	1051	Brandown	32.34	SOR-328211
10.5.11	1053	Warren - supplied 1 x T & D load shale from Brandown	32.86	SOP 328300
10 5 11	4050	Warren - supplied 1 x T & D load shale from	02.00	3011-320300
10.5.11	1053	Nicolas - supplied 1 x T & D load shale from	30.78	SOR-328327
10.5.11	1452	Brandown Warren - supplied 1 x T & D load shale from	33.76	SOR-328202
11.5.11	1054	Brandown	31.94	SOR-328393
11.5.11	1054	Warren - supplied 1 x T & D load shale from Brandown	32.20	SOR-328415
11 5 11	1055	Warren - supplied 1 x T & D load shale from	00.50	000 000075
11.5.11	10,55	Trevor - supplied 1 x T & D load shale from	30.52	SUR-328375
11.5.11	2476	Brandown Trevor - supplied 1 x T & D load shale from	31.26	SOR-328380
11.5.11	2476	Brandown	32.00	SOR-328395
11.5.11	2476	Brandown	31.96	SOR-328414
11 5 11	2345	Gavin - supplied 1 x T & D load shale from Brandown	22.90	SOB 208272
11.0.11	2040	Gavin - supplied 1 x T & D load shale from	32,00	SUR-526575
11.5.11	2345	Brandown Gavin - supplied 1 x T & D load shale from	32.54	SOR-328383
11.5.11	2345	Brandown	32.78	SOR-328401
11.5.11	1013	Brandown	29.66	SOR-328376
11.5.11	1013	Jim - supplied 1 x T & D load shale from Brandown	32.26	SOR-328306
44.5.44	4040	Jim - supplied 1 x T & D load shale from	02.20	0011-020030
11.5.11	1013	Jamie - supplied 1 x T & D load shale from	32.48	SOR-328416
11.5.11	2389	Brandown	32.08	SOR-328371

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Jun 13, 2019 00:56

	-		3291.72	
11.5.11	2389	Jamie - supplied 1 x T & D load shale from Brandown	31.74	SOR-328507
11.5.11	2389	Jamie - supplied 1 x T & D load shale from Brandown	31.56	SOR-328471
11.5.11	2389	Jamie - supplied 1 x T & D load shale from Brandown	31.52	SOR-328444
11.5.11	2389	Jamie - supplied 1 x T & D load shale from Brandown	31.60	SOR-328418
11.5.11	2389	Jamie - supplied 1 x T & D load shale from Brandown	32.20	SOR-328398
11.5.11	2389	Jamie - supplied 1 x 1 & D load shale from Brandown	32.84	SOR-32838

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Appendix C Geotextile Marker Layer Specification

Site Validation Report Corner Durham Street and Grand Avenue Rosehill NSW 2142

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Geotextiles

bidim[®] High Viz Marker Barrier

Specifications

bidim[®] geotextiles are manufactured in accordance with ISO 9001:2000

bidim[®] is a non-woven, needle punched, continuous filament, polyester geotextile made in Australia from recycled polymer.

Test Method	Units	Typical Values
AS3706.2-90	kN/m	4.5/ 3.5
AS2001.2.3	N	450/380
AS3706.7-90	095 - um	90
AS3706.9-90	l/m²/sec	230
		Orange
	Test Method AS3706.2-90 AS2001.2.3 AS3706.7-90 AS3706.9-90	Test Method Units AS3706.2-90 kN/m AS2001.2.3 N AS3706.7-90 095 - um AS3706.9-90 I/m²/sec

The product properties listed on this sheet are typical values. Mechanical Properties are shown in Machine Direction and Cross Machine Direction

IMPORTANT NOTICE

The information contained in this brochure is general in nature. In particular the content of this brochure does not take account of specific conditions that may be present at your site. Site conditions may alter the performance and longevity of the product and in extreme cases may make the product wholly unsuitable. Any data or specifications contained in this brochure are average values obtained in our laboratory. Actual dimensions and performance may vary. If your project requires accuracy to a certain specified tolerance level you must advise us before ordering the product from us. We can then advise whether the product will meet the required tolerances. Where provided, installation instructions cover installation of product in site conditions that are conducive to its use and optimum performance. If you have any doubts as to the installation instructions or their application to your site, please contact us for clarification before commencing installation. In all cases we recommend that advice be obtained from a qualified consulting engineer before proceeding with installation. © Copyright held by Geofabrics Australasia Pty Ltd. All rights are reserved and no part of this publication may be copied without prior permission.

SYDNEY (02) 9821 3277 fax (02) 9821 3670 Unit 1/9 Cunningham Street, Moorebank, NSW 2170



www.geofabrics.com.au

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Appendix D VENM Classification

Site Validation Report Corner Durham Street and Grand Avenue Rosehill NSW 2142



1 April 2011

Jemena Asset Management 100 Bennelong Parkway Sydney Olympic Park NSW 2127

Attention: Mr Chris Butler

Dear Chris

RE: Validation Consultancy Services Rosehill Recycled Water Scheme, Cnr Durham Street and Grand Avenue, Rosehill NSW Soil Classification Advice No. 1 - Brandown Quarry, Kemps Creek

1 INTRODUCTION

Coffey Environments Pty Ltd (Coffey) was engaged by Jemena Asset Management (Jemena) to provide validation consultancy services associated with remediation works being undertaken at the corner of Durham Street and Grand Avenue, Rosehill NSW (the Site).

2 OBJECTIVE

The objective of this advice is to provide an assessment of whether stockpiled shale material located at Brandown Quarry, Lot 90 Elizabeth Drive, Kemps Creek NSW (the source site), proposed for importation to the Site, is likely to be virgin excavated natural material (VENM).

3 SCOPE OF WORK

The scope of work undertaken to address the project objective included:

- visual observation of the material; and
- data assessment and reporting.

3.1 Observations

A Coffey environmental scientist visited the source site on 1 April 2011. Observations made by Coffey while onsite included the following:

Jun 13, 2019 00:56

• the material observed was a stockpile of blue grey moderately weathered shale;

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- advice from Steve Cottell of Brandown Quarry indicated that the material had been excavated from an area within the source site. Observations of the walls of the excavation in this area indicated the presence of blue grey shale;
- no odours (using olfactory methods) were detected in the stockpiled material;
- no staining was observed in the stockpiled material;
- no evidence of anthropogenic materials was observed within the stockpiled material;
- no evidence of commercial / industrial processes was observed in the immediate vicinity of the material. It is noted that a portion of the quarry is being operated as a landfill, however, there was no evidence to indicate the presence of landfill materials in the stockpiled material;

3.2 Discussion

NSW DECC 2009, 'Waste Classification Guidelines - Part 1: Classifying Waste' defines VENM as being material that is assessed as not:

- contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities; and
- · containing sulfidic ores or soils, or any other waste,

Based on Coffey's visual assessment of the material, it is considered unlikely that the material was contaminated with wastes, manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities

NSW Department of Land and Water Conservation 1997, 'Liverpool Acid Sulfate Risk Map – Edition Two' indicates that the site is located in an area where acid sulfate soils are not known or expected to occur. Based on this, it is considered unlikely that the material contains sulfidic ores or soils.

4 CONCLUSION

Based on an assessment of field observations and the available desktop, Coffey considers that the stockpiled blue grey weathered shale material assessed by Coffey on the source site is likely to classify as VENM and is suitable (from a contamination perspective) for importing as fill material to the Site. The importation of fill material must be recorded using material tracking logs, transport consignment notes and weighbridge dockets.

5 CLOSING

This advice should be read in conjunction with the attached Important Information About Your Coffey Environmental Report.

For and on behalf of Coffey Environments Australia Pty Ltd

Craig Cowper Associate

Attachments: 1. Important Information About Your Coffey Environmental Report



Important information about your **Coffey** Environmental Report

Uncertainties as to what lies below the ground on potentially contaminated sites can lead to remediation costs blow outs, reduction in the value of the land and to delays in the redevelopment of land. These uncertainties are an inherent part of dealing with land contamination. The following notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report has been written for a specific purpose

Your report has been developed on the basis of a specific purpose as understood by Coffey and applies only to the site or area investigated. For example, the purpose of your report may be:

- To assess the environmental effects of an on-going operation.
- To provide due diligence on behalf of a property vendor.
- To provide due diligence on behalf of a property purchaser.
- To provide information related to redevelopment of the site due to a proposed change in use, for example, industrial use to a residential use.
- To assess the existing baseline environmental, and sometimes geological and hydrological conditions or constraints of a site prior to an activity which may alter the sites environmental, geological or hydrological condition.

For each purpose, a specific approach to the assessment of potential soil and groundwater contamination is required. In most cases, a key objective is to identify, and if possible, quantify risks that both recognised and unrecognised contamination pose to the proposed activity. Such risks may be both financial (for example, clean up costs or limitations to the site use) and physical (for example, potential health risks to users of the site or the general public).

Scope of Investigations

The work was conducted, and the report has been prepared, in response to specific instructions from the client to whom this report is addressed, within practical time and budgetary constraints, and in reliance on certain data and information made available to Coffey. The analyses, evaluations, opinions and conclusions presented in this report are based on those instructions, requirements, data or information, and they could change if such instructions etc. are in fact inaccurate or incomplete.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man and may change with time. For example, groundwater levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of the subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project and/or on the property.

Interpretation of factual data

Environmental site assessments identify actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from indirect field measurements and sometimes other reports on the site are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, parties involved with land acquisition, management and/or redevelopment should retain the services of Coffey through the development and use of the site to identify variances, conduct additional tests if required, and recommend solutions to unexpected conditions or other problems encountered on site.



Important information about your Coffey Environmental Report

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered with redevelopment or on-going use of the site. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. In particular, a due diligence report for a property vendor may not be suitable for satisfying the needs of a purchaser. Your report should not be applied for any purpose other than that originally specified at the time the report was issued.

Interpretation by other professionals

Costly problems can occur when other professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other professionals who are affected by the report. Have Coffey explain the report implications to professionals affected by them and then review plans and specifications produced to see how they have incorporated the report findings.

Data should not be separated from the report

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way. Logs, figures, laboratory data, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel), field testing and laboratory evaluation of field samples. This information should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Contact Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to land development and land use. It is common that not all approaches will be necessarily dealt with in your environmental site assessment report due to concepts proposed at that time. As a project progresses through planning and design toward construction and/or maintenance, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Environmental reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than other design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

Appendix E Laboratory Certificates of Analysis and Chain of Custody

Site Validation Report Corner Durham Street and Grand Avenue Rosehill NSW 2142

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ISSUE: 3

Flagstaff Partners Jun 13, 2019 00:56



ANALYTICAL REPORT

4 April 2011

Coffey Environments Pty Ltd

Level 1, 3 Rider Boulevard RHODES **NSW 2138**

Attention:	Craig Cowper								
Your Reference:	ENVIRHOD01225AA - Rosehill J	emena							
Our Reference:	SE86654	Samples: Received:	5 Soils 1/4/11						
Preliminary Report S	ent: Not Issued								

These samples were analysed in accordance with your written instructions.

For and on Behalf of: SGS ENVIRONMENTAL SERVICES

Sample Receipt: **Production Manager:** Angela Mamalicos Huong Crawford

AU.SampleReceipt.Sydney@sgs.com Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

Ehrard Ibrahand

Edward Ibrahim Laboratory Manager

mlu/ Ly Kim Ha

Organics Signatory



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PAHs in Soil						
Our Reference:	UNITS	SE86654-1	SE86654-2	SE86654-3	SE86654-4	SE86654-5
Your Reference		V01	V02	V03	V04	QC1
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Depth		0.8	0.9	0.8	0.8	-
Date Sampled		1/04/2011	1/04/2011	1/04/2011	1/04/2011	1/04/2011
Date Extracted		1/04/2011	1/04/2011	1/04/2011	1/04/2011	1/04/2011
Date Analysed		1/04/2011	1/04/2011	1/04/2011	1/04/2011	1/04/2011
Naphthalene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Acenaphthylene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Acenaphthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Fluorene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Phenanthrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Fluoranthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[a]anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Chrysene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[b]fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo[k]fluoranthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[a]pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Indeno[123-cd]pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Dibenzo[<i>ah</i>]anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[ghi]perylene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Total PAHs (sum)	mg/kg	<2	<2	<2	<2	<2
Nitrobenzene-d5	%	84	106	74	94	90
2-Fluorobiphenyl	%	66	85	69	71	69
p -Terphenyl-d14	%	87	99	95	95	100



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UNITS	SE86654-1	SE86654-2	SE86654-3	SE86654-4
	V01	V02	V03	V04
	Soil	Soil	Soil	Soil
	0.8	0.9	0.8	0.8
	1/04/2011	1/04/2011	1/04/2011	1/04/2011
	4/04/2011	4/04/2011	4/04/2011	4/04/2011
	49g clay, soil	46g clay, soil	67g clay, soil	42g clay, soil
-	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	No asbestos detected
	UNITS 	UNITS SE86654-1 V01 Soil 0.8 1/04/2011 4/04/2011 49g clay, soil - No asbestos detected Organic fibres detected	UNITS SE86654-1 SE86654-2 V01 V02 Soil Soil 0.8 0.9 1/04/2011 1/04/2011 4/04/2011 4/04/2011 - No - No asbestos asbestos detected Organic fibres fibres detected detected	UNITS SE86654-1 SE86654-2 SE86654-3 V01 V02 V03 Soil Soil Soil 0.8 0.9 0.8 1/04/2011 1/04/2011 1/04/2011 4/04/2011 4/04/2011 4/04/2011 - No No Soil - No No No asbestos asbestos asbestos asbestos detected Organic Organic Organic fibres fibres fibres fibres



