





# WILTON PRESSURE SEWER TRANSFER MAIN

## CONTRACT No. PRESSURE SEWER TRANSFER MAIN DRAWINGS

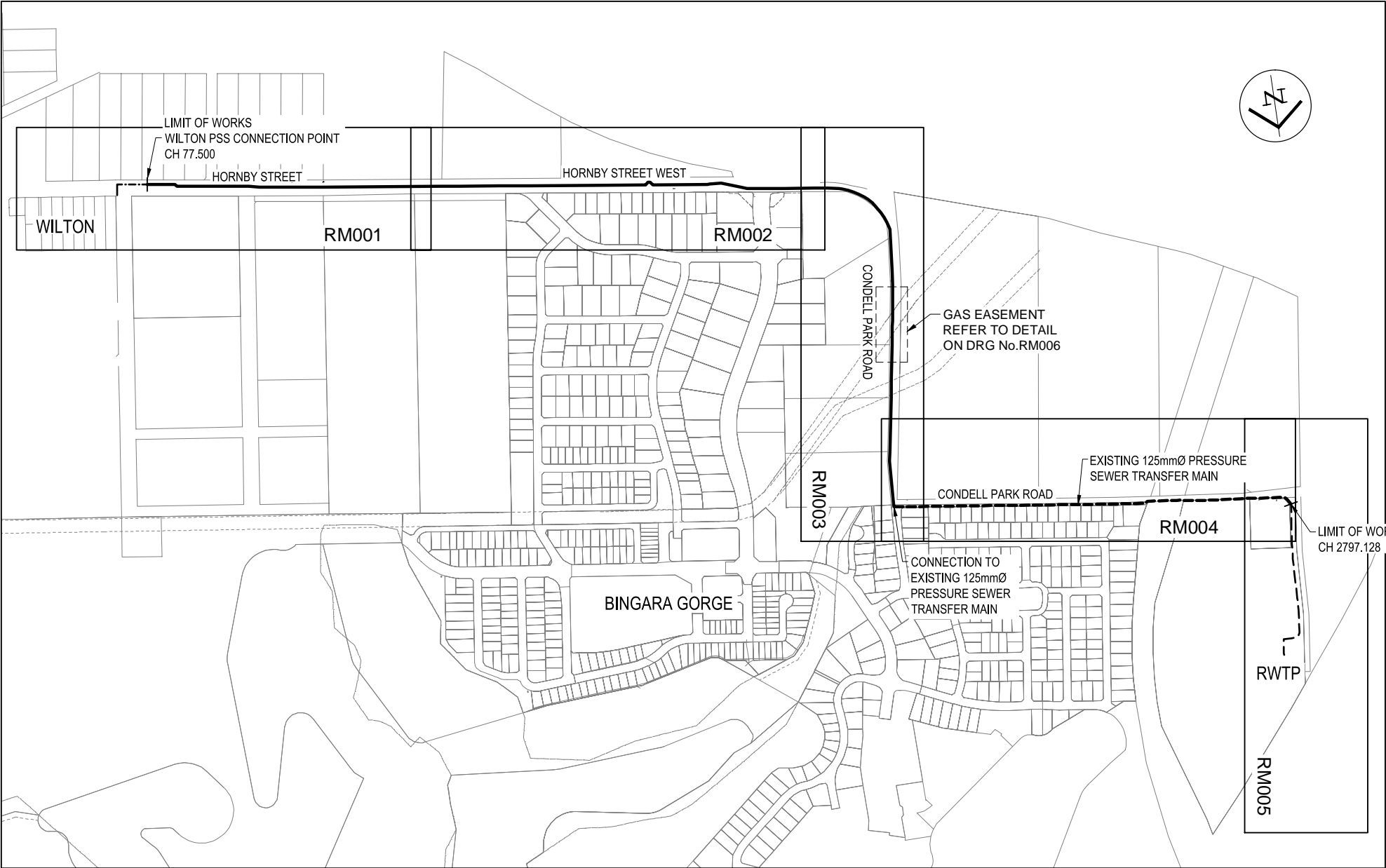
### LEGEND:

- SYDNEY WATER CORPORATION WORKS
- WILTON PROPOSED PRESSURE SEWER TRANSFER MAIN
- EXISTING 125mmØ PRESSURE SEWER TRANSFER MAIN
- SOLO WATER WORKS