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Environmental Services Unit 16/33 Maddox Street Alexandria NSW 2015 Australia t+64(0)285940400 f+61 (0)285940499

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PROJECT: ENVIRHOD01225A	A - Rosehill J Fi Jur	confidential emenaberts agstaff Partners n 13, 2019 00:5	6	REPORT	NO: SE86	654
Moisture						
Our Reference:	UNITS	SE86654-1	SE86654-2	SE86654-3	SE86654-4	SE86654-5
Your Reference		V01	V02	V03	V04	QC1
Sample Matrix		Soil	Soil	Soil	Soil	Soil

0.8

1/04/2011

1/04/2011

24

%

0.9

1/04/2011

1/04/2011

8

0.8

1/04/2011

1/04/2011

24

0.8

1/04/2011

1/04/2011

23

1/04/2011

1/04/2011

25



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Depth

Date Sampled

Date Analysed (moisture)

Moisture

SGS Australia Pty Ltd ABN 44 000 964 278
 Page 4 of 8

 Environmental Services
 Unit 16/33 Maddox Street
 Alexandria NSW 2015
 Australia

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 f + 61 (0)2 8594 0499
 www.au.sgs.com

Method ID	Methodology Summary
AN422	Polynuclear Aromatic Hydrocarbons - determined by solvent extraction with dichloromethane / acetone for soils and dichloromethane for waters, followed by instrumentation analysis using GC/MS SIM mode.
AN602	Analysed using in house method AN602 - Qualitative identification of Asbestos Fibres, Synthetic Mineral Fibres and Organic Fibres in bulk samples (including building materials and soils) using Polarised Light Microscopy and Dispersion Staining Techniques. Our NATA Accreditation does not currently cover the identification of Synthetic Mineral Fibres and Organic Fibres, however, according to new NATA requirements, the reporting of these fibres is compulsory if detected.
AN002	



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confidential PROJECT: ENVIRHOD01225AA - Rosehill Jemena berts Flagstaff Partners REPORT NO: SE86654									
QUALITY CONTROL PAHs in Soil	UNITS	LOR	METHOD	Jun 13, 201 Blank	9 00:56 Duplicate Sm#	Duplicate Base + Duplicate + %RPD	Spike Sm#	Matrix Spike % Recovery Duplicate + %RPD	
Date Extracted				01/04/1	[NT]	[NT]	LCS	01/04/11	
Date Analysed				01/04/1	[NT]	[NT]	LCS	01/04/11	
Naphthalene	mg/kg	0.1	AN422	<0.10	[NT]	[NT]	LCS	82%	
Acenaphthylene	mg/kg	0.1	AN422	<0.10	[NT]	[NT]	LCS	93%	
Acenaphthene	mg/kg	0.1	AN422	<0.10	[NT]	[NT]	LCS	99%	
Fluorene	mg/kg	0.1	AN422	<0.10	[NT]	[NT]	[NR]	[NR]	
Phenanthrene	mg/kg	0.1	AN422	<0.10	[NT]	[NT]	LCS	89%	
Anthracene	mg/kg	0.1	AN422	<0.10	[NT]	[NT]	LCS	96%	
Fluoranthene	mg/kg	0.1	AN422	<0.10	[NT]	[NT]	LCS	95%	
Pyrene	mg/kg	0.1	AN422	<0.10	[NT]	[NT]	LCS	99%	
Benzo[a]anthracene	mg/kg	0.1	AN422	<0.10	[NT]	[NT]	[NR]	[NR]	
Chrysene	mg/kg	0.1	AN422	<0.10	[NT]	[NT]	[NR]	[NR]	
Benzo[b]fluoranthene	mg/kg	0.1	AN422	<0.1	[NT]	[NT]	[NR]	[NR]	
Benzo[k]fluoranthene	mg/kg	0.1	AN422	<0.10	[NT]	[NT]	[NR]	[NR]	
Benzo[a]pyrene	mg/kg	0.1	AN422	<0.10	[NT]	[NT]	LCS	90%	
Indeno[<i>123-cd</i>]pyren e	mg/kg	0.1	AN422	<0.10	[NT]	[NT]	[NR]	[NR]	
Dibenzo[<i>ah</i>]anthrace ne	mg/kg	0.1	AN422	<0.10	[NT]	[NT]	[NR]	[NR]	
Benzo[<i>ghi</i>]perylene	mg/kg	0.1	AN422	<0.10	[NT]	[NT]	[NR]	[NR]	
Total PAHs (sum)	mg/kg	1.6	AN422	<2	[NT]	[NT]	[NR]	[NR]	
Nitrobenzene-d5	%	0	AN422	112	[NT]	[NT]	LCS	115%	
2-Fluorobiphenyl	%	0	AN422	95	[NT]	[NT]	LCS	99%	
<i>p</i> -Terphenyl- <i>d</i> 14	%	0	AN422	101	[NT]	[NT]	LCS	97%	



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QUALITY CONTROL	UNITS	LOR	METHOD	Blank 201	
Asbestos ID in soil					
Date Analysed				[NT]	

QUALITY CONTROL Moisture	UNITS	LOR	METHOD	Blank
Date Analysed (moisture)				[NT]
Moisture	%	1	AN002	<1



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Flagstaff Partners Jun 13, 2019 00:56

Result Codes

Report Comments Sampled by the client

- [INS]
 :
 Insufficient Sample for this test

 [NR]
 :
 Not Requested

 [NT]
 :
 Not tested

 [LOR]
 :
 Limit of reporting
- [RPD] : Relative Percentage Difference
 - : Not part of NATA Accreditation
- [N/A] : Not Applicable

Even after disintegration it can be very difficult, or impossible, to detect the presence of asbestos in some asbestos-containing bulk materials using polarised light microscopy. This is due to the low grade or small length or diameter of asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials.

No respirable fibres detected using trace analysis technique.

Asbestos analysed by Approved Identifier Yusuf Kuthpudin. Samples analysed as received. Solid samples expressed on a dry weight basis. Date Organics extraction commenced:

NATA Corporate Accreditation No. 2562, Site No 4354

Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*) This document is issued by the Company subject to its General Conditions of Service (www.sgs.com/terms_and_conditions.htm). Attention is drawn to the limitations of liability, indemnification and jurisdictional issues established therein.

This document is to be treated as an original within the meaning of UCP 600. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Quality Control Protocol

Method Blank: An analyte free matrix to which all reagents are added in the same volume or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. A method blank is prepared every 20 samples.

Duplicate: A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.

Surrogate Spike: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are added to samples before extraction to monitor extraction efficiency and percent recovery in each sample.

Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments.

Laboratory Control Sample: A known matrix spiked with compound(s) representative of the target analytes. It is used to document laboratory performance. When the results of the matrix spike analysis indicates a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

Matrix Spike: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Quality Acceptance Criteria

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf



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ox Street Alexandria NSW 2015 199 www.au.sgs.com



confidential James Roberts SAMPLE RECEIPTEADVICE (SRA)

4 April 2011

Client Details		Craig Cowper		Laboratory De	tails	
Client Contact Address	:	Coffey Environments Pty Ltd Craig Cowper Level 1, 3 Rider Boulevard RHODES NSW 2138		Laboratory Manager Address	:	SGS Environmental Services Edward Ibrahim Unit 16, 33 Maddox Street Alexandria NSW 2015
Email Telephone Facsimile	: : :	craig_cowper@coffey.com 02 8083 1600 02 8765 0762		Email Telephone Facsimile	:	au.samplereceipt.sydney@sgs.com 61 2 8594 0400 61 2 8594 0499
Project Order Number Samples	: : :	ENVIRHOD01225AA - Rosehill Jei 92134 5 Soils	mena	Report No No. of Samples Due Date	:	SE86654 5 4/04/2011
Date Instructions Received Sample Receipt Date	:	1/04/2011 1/4/11				
Samples received in good orde Samples received without head Upon receipt sample temperatu Sample containers provided by Turnaround time requested	er dspad ire :	: YES co YES : Cool : SGS : 1 Day	Samples received Sufficient quantity Cooling Method Samples clearly La Completed docume	in correct contair supplied belled entation received	ner:; : : :	YES YES Ice YES YES

Samples will be held for 1 month for water samples and 3 months for soil samples from date of receipt of samples, unless otherwise instructed.

Comments

To the extent not inconsistent with the other provisions of this document and unless specifically agreed otherwise in writing by SGS, all SGS services are rendered in accordance with the applicable SGS General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm as at the date of this document. Attention is drawn to the limitations of liablility and to the clauses of indemnification.

The signed chain of custody will be returned to you with the original report.

Page 1 of 2

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Jun 13, 2019 00:56

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SAMPLE RECEIPT ADVICE (SRA) - continued

Client	:	Coffey Environments Pty Ltd	Report No	:	SE86654
Project	:	ENVIRHOD01225AA - Rosehill Jemena			

Summary of Samples and Requested Analysis

The table below represents SGS Environmental Service's understanding and interpretation of the customer supplied sample request.

Please indicate ASAP if your request differs from these details.

Testing shall commence immediately as per this table, unless the customer intervenes with a correction prior to testing. Note that a small X in the table below indicates some testing has not been requested in the package.

Sample No.	Description	No Prep Required	PAHs in Soil	Asbestos ID in soil	Moisture
1	V01	Х	Х	Х	х
2	V02	Х	Х	Х	Х
3	V03	Х	Х	Х	Х
4	V04	Х	Х	Х	Х
5	QC1	Х	Х		Х

Sample No.	Description
1	V01
2	V02
3	V03
4	V04
5	QC1

Page 2 of 2

10101	PRINT	ERS	02 975	5 3545		-				_			-		-			cont	ident	ial			-	1	1	:		222
* Contair	Compa	Signatu	Compa	Signatu		15	14	13	17	11	10	2	es	¢	6	~	Fla JGn	gsta 13,	ff.Pa 2019	tne 00	Lab. No.		Special	Sampler	Project I		Project N	Philippines: VCT: VSW:
ner Type & Pr	ny:	Ire:	ny:	Ire:		VIA	215	EIN	110	511	219	510	211	11	V10	POU	900	tor	006		Sample ID		Instructions:	's Name: C	vame: Vc	, (No: SLU	Srd Floor, JMT
eservation Codes: P					RELINQUISHEI																Sample Location	descussion	For shring	THUL COWF	SEHIC JE		14070122	Bldg, ADB Ave, Ortigas Ctr, rrne Ave, Canberra ACT 2601 ar Blvd, Rhodes NSW 2138. arabrook Blvd, Warabrook N V Rd, Unanderra NSW 2526.
Diactio	Tin	Da	Tin	Da	BY:	0.2-0	0.2-0.	0.3-0	0-2-0-1	0.6	6.6	0.6	8.0	0.8	0.0	0	0 8	0.9	000	0.0	Sample	6	clos	130	TET		SAA	Pasig City, M
2 Columnt W	ne:	te:	ne:	te:		SW	4	S	4										- Calabra	ishi	Sample	R H	e of h	~	7	A		erro Manila; Phili
Inched Anid																					Time	5	S Saul SU					ppines Tel
Bineed Glace	Company:	Signature:	Company:	Signature:		-													1 100	0.1	Matrix (Soil etc)		20 04	Project N	Laporato	-	Task No:	(+63) (2) 638 968 (02) 6248 7366 (02) 8083 1600 (02) 4016 2300 (02) 4272 6071
Bottle V - Vial. N - Nitri			565		RECEP															1 VIDIOICY I	Container Type Preservative		11 as per	vianager: CHAG	IN SUS BUIL		1.6	Fax (+63) (2) 687 3518 Fax (02) 6248 7157 Fax (02) 8765 0762 Fax (02) 4016 2380 Fax (02) 4272 6075
Acid Prese					VED BY:															115	* 8			125700	a lot	In with		ald SA: VIC: WA:
erved	Time:	Date:	Time:	Date:			1												_	14DC	T-A-T (Specify)					A		47 Doggett St. Level 1, 2-3 G Coffey Busine: 126 Trenerry (126 Trenerry (128 U Level 1, 23 W Level 1, 23 W 61 Duke St, A 61 Duke St, A Suite 2, 53 Bu Suite 3 & 4, 2
			2:30p	12/4/24																	STATES S	TPT SPE	City					, Newstead QLD 4006 reenhill Rd, Wayville SA 5 ss Centre, 2 Melville St, H ss Catter, 2 Melville St, H Cres, Abbotsford VIC 306 Cres, Abbots
Lab. Re	Campion	Sample	All Docu	All Sam	Sample	1	11	11	1	11	1	11	11	11	11	11	11	///	1	1	the ted of	AS + S	103	111	11	111	Analy	034 obart TAS 7000 3220 3220 4 6100 orough WA 628
f/Batch No.		Received P	mentation is	oles Receive	Receipt Adv							5.4 PE	21-000-000	MBISCUP -	Il sejdiue.	718	Could be		1	-	111	1/100	111	111	1/1	111	sis Request	
3	inden ou	ronerly Ch	in Proper (d in Good (vice: (L							233	Service Se	reonner	nac)	2:200	127.0	14/1/	1	-	111	111	111	111	111	111	Section	1 (07) 3608 250 1 (08) 7221 350 1 (03) 6108 010 1 (03) 9473 140 1 (03) 5215 460 1 (08) 9892 640 1 (08) 9355 710 1 (08) 9756 786
0710-		illed	Order	Condition	ab Use On							7120	26-02	e (96	5	M	17			NC	/	11	111	111	111		00 Fax (07) 31 00 Fax (08) 8 00 Fax (03) 6 00 Fax (03) 9 00 Fax (03) 5 00 Fax (08) 9 00 Fax (08) 9 9 Fax (08) 9
		7	i	5	(VI								S ,A				Ja	cont	iden Rol	ial	TES				/	/		852 2805 172 1968 108 0199 473 1450 224 1368 392 6444 392 6444 355 7111 756 8878

Memory Maintain Maintain Maintain Maintain Maintain Maintain 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1<	* Container Type & Preservation Codes: P - Plas	Company:	Signature:	Company:	5 3545 Signature:	RELINQUISHED BY:	29.28 OCA	22 28 QC3A	口發 QC3	業 QCIA	u 0c2	25 V29 012	24 128 0.3	23 J27 D.A.	22 J26 01A	24 V25 011	20 V24 0.2	7日年 023 01	COM COM CONTRACTOR	fider s Rp 記 記 記 記 の ふ		Lat. No. Sample ID Sample Location De	discussion as	Special Instructions: 165 Hz by close	Samplers Name: CLAC COWSEL	Project Name: NOSCHIW JENENY	Project No: ENVIATEDO1225AA	CO:Ffey Philippines: 3rd Floor, JMT Bildg, ADB Ave, Ortigas Ctr, Pasig Ci ACT: 21:54 Northbourne Ave, Canberra ACT 2601 NSW: Clevel 1, 3 Rider Bivd, Rhodes NSW 2138 Lot 101, 19 Warabrook Bivd, Warabrook NSW 230. 11/222 Berkeley Rd, Unanderra NSW 2526
Intel Intel (45) (2) 669 866. Fax (45) (2) 687 3518 Intel (45) (2) 669 866. Fax (45) (2) 687 3518 Intel (45) (2) 669 866. Fax (45) (2) 687 3518 Intel (2) 869 7607 Intel (2) 869 7607 Intel (45) (2) 669 866. Fax (45) (2) 687 351 Intel (2) 869 7607 Intel (2) 869 7607 Intel (45) (2) 669 866. Fax (45) (2) 687 351 Intel (2) 869 7607 Intel (2) 869 7607 Intel (2) 868 760. Fax (45) (2) 687 351 Intel (2) 868 760. Intel (2) 868 760. Intel (2) 4016 200. Fax (45) (2) 687 351 Intel (2) 868 760. Intel (2) 868 760. Intel (2) 4016 200. Fax (45) (2) 687 351. Intel (2) 868 760. Intel (2) 868 760. Intel (2) 4016 200. Fax (45) (2) 477 807. Intel (2) 868 760. Intel (2) 868 760. Intel (2) 4016 200. Fax (45) (2) 477 807. Intel (2) 868 760. Intel (2) 868 760. Intel (2) 4016 200. Fax (45) (2) 477 807. Intel (2) 868 760. Intel (2) 868 760. Intel (2) 4016 200. Fax (45) (2) 477 770. Intel (2) 868 760. Intel (2) 868 760. Intel (2) 4016 200. Fax (45) (2) 477 770. Intel (2) 478 760. Intel (2) 478 760. Intel (2) 401 400 400 400 400 400 400 400 400 400	c. G - Solvent Washe	Time:	Date:	Time:	Date:			-				5.0	0:4	2.0	5.0	5+0	04	5-0	0.4	1 5.0	11/4/11 20	ple Sample T th Date T	H' Hong	al busines				nents , Metro Manila; Philippines
Barling Control (Control (Contr	Acid Rinsed Glass	Company:	Signature:	Company:	Signature:		4														Soil	ime Matrix (Soil etc)		55 20 04 11	Project N	Laborato	Task No:	Tel (+63) (2) 638 968 Tel (02) 6248 7366 Tel (02) 8083 1600 Tel (02) 4016 2300 Tel (02) 4272 6071
MUU:	Bottle, V - Vial, N - Nitric			563	Karle	RECEIV					1 G ICE	V								_	1721P LOCK, 19	Container Type Preservative*		as per	lanager: CMMC (N: SCIS ANJI	1.6	5 Fax (+63) (2) 687 3518 Fax (02) 6248 7157 Fax (02) 8765 0762 Fax (02) 4016 2380 Fax (02) 4272 6075
reenhill Rd, Wayville SA 5034 sc Centre, 2 Melville SA, Hobart TAS 7000 res, Abbotsford VIC 3067 st Fyans St, Newtown VIC 3220 sany WA 6330 rewood Rd, Burswood WA 6100 rewood Rd, Burswood Rd, Burs	Acid Preserved	Time:	Date:	Time:	Date: 6	IED BY:		8												-	ICE 24hr	& T-A-T (Specify)			DUTER	Non nor Ac		uLD: -47 Doggett St. SA: Devel 1, 2-3 Gr TAS: Coffey Busines VIC: 126 Trenerry C Devel 1, 23 We WA: 61 Duke St. Al Suite 2, 53 Bu Suite 3 & 4, 25
	Lab. Ref/Batch	Cumpico	Samples Recei	All Documentat	All Samples Re	Sample Hecel							1	1			1			11	//	1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PT 200 100 100	1 1 15 151	1////	1/1/	Analysis Rec	Newstead ULD 4006

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* Cont	Com	Signa	Com	Signa		confidentia James Robe Flagstaff Part Jun 13, 2019 (rt e n e s 00 X 6	Projec Samp Specia	Projec	Philippin ACT: NSW:
ainer Type & Pr	bany:	iture:	bany:	ture:		@c4A	. Sample ID	t Name: Se	INCE :0N P	es: 2.154 Northbour Lot 101, 19 Wid 1/222 Berkeley
eservation Codes: F					RELINQUISHE		Sample Location	AHE CONSIN	14070122	Bidg, ADB Ave, Ortigas Cir, me Ave, Canberra ACT 260 r Bivd, Rhodes NSW 2138. rabrook Bivd, Warabrook 19.
- Plastic, C	Tim	Dat	Tim	Dat	D BY:		Sample	and and	SAA	Pasig City, Me
- Solvent V	le:	e:	le:	е:		19/10/11	Sample Date	t of t		ents tro Manila; Phil
Vashed Acic							Time	Buon		ppines Tel
I Rinsed Glass	Company:	Signature:	Company:	Signature:		11 05	Matrix (Soil etc)	Project M 20 004	Task No:	(+63) (2) 638 9686 (02) 6248 7366 (02) 8083 1600 (02) 4016 2300
SG-S Bottle, V - Vial, N - Nitric Aci	56-3	Seg	Venda	RECEIVED	(a 105	Container Type & Preservative*	anager: CRAC, Co 11 as p-	1.6	01 S/ S/ TA TA TA TA TA TA TA TA TA TA	
id Preserved	Time:	Date:	Time: 2	Date: 10	O BY:	ZAN	T-A-T (Specify)	well	P	.D: 047 Doggett St, Ner 1: 047 Doggett St, Ner 1: 047 Dogfey Business C 1: 047 Tenerry Cres 1: 047 Tenerry Cre
			NOCH	showing			15 1 1 A S	XITPH ALS (Specify)		wstead QLD 4006 hhill Rd, Wayville SA 5 entre, 2 Melville St, H Abbotsford VIC 3067 Fyans St, Newtown VIC Fyans St, Newtown VIC gy WA 6330 www.waturaliste Tce, Dunsb
Lab. Hei/Bato	I at DatiData	Samples Rec	All Document	All Samples F	Sample Rece		1 / Salar	Cost Loss	Analysis Re	334
NON. SERT		vived Properly C	ation is in Proper	leceived in Good	ipt Advice:		1111		quest Section	Tel (07) 3608 25
120.		hilled	Order	Condition	(Lab Use Only)	confider	NOTES		1111	00 Fax (07) 3852 280 00 Fax (08) 8172 196 00 Fax (03) 6108 019 00 Fax (03) 9473 145 00 Fax (03) 5224 136 00 Fax (08) 9892 644 69 Fax (08) 9756 887

Flagstaff Partners Jun 13, 2019 00:56



ANALYTICAL REPORT

20 April 2011

Coffey Environments Pty Ltd

Level 1, 3 Rider Boulevard RHODES **NSW 2138**

Attention:	Craig Cowper		
Your Reference:	ENVIRHOD01225AA-Rosehill Je	mena	
Our Reference:	SE87120	Samples: Received:	29 Soils 19/04/2011
Preliminary Report S	ent: Not Issued		

These samples were analysed in accordance with your written instructions.

For and on Behalf of: SGS ENVIRONMENTAL SERVICES

Sample Receipt: **Production Manager:** Angela Mamalicos Huong Crawford

AU.SampleReceipt.Sydney@sgs.com Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

S. Paul

Ravee Sivasubramaniam Asbestos Signatory

Ly Kim Ha

Organics Signatory

Huong Crawford

Metals Signatory



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Jun 13, 2019 00:56

Environmental Services Unit 16/33 Maddox Street Alexandria NSW 2015 Australia t+64(0)285940400 f+61(0)285940499 www.au.sgs.com

REPORT NO: SE87120

confidential PROJECT: ENVIRHOD01225AA-Rosehill JemenaRoberts Flagstaff Partners

Jun 13, 2019 00:56

PAHs in Soil						
Our Reference:	UNITS	SE87120-1	SE87120-2	SE87120-3	SE87120-4	SE87120-5
Your Reference		V05	V06	V07	V08	V09
Depth		0.8	0.9	0.9	0.8	0.8
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Date Extracted		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Date Analysed		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Naphthalene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Acenaphthylene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Acenaphthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Fluorene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Phenanthrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Fluoranthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[a]anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Chrysene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[b]fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo[k]fluoranthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[a]pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Indeno[123-cd]pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Dibenzo[ah]anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[ghi]perylene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Total PAHs (sum)	mg/kg	<2	<2	<2	<2	<2
Nitrobenzene-d5	%	110	111	109	101	108
2-Fluorobiphenyl	%	101	101	100	93	100
p -Terphenyl-d14	%	110	110	109	102	110



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PROJECT: ENVIRHOD01225A	A-Rosehill Je	confidential mena Roberts agstaff Partners	6	REPORT	NO: SE87	'120
PAHs in Soil	Jur	13, 2019 00:5	6			
Our Reference:	UNITS	SE87120-6	SE87120-7	SE87120-8	SE87120-9	SE87120-1
Your Reference		V10	V11	V12	V13	V14
Depth		0.8	0.8	0.8	0.6	0.6
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Date Extracted		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Date Analysed		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Naphthalene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Acenaphthylene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Acenaphthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Fluorene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Phenanthrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Fluoranthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[a]anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Chrysene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[b]fluoranthene	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo[k]fluoranthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[a]pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Indeno[123-cd]pyrene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Dibenzo[ah]anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[ghi]perylene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Total PAHs (sum)	mg/kg	<2	<2	<2	<2	<2
Nitrobenzene-d5	%	102	104	105	98	108
2-Fluorobiphenyl	%	96	97	101	91	100
p -Terphenyl-d14	%	105	107	108	101	112



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PROJECT: ENVIRHOD01225A	A-Rosehill Je	confidential mena Roberts agstaff Partners		REPORT	NO: SE87	'120
PAHs in Soil	Ju	n 13, 2019 00:5	, 6			
Our Reference:	UNITS	SE87120-1	SE87120-1	SE87120-1	SE87120-1	SE87120-1
		1	2	3	4	5
Your Reference		V15	V16	V17	V18	V19
Depth		0.6	0.2-0.4	0.3-0.5	0.2-0.4	0.2-0.5
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Date Extracted		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Date Analysed		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Naphthalene	mg/kg	<0.10	<0.10	<0.10	<0.10	0.34
Acenaphthylene	mg/kg	<0.10	0.10	<0.10	0.11	1.2
Acenaphthene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Fluorene	mg/kg	<0.10	<0.10	<0.10	<0.10	0.18
Phenanthrene	mg/kg	<0.10	0.66	0.64	0.59	3.2
Anthracene	mg/kg	<0.10	0.23	0.21	0.24	1.6
Fluoranthene	mg/kg	<0.10	1.4	1.4	1.6	11
Pyrene	mg/kg	<0.10	1.4	1.4	1.6	12
Benzo[a]anthracene	mg/kg	<0.10	0.79	0.79	0.92	10
Chrysene	mg/kg	<0.10	0.45	0.45	0.48	5.7
Benzo[b]fluoranthene	mg/kg	<0.1	1	0.9	0.8	9.0
Benzo[k]fluoranthene	mg/kg	<0.10	0.30	0.37	0.34	2.4
Benzo[a]pyrene	mg/kg	<0.10	0.70	0.79	0.63	6.3
Indeno[123-cd]pyrene	mg/kg	<0.10	0.45	0.53	0.37	3.4
Dibenzo[ah]anthracene	mg/kg	<0.10	<0.10	0.11	<0.10	0.96
Benzo[ghi]perylene	mg/kg	<0.10	0.58	0.69	0.46	3.6
Total PAHs (sum)	mg/kg	<2	<8.40	<8.69	<8.55	<70.57
Nitrobenzene-d5	%	105	99	106	105	105
2-Fluorobiphenyl	%	98	97	101	99	107
p -Terphenyl-d14	%	110	106	110	108	113