### DRAWINGS

130830-RM000 - PRESSURE SEWER TRANSFER MAIN COVER SHEET

- 130830-RM001 - PRESSURE SEWER TRANSFER MAIN LAYOUT PLAN & LONGITUDINAL SECTION SHEET 1 OF 5
- 130830-RM002 - PRESSURE SEWER TRANSFER MAIN LAYOUT PLAN & LONGITUDINAL SECTION SHEET 2 OF 5
- 130830-RM003 - PRESSURE SEWER TRANSFER MAIN LAYOUT PLAN & LONGITUDINAL SECTION SHEET 3 OF 5
- 130830-RM004 - PRESSURE SEWER TRANSFER MAIN LAYOUT PLAN & LONGITUDINAL SECTION SHEET 4 OF 5
- 130830-RM005 - PRESSURE SEWER TRANSFER MAIN LAYOUT PLAN & LONGITUDINAL SECTION SHEET 5 OF 5
- 130830-RM006 - PRESSURE SEWER TRANSFER MAIN HIGH PRESSURE GAS EASEMENT CROSSING DETAILS
- 130830-RM101 - PRESSURE SEWER TRANSFER MAIN PINCH VALVE DETAIL
- 130830-RM102 - MISCELLANEOUS DETAILS
- 130830-RM103 - AIR VALVE DETAILS SHEET 1 OF 2
- 130830-RM104 - AIR VALVE DETAILS SHEET 2 OF 2



KEY PLAN

SETOUT COORDINATES TABLE			
Pt No.	Easting	Northing	Comments
1	287670.534	6209187.683	
2	287667.760	6209168.666	
3	287667.635	6209167.807	
3A	287610.876	6209176.451	LIMIT OF CONTRACT
4	287559.417	6209184.289	
5	287556.592	6209188.168	
6	287422.696	6209208.561	
7	287402.956	6209212.845	
8	287400.647	6209213.197	
9	287335.348	6209223.142	
10	287323.406	6209224.961	
11	287283.533	6209231.033	
12	287175.363	6209246.672	
13	287062.345	6209263.012	
14	287058.352	6209263.589	
15	287054.424	6209264.662	
16	287030.863	6209268.069	
17	286954.617	6209279.093	
18	286944.348	6209280.578	
19	286897.632	6209287.332	
20	286780.895	6209304.211	
21	286682.805	6209318.394	
22	286678.348	6209315.149	
23	286672.397	6209315.937	
24	286669.174	6209320.364	
25	286567.024	6209335.134	
26	286563.611	6209335.358	
27	286541.176	6209336.828	
28	286509.451	6209348.507	
29	286494.328	6209354.074	
30	286487.106	6209355.138	
31	286478.514	6209356.403	
32	286475.541	6209356.841	
33	286469.305	6209357.760	
34	286462.288	6209358.793	
35	286456.201	6209359.690	
36	286439.184	6209362.196	
37	286425.831	6209364.163	
38	286368.562	6209372.598	
39	286344.100	6209375.854	
40	286324.580	6209379.902	


SETOUT COORDINATES TABLE			
Pt No.	Easting	Northing	Comments
41	286323.505	6209380.179	
42	286317.672	6209381.885	
43	286306.626	6209385.812	
44	286296.610	6209391.127	
45	286287.853	6209396.473	
46	286279.514	6209402.295	
47	286278.328	6209403.349	
48	286271.980	6209408.987	
49	286265.369	6209416.677	
50	286259.458	6209424.893	
51	286256.678	6209429.389	
52	286255.038	6209431.945	
53	286252.178	6209436.995	
54	286247.503	6209446.677	
55	286243.611	6209456.916	
56	286240.702	6209466.619	
57	286239.617	6209471.206	
58	286241.106	6209485.910	
59	286247.653	6209550.535	
60	286250.098	6209574.584	
61	286258.427	6209625.721	
62	286261.226	6209642.817	
63	286262.855	6209652.473	
64	286265.472	6209667.976	
65	286268.677	6209686.969	
66	286279.938	6209753.693	
67	286284.389	6209780.069	
68	286285.325	6209785.612	
69	286303.044	6209885.467	
70	286306.124	6209902.825	
71	286310.596	6209983.352	
72	286310.950	6209989.729	CONNECT TO EXISTING 125mmØ PE MAIN
73	285570.452	6210097.050	LIMIT OF CONTRACT