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confidential PROJECT: ENVIRHOD01225AA-Rosehill JemenaRoberts Flagstaff Partners REPORT NO: SE87120						120
PAHs in Soil	Ju	<u>1 13, 2019 00:5</u>	Ô			
Our Reference:	UNITS	SE87120-1	SE87120-1	SE87120-1	SE87120-1	SE87120-2
		6	7	8	9	0
Your Reference		V20	V21	V22	V23	V24
Depth		0.2-0.5	0.3-0.5	0.2-0.4	0.1-0.3	0.2-0.4
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Date Extracted		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Date Analysed		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Naphthalene	mg/kg	<0.10	0.13	0.37	<0.10	<0.10
Acenaphthylene	mg/kg	0.15	0.47	1.6	0.51	0.56
Acenaphthene	mg/kg	<0.10	0.14	0.62	<0.10	0.15
Fluorene	mg/kg	<0.10	0.30	1.5	<0.10	0.29
Phenanthrene	mg/kg	0.94	4.8	28	2.4	5.3
Anthracene	mg/kg	0.32	1.2	4.2	0.80	1.3
Fluoranthene	mg/kg	1.9	8.5	54	6.1	10
Pyrene	mg/kg	1.9	8.0	49	5.8	9.7
Benzo[a]anthracene	mg/kg	0.98	4.8	21	3.8	4.6
Chrysene	mg/kg	0.64	2.5	8.7	2.0	2.9
Benzo[b]fluoranthene	mg/kg	1.2	5.4	25	5.3	6.1
Benzo[k]fluoranthene	mg/kg	0.41	1.4	4.4	1.5	1.6
Benzo[a]pyrene	mg/kg	0.94	3.9	20	3.4	4.6
Indeno[123-cd]pyrene	mg/kg	0.62	2.8	10	3.0	3.2
Dibenzo[<i>ah</i>]anthracene	mg/kg	0.14	0.51	1.9	0.13	0.54
Benzo[ghi]perylene	mg/kg	0.78	3.6	13	3.9	4.2
Total PAHs (sum)	mg/kg	<11.22	48	240	<39.03	<55.34
Nitrobenzene-d5	%	107	105	99	107	95
2-Fluorobiphenyl	%	100	102	98	101	94
p -Terphenyl-d14	%	108	109	110	110	102



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confidential PROJECT: ENVIRHOD01225AA-Rosehill Jemena Roberts Elaostaff Partners Elaostaff Partners					'120	
PAHs in Soil	Ju	13, 2019 00:5	р б			
Our Reference:	UNITS	SE87120-2	SF87120-2	SF87120-2	SE87120-2	SF87120-2
		1	2	3	4	5
Your Reference		V25	V26	V27	V28	V29
Depth		0.1-0.3	0.4-0.5	0.4-0.5	0.3-0.4	0.2-0.3
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Date Extracted		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Date Analysed		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Naphthalene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Acenaphthylene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Acenaphthene	mg/kg	<0.10	0.13	<0.10	<0.10	<0.10
Fluorene	mg/kg	<0.10	<0.10	0.12	<0.10	<0.10
Phenanthrene	mg/kg	0.25	0.58	0.61	<0.10	<0.10
Anthracene	mg/kg	<0.10	0.45	0.28	<0.10	<0.10
Fluoranthene	mg/kg	0.53	2.5	1.4	0.28	0.21
Pyrene	mg/kg	0.49	2.3	1.3	0.30	0.20
Benzo[a]anthracene	mg/kg	0.24	0.86	0.52	0.18	0.10
Chrysene	mg/kg	0.15	0.47	0.29	0.12	<0.10
Benzo[b]fluoranthene	mg/kg	0.3	1	0.6	0.2	0.1
Benzo[k]fluoranthene	mg/kg	0.11	0.26	0.21	<0.10	<0.10
Benzo[a]pyrene	mg/kg	0.23	0.76	0.50	0.17	0.12
Indeno[123-cd]pyrene	mg/kg	0.15	0.48	0.33	0.12	<0.10
Dibenzo[ah]anthracene	mg/kg	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo[ghi]perylene	mg/kg	0.20	0.65	0.45	0.16	0.12
Total PAHs (sum)	mg/kg	<3.23	<10.80	<6.99	<2.34	<1.89
Nitrobenzene-d5	%	100	99	101	103	99
2-Fluorobiphenyl	%	96	96	95	97	93
<i>p</i> -Terphenyl- <i>d14</i>	%	103	103	103	104	99



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PROJECT: ENVIRHOD01225	A-Rosehill Je	menaRoberts	
	FI	agstaff Partners	6
PAHs in Soil	Ju	11 13, 2019 00.5	0
Our Reference:	UNITS	SE87120-2	SE87120-2
		6	9
Your Reference		QC2	QC4
Depth		-	-
Sample Matrix		Soil	Soil
Date Sampled		19/04/2011	19/04/2011
Date Extracted		19/04/2011	19/04/2011
Date Analysed		19/04/2011	19/04/2011
Naphthalene	mg/kg	<0.10	<0.10
Acenaphthylene	mg/kg	<0.10	<0.10
Acenaphthene	mg/kg	<0.10	<0.10
Fluorene	mg/kg	<0.10	<0.10
Phenanthrene	mg/kg	<0.10	<0.10
Anthracene	mg/kg	<0.10	<0.10
Fluoranthene	mg/kg	0.14	<0.10
Pyrene	mg/kg	0.13	<0.10
Benzo[a]anthracene	mg/kg	<0.10	<0.10
Chrysene	mg/kg	<0.10	<0.10
Benzo[<i>b</i>]fluoranthene	mg/kg	<0.1	<0.1
Benzo[k]fluoranthene	mg/kg	<0.10	<0.10
Benzo[a]pyrene	mg/kg	<0.10	<0.10
Indeno[123-cd]pyrene	mg/kg	<0.10	<0.10
Dibenzo[ah]anthracene	mg/kg	<0.10	<0.10
Benzo[<i>ghi</i>]perylene	mg/kg	<0.10	<0.10
Total PAHs (sum)	mg/kg	<1.67	<2
Nitrobenzene-d5	%	99	100
2-Fluorobiphenyl	%	91	92
p -Terphenyl-d14	%	99	101



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PROJECT: ENVIRHOD01225A	PROJECT: ENVIRHOD01225AA-Rosehill Jemena Roberts REPORT NO: SE87 Flagstaff Partners Jun 13, 2019 00:56 Achastes ID in sail					
Asbestos ID in soil						
Our Reference:	UNITS	SE87120-1	SE87120-2	SE87120-3	SE87120-4	SE87120-5
Your Reference		V05	V06	V07	V08	V09
Depth		0.8	0.9	0.9	0.8	0.8
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011

Date Sampled		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Date Analysed		20/04/2011	20/04/2011	20/04/2011	20/04/2011	20/04/2011
Sample Description		38g clay, soil	73g clay, soil	40g clay, soil	60g clay, soil	44g clay, soil
Asbestos ID in soil	-	No asbestos detected Organic fibres detected	No asbestos detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected	No asbestos detected Organic fibres detected

[
Asbestos ID in soil						
Our Reference:	UNITS	SE87120-6	SE87120-7	SE87120-8	SE87120-9	SE87120-1
						0
Your Reference		V10	V11	V12	V13	V14
Depth		0.8	0.8	0.8	0.6	0.6
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Date Analysed		20/04/2011	20/04/2011	20/04/2011	20/04/2011	20/04/2011
Sample Description		47g clay,	35g clay,	40g clay,	36g clay,	52g clay,
		soil, rocks	soil	soil	soil, rocks	soil, rocks
Asbestos ID in soil	-	No	No	No	No	Chrysotile
		asbestos	asbestos	asbestos	asbestos	asbestos
		detected	detected	detected	detected	detected
					Organic	Organic
					fibres	fibres
					detected	detected



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PROJECT: ENVIRHOD01225A	confidential menaRoberts agstaff Partners	6	REPORT NO: SE87120			
Asbestos ID in soil	Ju	n 13, 2019 00:5	6			
Our Reference:	UNITS	SE87120-1	SE87120-1	SE87120-1	SE87120-1	SE87120-1
		1	2	3	4	5
Your Reference		V15	V16	V17	V18	V19
Depth		0.6	0.2-0.4	0.3-0.5	0.2-0.4	0.2-0.5
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Date Analysed		20/04/2011	20/04/2011	20/04/2011	20/04/2011	20/04/2011
Sample Description		48g clay,	50g clay,	58g rocks,	43g rocks,	29g rocks,
		soil, rocks	soil, rocks	soil	soil	soil
Asbestos ID in soil	-	Chrysotile	Chrysotile	No	Chrysotile	Chrysotile
		asbestos	asbestos	asbestos	asbestos	asbestos
		detected	detected	detected	detected	detected
			Organic	Organic	Organic	Organic
			fibres	fibres	fibres	fibres
			detected	detected	detected	detected

Ashastas ID in sail						
Aspestos ID in soli						
Our Reference:	UNITS	SE87120-1	SE87120-1	SE87120-1	SE87120-1	SE87120-2
		6	7	8	9	0
Your Reference		V20	V21	V22	V23	V24
Depth		0.2-0.5	0.3-0.5	0.2-0.4	0.1-0.3	0.2-0.4
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Date Analysed		20/04/2011	20/04/2011	20/04/2011	20/04/2011	20/04/2011
Sample Description		50g rocks,	30g rocks,	62g rocks,	88g rocks,	31g rocks,
		soil	soil	soil	soil	soil
Asbestos ID in soil	-	Chrysotile	Chrysotile	Chrysotile	Chrysotile	Chrysotile
		asbestos	asbestos	asbestos	asbestos	asbestos
		detected	detected	detected	detected	detected
		Organic	Amosite	Organic	Organic	Organic
		fibres	asbestos	fibres	fibres	fibres
		detected	detected	detected	detected	detected
			Organic			
			fibres			
			detected			



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PROJECT: ENVIRHOD01225A	A-Rosehill Je	confidential mena Roberts		REPORT	NO: SE87	'120
	FI	agstaff Partners	6			
Asbestos ID in soil	Ju	n 13, 2019 00:5	6			
Our Reference:	UNITS	SE87120-2	SE87120-2	SE87120-2	SE87120-2	SE87120-2
		1	2	3	4	5
Your Reference		V25	V26	V27	V28	V29
Depth		0.1-0.3	0.4-0.5	0.4-0.5	0.3-0.4	0.2-0.3
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Date Analysed		20/04/2011	20/04/2011	20/04/2011	20/04/2011	20/04/2011
Sample Description		51g rocks,	90g rocks,	59g rocks,	35g rocks,	60g rocks,
		soil	soil	soil	soil	soil
Asbestos ID in soil	-	Chrysotile	No	Chrysotile	Chrysotile	No
		asbestos	asbestos	asbestos	asbestos	asbestos
		detected	detected	detected	detected	detected
		Organic	Organic	Organic	Crocidolite	Organic
		fibres	fibres	fibres	asbestos	fibres
		detected	detected	detected	detected	detected
					Organic	
					fibres	
					detected	



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confidential **PROJECT: ENVIRHOD01225AA-Rosehill Jemena**Roberts Flagstaff Partners Jun 13, 2019 00:56

Moisture						
Our Reference:	UNITS	SE87120-1	SE87120-2	SE87120-3	SE87120-4	SE87120-5
Your Reference		V05	V06	V07	V08	V09
Depth		0.8	0.9	0.9	0.8	0.8
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Date Analysed (moisture)		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Moisture	%	29	24	28	14	9

Moisture Our Reference:	UNITS	SE87120-6	SE87120-7	SE87120-8	SE87120-9	SE87120-1 0
Your Reference		V10	V11	V12	V13	V14
Depth		0.8	0.8	0.8	0.6	0.6
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Date Analysed (moisture)		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Moisture	%	9	20	36	28	29

Moisture						
Our Reference:	UNITS	SE87120-1	SE87120-1	SE87120-1	SE87120-1	SE87120-1
		1	2	3	4	5
Your Reference		V15	V16	V17	V18	V19
Depth		0.6	0.2-0.4	0.3-0.5	0.2-0.4	0.2-0.5
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Date Analysed (moisture)		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Moisture	%	37	9	8	5	5

Moisture						
Our Reference:	UNITS	SE87120-1	SE87120-1	SE87120-1	SE87120-1	SE87120-2
		6	7	8	9	0
Your Reference		V20	V21	V22	V23	V24
Depth		0.2-0.5	0.3-0.5	0.2-0.4	0.1-0.3	0.2-0.4
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Date Analysed (moisture)		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Moisture	%	9	4	20	14	17



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Street Alexandria NSW 201 www.au.sgs.com

PROJECT: ENVIRHOD01225A	REPORT	NO: SE87	120			
Moisture	Jur	1 13, 2019 00:5	6			
Our Reference:	UNITS	SE87120-2 1	SE87120-2 2	SE87120-2 3	SE87120-2 4	SE87120-2 5
Your Reference		V25	V26	V27	V28	V29
Depth		0.1-0.3	0.4-0.5	0.4-0.5	0.3-0.4	0.2-0.3
Sample Matrix Date Sampled		Soil 19/04/2011	Soil 19/04/2011	Soil 19/04/2011	Soil 19/04/2011	Soil 19/04/2011
Date Analysed (moisture)		19/04/2011	19/04/2011	19/04/2011	19/04/2011	19/04/2011
Moisture	%	14	10	16	31	28

Moisture			
Our Reference:	UNITS	SE87120-2	SE87120-2
		6	9
Your Reference		QC2	QC4
Depth		-	-
Sample Matrix		Soil	Soil
Date Sampled		19/04/2011	19/04/2011
		40/04/0044	40/04/0044
Date Analysed (moisture)		19/04/2011	19/04/2011
Moisture	%	29	10



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Method ID	Methodology Summary
AN422	Polynuclear Aromatic Hydrocarbons - determined by solvent extraction with dichloromethane / acetone for soils and dichloromethane for waters, followed by instrumentation analysis using GC/MS SIM mode.
AN602	Analysed using in house method AN602 - Qualitative identification of Asbestos Fibres, Synthetic Mineral Fibres and Organic Fibres in bulk samples (including building materials and soils) using Polarised Light Microscopy and Dispersion Staining Techniques. Our NATA Accreditation does not currently cover the identification of Synthetic Mineral Fibres and Organic Fibres, however, according to new NATA requirements, the reporting of these fibres is compulsory if detected.
AN002	



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PROJECT:	ENVIRHC	D01225	AA-Rosehill	confide Jemenar Flagstaff F	ential oberts Partners	REPORT	NO: SE87	7120
QUALITY CONTROL	UNITS	LOR	METHOD	Blank 20	Duplicate Sm#	Duplicate	Spike Sm#	Matrix Spike % Recovery
						%RPD		
Date Extracted				19/04/1 1	SE87120-1 1	19/04/2011 19/04/2011	SE87120-5	19/04/11
Date Analysed				19/04/1 1	SE87120-1 1	19/04/2011 19/04/2011	SE87120-5	19/04/11
Naphthalene	mg/kg	0.1	AN422	<0.10	SE87120-1 1	<0.10 <0.10	SE87120-5	91%
Acenaphthylene	mg/kg	0.1	AN422	<0.10	SE87120-1 1	<0.10 <0.10	SE87120-5	98%
Acenaphthene	mg/kg	0.1	AN422	<0.10	SE87120-1 1	<0.10 <0.10	SE87120-5	105%
Fluorene	mg/kg	0.1	AN422	<0.10	SE87120-1 1	<0.10 <0.10	[NR]	[NR]
Phenanthrene	mg/kg	0.1	AN422	<0.10	SE87120-1 1	<0.10 <0.10	SE87120-5	97%
Anthracene	mg/kg	0.1	AN422	<0.10	SE87120-1 1	<0.10 <0.10	SE87120-5	112%
Fluoranthene	mg/kg	0.1	AN422	<0.10	SE87120-1 1	<0.10 <0.10	SE87120-5	103%
Pyrene	mg/kg	0.1	AN422	<0.10	SE87120-1 1	<0.10 <0.10	SE87120-5	112%
Benzo[a]anthracene	mg/kg	0.1	AN422	<0.10	SE87120-1 1	<0.10 <0.10	[NR]	[NR]
Chrysene	mg/kg	0.1	AN422	<0.10	SE87120-1 1	<0.10 <0.10	[NR]	[NR]
Benzo[b]fluoranthene	mg/kg	0.1	AN422	<0.1	SE87120-1 1	<0.1 <0.1	[NR]	[NR]
Benzo[k]fluoranthene	mg/kg	0.1	AN422	<0.10	SE87120-1 1	<0.10 <0.10	[NR]	[NR]
Benzo[a]pyrene	mg/kg	0.1	AN422	<0.10	SE87120-1 1	<0.10 <0.10	SE87120-5	99%
Indeno[123-cd]pyren e	mg/kg	0.1	AN422	<0.10	SE87120-1 1	<0.10 <0.10	[NR]	[NR]
Dibenzo[<i>ah</i>]anthrace ne	mg/kg	0.1	AN422	<0.10	SE87120-1 1	<0.10 <0.10	[NR]	[NR]
Benzo[ghi]perylene	mg/kg	0.1	AN422	<0.10	SE87120-1 1	<0.10 <0.10	[NR]	[NR]
Total PAHs (sum)	mg/kg	1.6	AN422	<2	SE87120-1 1	<2 <2	[NR]	[NR]
Nitrobenzene-d5	%	0	AN422	108	SE87120-1 1	105 101 RPD: 4	SE87120-5	110%
2-Fluorobiphenyl	%	0	AN422	100	SE87120-1 1	98 95 RPD: 3	SE87120-5	104%
p -Terphenyl-d 14	%	0	AN422	107	SE87120-1 1	110 106 RPD: 4	SE87120-5	116%



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confidential PROJECT: ENVIRHOD01225AA-Rosehill JemenaRoberts Flagstaff Partners

QUALITY CONTROL Asbestos ID in soil	UNITS	LOR	METHOD	Blank	9 00:56
Date Analysed				20/04/2 011	

QUALITY CONTROL	UNITS	LOR	METHOD	Blank
Hold sample- NO test required				
Sample on HOLD		[NT]		[NT]

QUALITY CONTROL	UNITS	LOR	METHOD	Blank
Moisture				
Date Analysed (moisture)				19/04/2 011
Moisture	%	1	AN002	<1

QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate	Spike Sm#	Matrix Spike % Recovery
PAHs in Soil			Base + Duplicate + %RPD		Duplicate + %RPD
Date Extracted		SE87120-4	19/04/2011 19/04/2011	LCS	19/04/11
Date Analysed		SE87120-4	19/04/2011 19/04/2011	LCS	19/04/11
Naphthalene	mg/kg	SE87120-4	<0.10 <0.10	LCS	86%
Acenaphthylene	mg/kg	SE87120-4	<0.10 <0.10	LCS	93%
Acenaphthene	mg/kg	SE87120-4	<0.10 <0.10	LCS	100%
Fluorene	mg/kg	SE87120-4	<0.10 <0.10	[NR]	[NR]
Phenanthrene	mg/kg	SE87120-4	<0.10 <0.10	LCS	93%
Anthracene	mg/kg	SE87120-4	<0.10 <0.10	LCS	104%
Fluoranthene	mg/kg	SE87120-4	<0.10 <0.10	LCS	97%
Pyrene	mg/kg	SE87120-4	<0.10 <0.10	LCS	104%
Benzo[a]anthracene	mg/kg	SE87120-4	<0.10 <0.10	[NR]	[NR]
Chrysene	mg/kg	SE87120-4	<0.10 <0.10	[NR]	[NR]
Benzo[b]fluoranthene	mg/kg	SE87120-4	<0.1 <0.1	[NR]	[NR]
Benzo[k]fluoranthene	mg/kg	SE87120-4	<0.10 <0.10	[NR]	[NR]
Benzo[a]pyrene	mg/kg	SE87120-4	<0.10 <0.10	LCS	94%
Indeno[123-cd]pyrene	mg/kg	SE87120-4	<0.10 <0.10	[NR]	[NR]
Dibenzo[ah]anthracene	mg/kg	SE87120-4	<0.10 <0.10	[NR]	[NR]
Benzo[ghi]perylene	mg/kg	SE87120-4	<0.10 <0.10	[NR]	[NR]
Total PAHs (sum)	mg/kg	SE87120-4	<2 <2	[NR]	[NR]



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PROJECT: EN	IVIRHOD0	1225AA-Ro	confidential sehill Jemena	ts	REPORT NO:	SE87120
QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate Jun 13, 2019 00	Spike Sm#	Matrix Spike % Recovery	
PAHs in Soil			Base + Duplicate + %RPD		Duplicate + %RPD	
Nitrobenzene-d5	%	SE87120-4	101 108 RPD: 7	LCS	97%	
2-Fluorobiphenyl	%	SE87120-4	93 99 RPD: 6	LCS	94%	
p -Terphenyl-d14	%	SE87120-4	102 108 RPD: 6	LCS	107%	

QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate
PAHs in Soil			Base + Duplicate + %RPD
Date Extracted		SE87120-2 1	19/04/2011 19/04/2011
Date Analysed		SE87120-2 1	19/04/2011 19/04/2011
Naphthalene	mg/kg	SE87120-2 1	<0.10 <0.10
Acenaphthylene	mg/kg	SE87120-2 1	<0.10 <0.10
Acenaphthene	mg/kg	SE87120-2 1	<0.10 <0.10
Fluorene	mg/kg	SE87120-2 1	<0.10 <0.10
Phenanthrene	mg/kg	SE87120-2 1	0.25 0.31 RPD: 21
Anthracene	mg/kg	SE87120-2 1	<0.10 0.11
Fluoranthene	mg/kg	SE87120-2 1	0.53 0.58 RPD: 9
Pyrene	mg/kg	SE87120-2 1	0.49 0.58 RPD: 17
Benzo[a]anthracene	mg/kg	SE87120-2 1	0.24 0.26 RPD: 8
Chrysene	mg/kg	SE87120-2 1	0.15 0.16 RPD: 6
Benzo[<i>b</i>]fluoranthene	mg/kg	SE87120-2 1	0.3 0.3 RPD: 0
Benzo[<i>k</i>]fluoranthene	mg/kg	SE87120-2 1	0.11 0.11 RPD: 0
Benzo[a]pyrene	mg/kg	SE87120-2 1	0.23 0.23 RPD: 0
Indeno[123-cd]pyrene	mg/kg	SE87120-2 1	0.15 0.15 RPD: 0
Dibenzo[<i>ah</i>]anthracene	mg/kg	SE87120-2 1	<0.10 <0.10
Benzo[<i>ghi</i>]perylene	mg/kg	SE87120-2 1	0.20 0.20 RPD: 0



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REPORT NO:	SE87120
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PROJECT: EN	IVIRHOD0	1225AA-Ro	confidential sehill JemenaRoberts
QUALITY CONTROL	UNITS	Dup. Sm#	Duplicate Flagstaff Partners
PAHs in Soil			Base + Duplicate +
			%RPD
Total PAHs (sum)	mg/kg	SE87120-2 1	<3.23 <3.48
Nitrobenzene-d5	%	SE87120-2 1	100 97 RPD: 3
2-Fluorobiphenyl	%	SE87120-2 1	96 93 RPD: 3
p -Terphenyl-d14	%	SE87120-2 1	103 99 RPD: 4



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confidential PROJECT: ENVIRHOD01225AA-Rosehill JemenaRoberts

Flagstaff Partners Jun 13, 2019 00:56

[RPD] : Relative Percentage Difference

[N/A] : Not Applicable

: Not part of NATA Accreditation

Result Codes

[INS] Insufficient Sample for this test : [NR] Not Requested

[NT] : Not tested

[LOR] : Limit of reporting

Report Comments

PAH-Spike not reported for sample#22 due to sample matrix interference. Sampled by the client

Even after disintegration it can be very difficult, or impossible, to detect the presence of asbestos in some asbestos-containing bulk materials using polarised light microscopy. This is due to the low grade or small length or diameter of asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials.

No respirable fibres detected using trace analysis technique.

Sample #10: 1-3mm length fibre bundles x3 found loose in sample. Sample #11, 12,14, 15, 16: 1-3mm length fibre bundle x1found loose in sample. Sample #17: 1-4mm length fibre bundles x2 found loose in sample. Sample #18: 1-4mm length fibre bundles found loose in sample and 4x2x2mm cement sheet fragment. Sample #19: 1-4mm length fibre bundles found loose in sample and 5x3x2mm cement sheet fragments. Sample #20, 21: 1-3mm length fibre bundles x2 found loose in sample. Sample #23: 1-4mm length fibre bundles x3 found loose in sample. Sample #24: 1-4mm length fibre bundles found loose in sample and 6x4x2mm cement sheet fragments. Asbestos analysed by Approved Identifier Yusuf Kuthpudin. Samples analysed as received. Solid samples expressed on a dry weight basis. Date Organics extraction commenced: NATA Corporate Accreditation No. 2562, Site No 4354 Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*) This document is issued by the Company subject to its General Conditions of Service (www.sgs.com/terms and conditions.htm). Attention is drawn to the limitations of liability,

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Quality Control Protocol

Method Blank: An analyte free matrix to which all reagents are added in the same volume or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. A method blank is prepared every 20 samples.

Duplicate: A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.

Surrogate Spike: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are added to samples before extraction to monitor extraction efficiency and percent recovery in each sample.

Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments

Laboratory Control Sample: A known matrix spiked with compound(s) representative of the target analytes. It is used to document laboratory performance. When the results of the matrix spike analysis indicates a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

Matrix Spike: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.



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confidential PROJECT: ENVIRHOD01225AA-Rosehill JemenaRoberts

Quality Acceptance Criteria

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf

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confidential James Roberts SAMPLE RECEIPTEADVICE (SRA)

20 April 2011

Client Details		Croig Cowpor		Laboratory Det	ails	
Requested By Client Contact Address	:	Coffey Environments Pty Ltd Craig Cowper Level 1, 3 Rider Boulevard RHODES NSW 2138		Laboratory Manager Address	:	SGS Environmental Services Edward Ibrahim Unit 16, 33 Maddox Street Alexandria NSW 2015
Email Telephone Facsimile	: :	craig_cowper@coffey.com 02 8083 1600 02 8765 0762		Email Telephone Facsimile	: :	au.samplereceipt.sydney@sgs.com 61 2 8594 0400 61 2 8594 0499
Project Order Number Samples	: :	ENVIRHOD01225AA-Rosehill Jem 92135-92137 29 Soils	ena	Report No No. of Samples Due Date	:	SE87120 29 20/04/2011
Date Instructions Received Sample Receipt Date	:	19/04/2011 19/04/2011				
Samples received in good orde Samples received without head Upon receipt sample temperatu Sample containers provided by Turnaround time requested	r dspao ire :	: YES co YES : Cool : SGS : 1 Day	Samples received Sufficient quantity Cooling Method Samples clearly La Completed docume	in correct containe supplied belled entation received	er:; : : :	YES YES Ice YES YES

Samples will be held for 1 month for water samples and 3 months for soil samples from date of receipt of samples, unless otherwise instructed.