FOR TENDER

SIZE  
A1


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A	FOR TENDER	SW	20/09/13
REV	DESCRIPTION	BY	DATE

DESIGN BY:  
  
P.S. Solutions  
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DRAWN	KG	DATE	20/09/13
CHECKED	RRS	DATE	20/09/13
APPROVED	SW	DATE	20/09/13

CLIENT:  


PROJECT: WILTON PRESSURE SEWER TRANSFER MAIN

TITLE:  
PRESSURE SEWER TRANSFER MAIN  
COVER SHEET, LOCALITY PLAN & DRAWING LIST

DRG No. 130830-RM000

REV

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# Specified Area of Operations under Licence No. 10\_012

BINGARA GORGE, NSW

## Legend

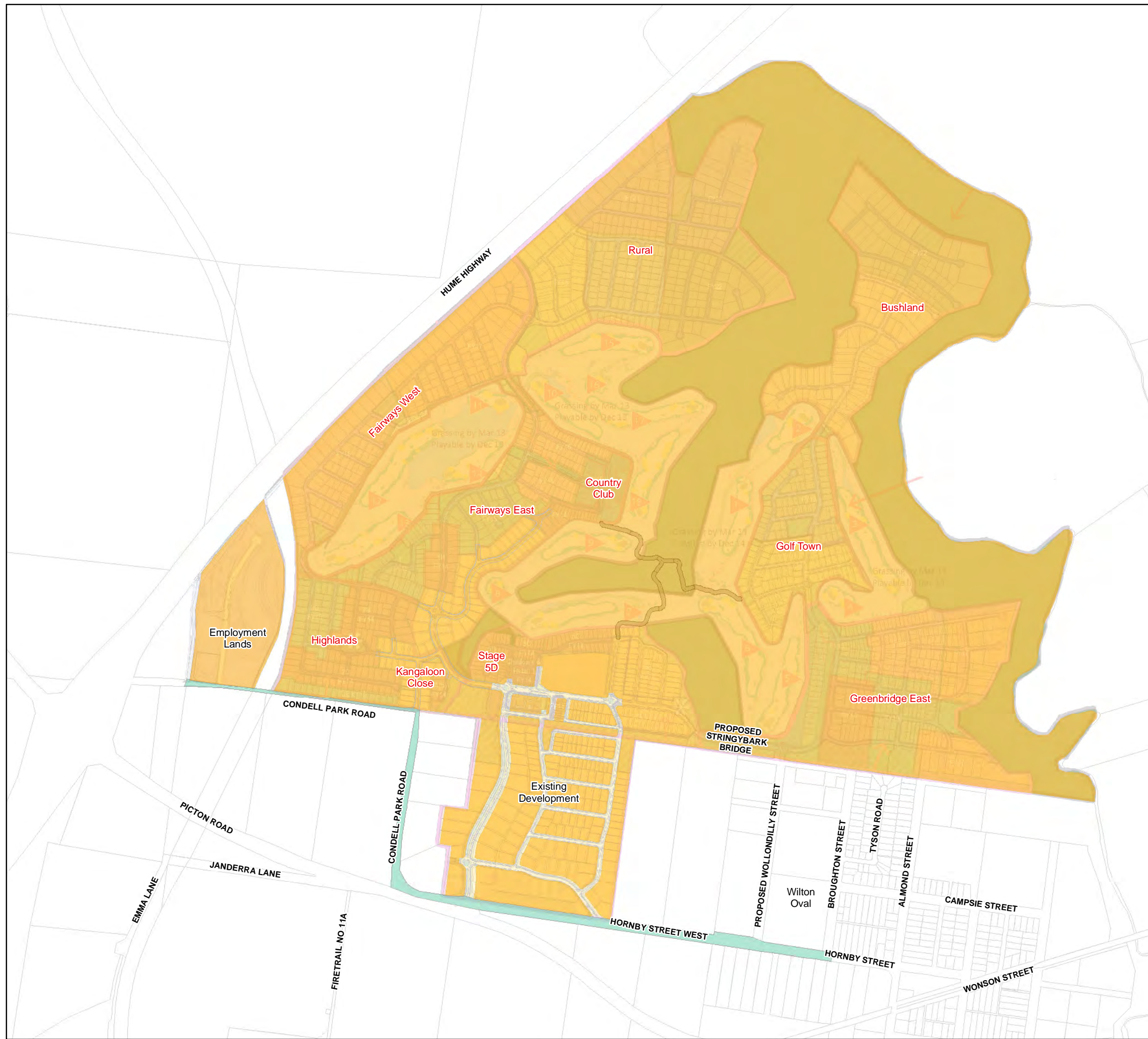
- Proposed Variation to Areas of Operation
- Specified Area of Operations
- Industrial
- Commercial
- School
- Environmental Trust Bushland
- Country Club
- Park
- Road Reserve
- Lots
- Cadastre (LPI, 2013)