Comments

To the extent not inconsistent with the other provisions of this document and unless specifically agreed otherwise in writing by SGS, all SGS services are rendered in accordance with the applicable SGS General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm as at the date of this document. Attention is drawn to the limitations of liablility and to the clauses of indemnification.

The signed chain of custody will be returned to you with the original report.

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Jun 13, 2019 00:56

confidential



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SAMPLE RECEIPT ADVICE (SRA) - continued

Client	:	Coffey Environments Pty Ltd	Report No	:	SE87120
Project	:	ENVIRHOD01225AA-Rosehill Jemena			

Summary of Samples and Requested Analysis

The table below represents SGS Environmental Service's understanding and interpretation of the customer supplied sample request.

Please indicate ASAP if your request differs from these details.

Testing shall commence immediately as per this table, unless the customer intervenes with a correction prior to testing. Note that a small X in the table below indicates some testing has not been requested in the package.

Sample No.	Description	No Prep Required	PAHs in Soil	Asbestos ID in soil	Hold sample-NO test required	Moisture
1	V05	Х	Х	х		Х
2	V06	Х	Х	х		Х
3	V07	Х	Х	Х		Х
4	V08	Х	Х	Х		Х
5	V09	Х	Х	Х		Х
6	V10	Х	Х	Х		Х
7	V11	Х	Х	Х		Х
8	V12	Х	Х	х		Х
9	V13	Х	Х	Х		Х
10	V14	Х	Х	Х		Х
11	V15	Х	Х	Х		Х
12	V16	Х	Х	Х		Х
13	V17	Х	Х	Х		Х
14	V18	Х	Х	x		Х
15	V19	Х	Х	Х		Х
16	V20	Х	Х	Х		Х
17	V21	Х	Х	Х		Х
18	V22	Х	Х	Х		Х

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SAMPLE RECEIPT ADVICE (SRA) - continued

Client Project	t	:	Coffey En ENVIRHO	vironme D01225/	nts Pty L AA-Rose	_td hillJem	ena	Report No	:	SE87120
							red			

Sample No.	Description	No Prep Required	PAHs in Soil	Asbestos ID in soil	Hold sample-NO test requi	Moisture
19	V23	Х	х	х		х
20	V24	Х	Х	Х		х
21	V25	Х	Х	Х		х
22	V26	Х	Х	Х		Х
23	V27	Х	Х	Х		Х
24	V28	Х	Х	Х		Х
25	V29	Х	Х	Х		Х
26	QC2	Х	Х			х
27	QC3				Х	
28	QC3A				Х	
29	QC4	Х	Х			Х

Sample No.	Description
1	V05
2	V06
3	V07
4	V08
5	V09
6	V10
7	V11
8	V12
9	V13

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SAMPLE RECEIPT ADVICE (SRA) - continued

Client Project	:	Coffey Environments Pty Ltd ENVIRHOD01225AA-Rosehill Jemena	Report No	:	SE87120

Sample No.	Description
10	V14
11	V15
12	V16
13	V17
14	V18
15	V19
16	V20
17	V21
18	V22
19	V23
20	V24
21	V25
22	V26
23	V27
24	V28
25	V29
26	QC2
27	QC3
28	QC3A
29	QC4

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NANS	PRINT	ERS	02 975	5 3545	5			Jame	es Robe	erts ners	1
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	Tin	Da	ПП	Da	D BY:					Sample	Onm Pasig City, M NSW 2304
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				_	_					Time	ines in
	Company:	Signature:	Company:	Signature:			Ų		-8	Matrix (Soil etc)	/ (463) (2) 638 9686 (02) 8083 1600 (02) 4016 2300 (02) 4272 6071 Task No: Laborator Project Mi
			28	In	RECEIVI		Ą		1 bag	Container Type Preservative*	Fax (+63) (2) 687 3518 Fax (02) 6248 7157 Fax (02) 4016 2380 Fax (02) 4272 6075 I - 6 Y: SC S anager: CDAC (
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	Time:	Date:	Time:	Date:			ł		24	T-A-T (Specify)	147 Doggett St Lavel 1, 2-3 G D Coffey Busine 126 Trenery V 146 Trenery V 146 Duke St, A 161 Duke St, A 161 Duke St, A 150 Ute 3 & 4, 2 Suite 3 & 4, 2
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7	d			ndition	Use Only)	20 er 0 00				NOTES	Fax (07) 3852 2805 Fax (08) 8172 1968 Fax (03) 6108 0199 Fax (03) 9473 1450 Fax (08) 9355 7111 Fax (08) 9355 71111 Fax (08) 9355 71111 Fax (08) 9756 8878

James Roberts Flagstaff Partners Jun 13, 2019 00:56



confidential James Roberts Flagstaff Partners Jun 13, 2019 00:56

ANALYTICAL REPORT

5 May 2011

Coffey Environments Pty Ltd

Level 1, 3 Rider Boulevard RHODES **NSW 2138**

Attention:	Craig Cowper		
Your Reference:	ENVIRHOD01225AA - Rosehill	Jemena	
Our Reference:	SE87368	Samples: Received:	6 Soils 4/5/11
Preliminary Report	Sent: Not Issued		

These samples were analysed in accordance with your written instructions.

For and on Behalf of: SGS ENVIRONMENTAL SERVICES

Sample Receipt: **Production Manager:** Angela Mamalicos Huong Crawford

AU.SampleReceipt.Sydney@sgs.com Huong.Crawford@sgs.com

Results Approved and/or Authorised by:

S.Raunel

Ravee Sivasubramaniam Asbestos Signatory



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Page 1 of 4

SGS Australia Pty Ltd ABN 44 000 964 278

t+64(0)285940400 f+61(0)285940499

Environmental Services Unit 16/33 Maddox Street Alexandria NSW 2015 Australia www.au.sgs.com

confidential PROJECT: ENVIRHOD01225AA - Rosehill Jemena berts Flagstaff Partners Jun 13, 2019 00:56

Asbestos ID in soil						
Our Reference:	UNITS	SE87368-1	SE87368-2	SE87368-3	SE87368-4	SE87368-5
Your Reference		V30	V31	V32	V33	V34
Sample Matrix		Soil	Soil	Soil	Soil	Soil
Date Sampled		4/05/2011	4/05/2011	4/05/2011	4/05/2011	4/05/2011
Date Analysed		5/05/2011	5/05/2011	5/05/2011	5/05/2011	5/05/2011
Sample Description		120g	135g	160g	142g	128g
		Clay,soil	Clay,soil	Clay,soil	Clay,soil	Clay,soil
Asbestos ID in soil	-	No	No	No	No	No
		asbestos	asbestos	asbestos	asbestos	asbestos
		detected	detected	detected	detected	detected
		Organic	Organic	Organic	Organic	Organic
		fibres	fibres	fibres	fibres	fibres
		detected	detected	detected	detected	detected

Asbestos ID in soil		
Our Reference:	UNITS	SE87368-6
Your Reference		V35
Sample Matrix		Soil
Date Sampled		4/05/2011
Date Analysed		5/05/2011
Sample Description		114g Clay,soil
Asbestos ID in soil	-	No asbestos detected Organic fibres detected



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Method ID	Methodology Summary
AN602	Analysed using in house method AN602 - Qualitative identification of Asbestos Fibres, Synthetic Mineral Fibres and Organic Fibres in bulk samples (including building materials and soils) using Polarised Light Microscopy and Dispersion Staining Techniques. Our NATA Accreditation does not currently cover the identification of Synthetic Mineral Fibres and Organic Fibres, however, according to new NATA requirements, the reporting of these fibres is compulsory if detected.



Page 3 of 4

SGS Australia Pty Ltd ABN 44 000 964 278 Environmental Services Unit 16/33 Maddox Street Alexandria NSW 2015 Australia t +61(0)28594 0400 f + 61 (0)2 8594 0499 www.au.sgs.com

Result Codes

 [INS]
 :
 Insufficient Sample for this test

 [NR]
 :
 Not Requested

 [NT]
 :
 Not tested

 [LOR]
 :
 Limit of reporting

 Report
 Comments

 Sampled by the client

[RPD] : Relative Percentage Difference

: Not part of NATA Accreditation

[N/A] : Not Applicable

Flagstaff Partners Jun 13, 2019 00:56

Even after disintegration it can be very difficult, or impossible, to detect the presence of asbestos in some asbestos-containing bulk materials using polarised light microscopy. This is due to the low grade or small length or diameter of asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials.

No respirable fibres detected using trace analysis technique.

Asbestos analysed by Approved Identifier Yusuf Kuthpudin. Samples analysed as received. Solid samples expressed on a dry weight basis. Date Organics extraction commenced: NATA Corporate Accreditation No. 2562, Site No 4354 Note: Test results are not corrected for recovery (excluding Air-toxics and Dioxins/Furans*) This document is issued by the Company subject to its General Conditions of Service (www.sgs.com/terms_and_conditions.htm). Attention is drawn to the limitations of liability, indemnification and jurisdictional issues established therein.

This document is to be treated as an original within the meaning of UCP 600. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Quality Control Protocol

Method Blank: An analyte free matrix to which all reagents are added in the same volume or proportions as used in sample processing. The method blank should be carried through the complete sample preparation and analytical procedure. A method blank is prepared every 20 samples.

Duplicate: A separate portion of a sample being analysed that is treated the same as the other samples in the batch. One duplicate is processed at least every 10 samples.

Surrogate Spike: An organic compound which is similar to the target analyte(s) in chemical composition and behavior in the analytical process, but which is not normally found in environmental samples. Surrogates are added to samples before extraction to monitor extraction efficiency and percent recovery in each sample.

Internal Standard: Added to all samples requiring analysis for organics (where relevant) or metals by ICP after the extraction/digestion process; the compounds/elements serve to give a standard of retention time and/or response, which is invariant from run-to-run with the instruments.

Laboratory Control Sample: A known matrix spiked with compound(s) representative of the target analytes. It is used to document laboratory performance. When the results of the matrix spike analysis indicates a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

Matrix Spike: An aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

Quality Acceptance Criteria

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: http://www.au.sgs.com/sgs-mp-au-env-qu-022-qa-qc-plan-en-09.pdf



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Page 4 of 4

Environmental Services Unit 16/33 Maddox Street Alexandria NSW 2015 Australia t+61(0)28594 0400 f+61 (0)2 8594 0499 www.au.sgs.com



confidential James Roberts SAMPLE RECEIPTEADVICE (SRA)

5 May 2011

Client Details Requested By	•	Craig Cowper		Laboratory De	tails	
Client	:	Coffey Environments Pty Ltd		Laboratory	:	SGS Environmental Services
Contact	:	Craig Cowper		Manager	:	Edward Ibrahim
Address	:	Level 1, 3 Rider Boulevard RHODES NSW 2138		Address	:	Unit 16, 33 Maddox Street Alexandria NSW 2015
Email	:	craig_cowper@coffey.com		Email	:	au.samplereceipt.sydney@sgs.com
Telephone	:	02 8083 1600		Telephone	:	61 2 8594 0400
Facsimile	:	02 8765 0762		Facsimile	:	61 2 8594 0499
Project	:	ENVIRHOD01225AA - Rosehill Jei	mena	Report No	:	SE87368
Order Number	:	92138		No. of Samples	:	6
Samples	:	6 Soils		Due Date	:	5/05/2011
Date Instructions Received	:	4/05/2011				
Sample Receipt Date	:	4/5/11				
Samples received in good order	-	: YES	Samples received	in correct contain	er:;	YES
Samples received without head	spac	o N/A	Sufficient quantity	supplied	:	YES
Upon receipt sample temperatur	e :	Ambient	Cooling Method		:	None
Sample containers provided by		: Customer	Samples clearly La	belled	:	YES
Turnaround time requested		: 1 Day	Completed docume	entation received	:	YES

Samples will be held for 1 month for water samples and 3 months for soil samples from date of receipt of samples, unless otherwise instructed.

Comments

To the extent not inconsistent with the other provisions of this document and unless specifically agreed otherwise in writing by SGS, all SGS services are rendered in accordance with the applicable SGS General Conditions of Service accessible at http://www.sgs.com/terms_and_conditions.htm as at the date of this document. Attention is drawn to the limitations of liablility and to the clauses of indemnification.

The signed chain of custody will be returned to you with the original report.

Page 1 of 2

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Jun 13, 2019 00:56

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SAMPLE RECEIPT ADVICE (SRA) - continued

Client	:	Coffey Environments Pty Ltd	Report No	:	SE87368
Project	:	ENVIRHOD01225AA - Rosehill Jemena			

Summary of Samples and Requested Analysis

The table below represents SGS Environmental Service's understanding and interpretation of the customer supplied sample request.

Please indicate ASAP if your request differs from these details.

Testing shall commence immediately as per this table, unless the customer intervenes with a correction prior to testing. Note that a small X in the table below indicates some testing has not been requested in the package.

Sample No.	Description	No Prep Required	Asbestos ID in soil
1	V30	Х	Х
2	V31	Х	Х
3	V32	Х	Х
4	V33	Х	Х
5	V34	Х	Х
6	V35	х	Х

Sample No.	Description
1	V30
2	V31
3	V32
4	V33
5	V34
6	V35

Page 2 of 2 confidential James Roberts Flagstaff Partners Jun 13, 2019 00:56



Sydney Unit F6, Building F 16 Mars Road Lane Cove West NSW 2066 Phone : +61 2 8215 6222 NATA # 1261 Site # 18217 Brisbane 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 4600

Sample Receipt Advice

company name.	
Contact name:	- ALL INV Nicole
Client job number:	ROSEHILL JEMENA ENVIRHOD01225AA
COC number:	92134
Turn around time:	1 Day
Date received:	Apr 1, 2011
MGT lab reference:	295216

Coffee Coviree ments Dtrolled NOW

Sample information

Compony nome

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- Sample Temperature of a random sample selected from the batch as recorded by mgt Sample Receipt : 4.00 Celsius.
- All samples have been received as described on the above COC.
- COC has been completed correctly.
- \checkmark Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ☑ Organic samples had Teflon liners.
- Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Bob Symons on Phone : +61 2 8215 6222 or by e.mail: enviro.sydney@labmark.com.au

Results will be delivered electronically via e.mail to - ALL INV Nicole - Nicole_Coffee@coffey.com.

mgt Labmark Sample Receipt





Flagstaff Partners Jun 13, 2019 00:56

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

92134

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CHAIN OF CUSTODY AND ANALYSIS REQUEST USSUE 3 ISSUE: 3																				

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Coffey Environments Pty Ltd NSW Level 1, 3 Rider Boulevard Rhodes New South Wales 2138

Attention: Craig Cowper

Report Client Reference Received Date 295216-S ROSEHILL JEMENA ENVIRHOD01225AA Apr 01, 2011

Client Sample ID			QC1A
Sample Matrix			Soil
mgt-LabMark Sample No.			S11-MA33718
Date Sampled			Apr 01, 2011
Test/Reference	LOR	Unit	
Polyaromatic Hydrocarbons (PAH)			
Acenaphthene	0.5	mg/kg	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5
Anthracene	0.5	mg/kg	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5
Benzo(b)fluoranthene &			
Benzo(k)fluoranthene	1	mg/kg	< 1
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5
Chrysene	0.5	mg/kg	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5
Fluorene	0.5	mg/kg	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5
Naphthalene	0.5	mg/kg	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5
Pyrene	0.5	mg/kg	< 0.5
Total PAH	1	mg/kg	< 1
2-Fluorobiphenyl (surr.)	1	%	97
p-Terphenyl-d14 (surr.)	1	%	95
% Moisture	0.1	%	25

Certificate of Analysis



NATA Accredited Accreditation Number 1261 Site Number 18217

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Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Testing Site	Extracted	Holding Time
Polyaromatic Hydrocarbons (PAH)	Sydney	Apr 01, 2011	14 Day
- Method: E007 Polyaromatic Hydrocarbons (PAH)			
% Moisture	Sydney	Apr 01, 2011	28 Day
- Method: E005 Moisture Content			

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ABN – 50 005 085 521 e.mail : mgt@mgtenv.com.au confidential James Roberts Flagstaff Partners Jun 13, 2019 00:56 web : www.mgtiabmark.com.au

Melbourne 3-5 Kingston Town Close Oakleigh VIC 3166 Phone : +61 3 9564 7055 NATA # 1261 & 1645 Site # 1254 & 14271
 Sydney
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 Unit F6, Building F
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 Lane Cove West NSW 2066
 P

 Phone : +61 2 8215 6222
 NATA # 1261 Site # 18217

Brisbane 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 4600

Client Manager: Leanne Knowles



mgt-LabMark Internal Quality Control Review General

- 1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples
- are included in this QC report where applicable. Additional QC data may be available on request.
- 2. All soil results are reported on a dry basis, unless otherwise stated.
- 3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
- 4. Results are uncorrected for matrix spikes or surrogate recoveries.
- 5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- 6. Samples were analysed on an 'as received' basis.
- 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001) For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment. If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

**NOTE: pH duplicates are reported as a range NOT as an RPD

UNITS

mg/kg:milligrams per Kilogram	mg/L:milligrams per litre
μg/l: micrograms per litre	ppm: Parts per million
ppb: Parts per billion	%: Percentage
org/100ml: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units

TERMS

Dry:	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.				
LOR:	Limit Of Reporting.				
SPIKE:	Addition of the analyte to the sample and reported as percentage recovery.				
RPD:	Relative Percent Difference between two Duplicate pieces of analysis.				
LCS:	Laboratory Control Sample - reported as percent recovery.				
CRM:	Certified Reference Material - reported as percent recovery.				
Method Blank:	In the case of solid samples these are performed on laboratory certified clean sands.				
	In the case of water samples these are performed on de-ionised water.				
Surr - Surrogate:	: The addition of a like compound to the analyte target and reported as percentage recovery.				
Duplicate:	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.				
Batch Duplicate:	A second piece of analysis from a sample outside of the client's batch of samples but run within the laboratory batch of analysis.				
Batch SPIKE:	Spike recovery reported on a sample from outside of the client's batch of samples but run within the laboratory batch of analysis.				
USEPA:	U.S Environmental Protection Agency				
APHA:	American Public Health Association				
ASLP:	Australian Standard Leaching Procedure (AS4439.3)				
TCLP:	Toxicity Characteristic Leaching Procedure				
COC:	Chain Of Custody				
SRA:	Sample Receipt Advice				

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-20%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.

- 2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- 3. Organochlorine Pesticide analysis where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
- 4. Organochlorine Pesticide analysis where reporting Spike data, Toxophene is not added to the Spike.
- 5. Total Recoverable Hydrocarbons where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.

6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.

7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte. 8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.

9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.

10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data below the LOR with a positive RPD

- eg: LOR 0.1, Result A = <0.1 (raw data is 0.02) & Result B = <0.1 (raw data is 0.03) resulting in a RPD of 40% calculated from the raw data.

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Quality Control Results

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes	
Method Blank								
Polyaromatic Hydrocarbons (PAH) E007 Polyaromatic Hydroca								
Acenaphthene	mg/kg	< 0.5			0.5	Pass		
Acenaphthylene	mg/kg	< 0.5			0.5	Pass		
Anthracene	mg/kg	< 0.5			0.5	Pass		
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass		
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass		
Benzo(b)fluoranthene & Benzo(k)fluorar	mg/kg	< 1			1	Pass		
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass		
Chrysene	mg/kg	< 0.5			0.5	Pass		
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass		
Fluoranthene	mg/kg	< 0.5			0.5	Pass		
Fluorene	mg/kg	< 0.5			0.5	Pass		
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass		
Naphthalene	mg/kg	< 0.5			0.5	Pass		
Phenanthrene	mg/kg	< 0.5			0.5	Pass		
Pyrene	mg/kg	< 0.5			0.5	Pass		
LCS - % Recovery								
Polyaromatic Hydrocarbons (PAH) E007 Polyarom	natic Hydroca	Result 1						
Acenaphthene	%	89			70-130	Pass		
Acenaphthylene	%	88			70-130	Pass		
Anthracene	%	87			70-130	Pass		
Benz(a)anthracene	%	81			70-130	Pass		
Benzo(a)pyrene	%	73			70-130	Pass		
Benzo(b)fluoranthene & Benzo(k)fluorar	%	74			70-130	Pass		
Benzo(g.h.i)perylene	%	120			70-130	Pass		
Chrysene	%	91			70-130	Pass		
Dibenz(a.h)anthracene	%	98			70-130	Pass		
Fluoranthene	%	89			70-130	Pass		
Fluorene	%	88			70-130	Pass		
Indeno(1.2.3-cd)pyrene	%	108			70-130	Pass		
Naphthalene	%	91			70-130	Pass		
Phenanthrene	%	86			70-130	Pass		
Pyrene	%	88			70-130	Pass		

confidential



Comments

Sample Integrity	
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Organic samples had Teflon liners	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Dr. Bob Symons NATA Signatory

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

mgt-LabMark shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall mgt-LabMark be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.



Melbourne 3-5 Kingston Town Close Oakleigh Vic 3166 Phone : +61 3 9564 7055 NATA # 1261 & 1645 Site # 1254 & 14271 Sydney Unit F6, Building F 16 Mars Road Lane Cove West NSW 2066 Phone : +61 2 8215 6222 NATA # 1261 Site # 18217 Brisbane 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 4600

Sample Receipt Advice

Company name:	Coffey Environments Pty Ltd NSW
Contact name:	Craig Cowper
Client job number:	JEMENA ROSEHILL ENVIROHOD01225AA
COC number:	92137
Turn around time:	1 Day
Date received:	Apr 21, 2011
MGT lab reference:	297317

Sample information

A detailed list of analytes logged into our LIMS, is included in the attached summary table.

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- All samples have been received as described on the above COC.
- COC has been completed correctly.
- Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ☑ Organic samples had Teflon liners.
- Some samples have been subcontracted.
- N/A Custody Seals intact (if used).

Contact notes

If you have any questions with respect to these samples please contact:

Leanne Knowles on Phone : +61 2 9476 6533 or by e.mail: leanne.knowles@labmark.com.au

Results will be delivered electronically via e.mail to Craig Cowper - Craig_Cowper@coffey.com.

mgt Labmark Sample Receipt





Flagstaff Partners Jun 13, 2019 00:56



Coffey Environments Pty Ltd NSW Level 1, 3 Rider Boulevard Rhodes New South Wales 2138

WORLD RECOGNISED ACCREDITATION

Certificate of Analysis

NATA Accredited Accreditation Number 1261 Site Number 18217

This document is issued in accordance with NATA's accredited for compliance with ISO/IEC 17025. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: Craig Cowper

Report Client Reference Received Date 297317-S JEMENA ROSEHILL ENVIROHOD01225AA Apr 21, 2011

Client Sample ID			QC4A
Sample Matrix			Soil
mgt-LabMark Sample No.			S11-Ap32094
Date Sampled			Apr 19, 2011
Test/Reference	LOR	Unit	
Polyaromatic Hydrocarbons (PAH)			
Acenaphthene	0.5	mg/kg	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5
Anthracene	0.5	mg/kg	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5
Benzo(b)fluoranthene &			
Benzo(k)fluoranthene	1	mg/kg	< 1
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5
Chrysene	0.5	mg/kg	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5
Fluorene	0.5	mg/kg	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5
Naphthalene	0.5	mg/kg	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5
Pyrene	0.5	mg/kg	< 0.5
Total PAH	1	mg/kg	< 1
2-Fluorobiphenyl (surr.)	1	%	89
p-Terphenyl-d14 (surr.)	1	%	100
% Moisture	0.1	%	7.4


Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Testing Site	Extracted	Holding Time
Polyaromatic Hydrocarbons (PAH)	Sydney	Apr 21, 2011	14 Day
- Method: E007 Polyaromatic Hydrocarbons (PAH)			
% Moisture	Sydney	Apr 21, 2011	28 Day
- Method: E005 Moisture Content			



ABN – 50 005 085 521 e.mail : mgt@mgtenv.com.au confidential James Roberts Flagstaff Partners Jun 13, 2019 00:56 web : www.mgtiabmark.com.au

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Brisbane 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 4600

New South Wales 2138 Fax: 02 8765 0762 Contact name:	1 Day Craig Cowper
Client Job No.: JEMENA ROSEHILL ENVIROHOD01225AA mgt-Labh	Mark Client Manager: Leanne Knowle
Polyaromatic Hydrocarbons (PAH) % Moisture Sample Detail	
Laboratory where analysis is conducted	
Melbourne Laboratory - NATA Site #1261	
Sydney Laboratory - NATA Site #1645 X X	
Sample ID Sample Date Sampling Matrix LAB ID	



mgt-LabMark Internal Quality Control Review General

- 1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples
- are included in this QC report where applicable. Additional QC data may be available on request.
- 2. All soil results are reported on a dry basis, unless otherwise stated.
- 3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
- 4. Results are uncorrected for matrix spikes or surrogate recoveries.
- 5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- 6. Samples were analysed on an 'as received' basis.
- 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001) For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment. If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

**NOTE: pH duplicates are reported as a range NOT as an RPD

UNITS

mg/kg:milligrams per Kilogram	mg/L:milligrams per litre
μg/l: micrograms per litre	ppm: Parts per million
ppb: Parts per billion	%: Percentage
org/100ml: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units

TERMS

Dry:	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR:	Limit Of Reporting.
SPIKE:	Addition of the analyte to the sample and reported as percentage recovery.
RPD:	Relative Percent Difference between two Duplicate pieces of analysis.
LCS:	Laboratory Control Sample - reported as percent recovery.
CRM:	Certified Reference Material - reported as percent recovery.
Method Blank:	In the case of solid samples these are performed on laboratory certified clean sands.
	In the case of water samples these are performed on de-ionised water.
Surr - Surrogate:	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate:	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate:	A second piece of analysis from a sample outside of the client's batch of samples but run within the laboratory batch of analysis.
Batch SPIKE:	Spike recovery reported on a sample from outside of the client's batch of samples but run within the laboratory batch of analysis.
USEPA:	U.S Environmental Protection Agency
APHA:	American Public Health Association
ASLP:	Australian Standard Leaching Procedure (AS4439.3)
TCLP:	Toxicity Characteristic Leaching Procedure
COC:	Chain Of Custody
SRA:	Sample Receipt Advice

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-20%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.

- 2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- 3. Organochlorine Pesticide analysis where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
- 4. Organochlorine Pesticide analysis where reporting Spike data, Toxophene is not added to the Spike.
- 5. Total Recoverable Hydrocarbons where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.

6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.

7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte. 8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.

9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.

10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data below the LOR with a positive RPD

- eg: LOR 0.1, Result A = <0.1 (raw data is 0.02) & Result B = <0.1 (raw data is 0.03) resulting in a RPD of 40% calculated from the raw data.



Quality Control Results

Sample, Test, Result Reference	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Codes
Method Blank						
Polyaromatic Hydrocarbons (PAH) E007	' Polyarom	atic Hydroca				
Acenaphthene	mg/kg	< 0.5		0.5	Pass	
Acenaphthylene	mg/kg	< 0.5		0.5	Pass	
Anthracene	mg/kg	< 0.5		0.5	Pass	
Benz(a)anthracene	mg/kg	< 0.5		0.5	Pass	
Benzo(a)pyrene	mg/kg	< 0.5		0.5	Pass	
Benzo(b)fluoranthene & Benzo(k)fluorar	mg/kg	< 1		1	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.5		0.5	Pass	
Chrysene	mg/kg	< 0.5		0.5	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.5		0.5	Pass	
Fluoranthene	mg/kg	< 0.5		0.5	Pass	
Fluorene	mg/kg	< 0.5		0.5	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5		0.5	Pass	
Naphthalene	mg/kg	< 0.5		0.5	Pass	
Phenanthrene	mg/kg	< 0.5		0.5	Pass	
Pyrene	mg/kg	< 0.5		0.5	Pass	
LCS - % Recovery						
Polyaromatic Hydrocarbons (PAH) E007 Polyarom	natic Hydroca	Result 1				
Acenaphthene	%	80		70-130	Pass	
Acenaphthylene	%	76		70-130	Pass	
Anthracene	%	74		70-130	Pass	
Benz(a)anthracene	%	72		70-130	Pass	
Benzo(a)pyrene	%	72		70-130	Pass	
Benzo(g.h.i)perylene	%	71		70-130	Pass	
Chrysene	%	78		70-130	Pass	
Dibenz(a.h)anthracene	%	71		70-130	Pass	
Fluoranthene	%	75		70-130	Pass	
Fluorene	%	78		70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	71		70-130	Pass	
Naphthalene	%	80		70-130	Pass	
Phenanthrene	%	78		70-130	Pass	
Pyrene	%	70		70-130	Pass	



Comments

Sample Integrity	
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Organic samples had Teflon liners	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Dr. Bob Symons NATA Signatory

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

mgt-LabMark shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall mgt-LabMark be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.



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Sydney Unit F6, Building F 16 Mars Road Lane Cove West NSW 2066 Phone : +61 2 8215 6222 NATA # 1261 Site # 18217 Brisbane 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 4600

Sample Receipt Advice

Company name.	Colley Environments Fty Ltu NSW
Contact name:	- ALL INV Nicole
Client job number:	ROSEHILL JEMENA ENVIRHOD01225AA
COC number:	92136
Turn around time:	5 Day
Date received:	Apr 21, 2011
MGT lab reference:	297318

Coffee (Environmente Dhulltd NOW)

Sample information

Compony nome

- A detailed list of analytes logged into our LIMS, is included in the attached summary table.
- Sample Temperature of a random sample selected from the batch as recorded by mgt Sample Receipt : 11.00 Celsius.
- All samples have been received as described on the above COC.
- \boxtimes COC has been completed correctly.
- \boxtimes Attempt to chill was evident.
- Appropriately preserved sample containers have been used.
- All samples were received in good condition.
- Samples have been provided with adequate time to commence analysis in accordance with the relevant holding times.
- ☑ Organic samples had Teflon liners.
- Sample containers for volatile analysis received with zero headspace.
- Some samples have been subcontracted.

Contact notes N/A Custody Seals intact (if used).

If you have any questions with respect to these samples please contact:

Adrian Tabacchiera on Phone : +61 3 9564 7055 or by e.mail: adrian.tabacchiera@mgtlabmark.com.au

Results will be delivered electronically via e.mail to - ALL INV Nicole - Nicole_Coffee@coffey.com.

mgt Labmark Sample Receipt





35Years of Environmental Analysis & Experience - fully Australian Owned

Flagstaff Partners Jun 13, 2019 00:56



Coffey Environments Pty Ltd NSW Level 1, 3 Rider Boulevard Rhodes New South Wales 2138

Certificate of Analysis

NATA Accredited Accreditation Number 1261 Site Number 18217

This document is issued in accordance with NATA's accredited for compliance with ISO/IEC 17025. The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

Attention: Craig Cowper

Report Client Reference Received Date 297318-S ROSEHILL JEMENA ENVIRHOD01225AA Apr 21, 2011

Client Sample ID			QC2A
Sample Matrix			Soil
mgt-LabMark Sample No.			S11-Ap32095
Date Sampled			Apr 19, 2011
Test/Reference	LOR	Unit	
Polyaromatic Hydrocarbons (PAH)			
Acenaphthene	0.5	mg/kg	< 0.5
Acenaphthylene	0.5	mg/kg	< 0.5
Anthracene	0.5	mg/kg	< 0.5
Benz(a)anthracene	0.5	mg/kg	< 0.5
Benzo(a)pyrene	0.5	mg/kg	< 0.5
Benzo(b)fluoranthene &			
Benzo(k)fluoranthene	1	mg/kg	< 1
Benzo(g.h.i)perylene	0.5	mg/kg	< 0.5
Chrysene	0.5	mg/kg	< 0.5
Dibenz(a.h)anthracene	0.5	mg/kg	< 0.5
Fluoranthene	0.5	mg/kg	< 0.5
Fluorene	0.5	mg/kg	< 0.5
Indeno(1.2.3-cd)pyrene	0.5	mg/kg	< 0.5
Naphthalene	0.5	mg/kg	< 0.5
Phenanthrene	0.5	mg/kg	< 0.5
Pyrene	0.5	mg/kg	< 0.5
Total PAH	1	mg/kg	< 1
2-Fluorobiphenyl (surr.)	1	%	91
p-Terphenyl-d14 (surr.)	1	%	98
% Moisture	0.1	%	29



Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.

Description	Testing Site	Extracted	Holding Time
Polyaromatic Hydrocarbons (PAH)	Sydney	Apr 21, 2011	14 Day
- Method: E007 Polyaromatic Hydrocarbons (PAH)			
% Moisture	Sydney	Apr 21, 2011	28 Day
- Method: E005 Moisture Content			



ABN – 50 005 085 521 e.mail : mgt@mgtenv.com.au confidential James Roberts Flagstaff Partners Jun 13, 2019 00:56 web : www.mgtiabmark.com.au

Melbourne 3-5 Kingston Town Close Oakleigh VIC 3166 Phone : +61 3 9564 7055 NATA # 1261 & 1645 Site # 1254 & 14271 Sydney Unit F6, Building F 16 Mars Road Lane Cove West NSW 2066 Phone : +61 2 8215 6222 NATA # 1261 Site # 18217

Brisbane 1/21 Smallwood Place Murarrie QLD 4172 Phone : +61 7 3902 4600

Company Na Address:	ame: Coffey Level Rhode New S	Environments 1, 3 Rider Boul s outh Wales 21	Pty Ltd NS evard 38	W	Orde Rep Pho Fax:	er No.: ort #: ne: :	297318 02 8083 1600 02 8765 0762	Received: Due: Priority: Contact na	me:	Apr 21, 2011 12:00 Apr 27, 2011 03:34 1 Day Craig Cowper
Client Job No	o.: ROSE	HILL JEMENA	ENVIRHO	D01225AA					mgt-LabMar	Client Manager: Leanne Knowles
	Sa	mple Deta	il		% Moisture	Polyaromatic Hydrocarbons (PAH)				
Laboratory wh	nere analysis i	s conducted								
Melbourne La	boratory - NAT	TA Site #1261								
Sydney Labor	atory - NATA	Site #1645			X	Х				
Sample ID	Sample Date	Sampling Time	Matrix	LAB ID						
QC2A	Apr 21, 2011		Soil	S11-Ap32095	X	Х				

First Reported:Apr 27, 2011 Date Reported:Apr 27, 2011



mgt-LabMark Internal Quality Control Review General

- 1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples
- are included in this QC report where applicable. Additional QC data may be available on request.
- 2. All soil results are reported on a dry basis, unless otherwise stated.
- 3. Actual PQLs are matrix dependant. Quoted PQLs may be raised where sample extracts are diluted due to interferences.
- 4. Results are uncorrected for matrix spikes or surrogate recoveries.
- 5. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
- 6. Samples were analysed on an 'as received' basis.
- 7. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001) For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the Sample Receipt Acknowledgment. If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

**NOTE: pH duplicates are reported as a range NOT as an RPD

UNITS

mg/kg:milligrams per Kilogram	mg/L:milligrams per litre
μg/l: micrograms per litre	ppm: Parts per million
ppb: Parts per billion	%: Percentage
org/100ml: Organisms per 100 millilitres	NTU: Nephelometric Turbidity Units

TERMS

Dry:	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR:	Limit Of Reporting.
SPIKE:	Addition of the analyte to the sample and reported as percentage recovery.
RPD:	Relative Percent Difference between two Duplicate pieces of analysis.
LCS:	Laboratory Control Sample - reported as percent recovery.
CRM:	Certified Reference Material - reported as percent recovery.
Method Blank:	In the case of solid samples these are performed on laboratory certified clean sands.
	In the case of water samples these are performed on de-ionised water.
Surr - Surrogate:	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate:	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
Batch Duplicate:	A second piece of analysis from a sample outside of the client's batch of samples but run within the laboratory batch of analysis.
Batch SPIKE:	Spike recovery reported on a sample from outside of the client's batch of samples but run within the laboratory batch of analysis.
USEPA:	U.S Environmental Protection Agency
APHA:	American Public Health Association
ASLP:	Australian Standard Leaching Procedure (AS4439.3)
TCLP:	Toxicity Characteristic Leaching Procedure
COC:	Chain Of Custody
SRA:	Sample Receipt Advice

QC - ACCEPTANCE CRITERIA

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-20%

Surrogate Recoveries : Recoveries must lie between 50-150% - Phenols 20-130%.

QC DATA GENERAL COMMENTS

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.

- 2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- 3. Organochlorine Pesticide analysis where reporting LCS data, Toxophene & Chlordane are not added to the LCS.
- 4. Organochlorine Pesticide analysis where reporting Spike data, Toxophene is not added to the Spike.
- 5. Total Recoverable Hydrocarbons where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.

6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.

7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte. 8. Polychlorinated Biphenyls are spiked only using Arochlor 1260 in Matrix Spikes and LCS's.

9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.

10. Duplicate RPD's are calculated from raw analytical data thus it is possible to have two sets of data below the LOR with a positive RPD

- eg: LOR 0.1, Result A = <0.1 (raw data is 0.02) & Result B = <0.1 (raw data is 0.03) resulting in a RPD of 40% calculated from the raw data.



Quality Control Results

Sample, Test, Result Reference	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Codes	
Method Blank								
Polyaromatic Hydrocarbons (PAH) E007 Polyaromatic Hydroca								
Acenaphthene	mg/kg	< 0.5			0.5	Pass		
Acenaphthylene	mg/kg	< 0.5			0.5	Pass		
Anthracene	mg/kg	< 0.5			0.5	Pass		
Benz(a)anthracene	mg/kg	< 0.5			0.5	Pass		
Benzo(a)pyrene	mg/kg	< 0.5			0.5	Pass		
Benzo(b)fluoranthene & Benzo(k)fluorar	mg/kg	< 1			1	Pass		
Benzo(g.h.i)perylene	mg/kg	< 0.5			0.5	Pass		
Chrysene	mg/kg	< 0.5			0.5	Pass		
Dibenz(a.h)anthracene	mg/kg	< 0.5			0.5	Pass		
Fluoranthene	mg/kg	< 0.5			0.5	Pass		
Fluorene	mg/kg	< 0.5			0.5	Pass		
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.5			0.5	Pass		
Naphthalene	mg/kg	< 0.5			0.5	Pass		
Phenanthrene	mg/kg	< 0.5			0.5	Pass		
Pyrene	mg/kg	< 0.5			0.5	Pass		
LCS - % Recovery								
Polyaromatic Hydrocarbons (PAH) E007 Polyaromatic Hydroca Result 1								
Acenaphthene	%	80			70-130	Pass		
Acenaphthylene	%	76			70-130	Pass		
Anthracene	%	74			70-130	Pass		
Benz(a)anthracene	%	72			70-130	Pass		
Benzo(a)pyrene	%	72			70-130	Pass		
Benzo(g.h.i)perylene	%	71			70-130	Pass		
Chrysene	%	78			70-130	Pass		
Dibenz(a.h)anthracene	%	71			70-130	Pass		
Fluoranthene	%	75			70-130	Pass		
Fluorene	%	78			70-130	Pass		
Indeno(1.2.3-cd)pyrene	%	71			70-130	Pass		
Naphthalene	%	80			70-130	Pass		
Phenanthrene	%	78			70-130	Pass		
Pyrene	%	70			70-130	Pass		



Comments

Sample Integrity	
Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Organic samples had Teflon liners	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Authorised By

Dr. Bob Symons NATA Signatory

Final report - this Report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Uncertainty data is available on request

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