1:12,000 Scale at A3



Map Produced by Cardno NSW/ACT Pty Ltd (WOL)  
Date: 2015-01-09  
Coordinate System: GDA 1994 MGA Zone 56  
Project: NA82013043-22  
Map: G22005\_IPART.mxd 02







Most of pipeline is buried	Security fencing; intruder security alarm with back to base notification; Security Community Patrols	Have sufficient insurance spares for critical equipment	Unlikely	Minor/Moderate	Low	Y	LL	LL
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## Wilton Village Rising Main

Context	Potential Immediate	Consequence	Consequence of Occurrence	Risk Evaluation:	Example Risk Treatment	Example Risk Treatment to mitigate impact of Adverse Event	Residual	Residual	Residual Risk	Risk Treatment	Responsibility	Responsibility*			
And category	Adverse Event	Consequence	(Penultimate Risk)	Likelihood (Risk of Occurrence	(Risk Outcome)	Risk Rating	Acceptable Outcome (Y/N)	to Avert an Adverse Event	Likelihood of occurrence	Consequence	Rating (Significance)	Adequate (Y/N)	Prevention at D&C By	Mitigate impact By	
External															
Access & security	Flood, extreme rain event	No access	Loss of transfer	Rare event	Moderate	Low	Y				Low	Y	Not applicable	LL & VWS	
Access & security	Lightning	Safety of personnel & plant	Injury or plant failure	Possible	Minor	Medium	Y				Medium	Y	Not applicable	LL & VWS	
Access & security	Bush fire	No access	Loss of transfer	Rare event	Moderate	Medium	Y				Medium	Y	Not applicable	LL & VWS	
Access & security	Earthquake	Infrastructure damage	Loss of transfer	Rare event	Moderate	Low	Y				Low	Y	Not applicable	VWS	
Access & security	Road accident restricting access	No access	Loss of transfer	Rare event	Moderate	Low	Y				Low	Y	Not applicable	LL	
Access & security	Vandalism	Infrastructure damage	Loss of transfer	Possible	Moderate	High	N	Most of pipeline is buried	Operator to inspect pipeline during weekly rounds.	Unlikely	Minor/Moderate	Low	Y	LL	VWS
Utilities, suppliers	Power supply failure	PSS stoppage	Loss of transfer	Possible	Minor	Medium	Y				Medium	Y	LL	VWS	
Utilities, suppliers	Third party excavation cause damage	Service interruption	Loss of transfer	Possible	Moderate	High	N	Dial before you dig; visible marking of pipe route	Emergency call out to repair	Possible	Minor/Moderate	Medium	Y	LL	VWS
Legal & regulatory	WICA licence breach	VWS must consult IPART	Loss of licence	Rare event	Severe	High	N	Have in place adequate contract administration and infrastructure management	Take whatever action is required applicable to the matter to rectify breach	Rare event	Minor/Moderate	Low	Y	LL	VWS
Legal & regulatory	Change in law for licence holder	VWS must consult IPART	Licence amendment	Possible	Moderate	High	N	VWS has no influence over change in law. These may occur	Negotiate sensibly with IPART and LL	Unchanged	Reduced	Low	Y	Not applicable	VWS
Consumer customer	Illegal discharge of contaminants	Process upset	Loss of production	Possible	Major	V High	N	Customer contracts and other documentation including penalties highlighting that such discharge is illegal	Sufficient surge capacity in sewage storage to dilute contaminants and procedures to handle various	Reduced	Reduced	Low	Y	SWC	VWS & SWC
Stakeholder	Community complaint eg odour (relates to internal context public health)	PR and rectification costs	Loss of reputation or litigation	Possible	Moderate	High	N	Infrastructure design to have eg adequate odour control. Operate, maintain and monitor treatment infrastructure to high standard. Refer IOPs. Have in place Codes for Complaints Handling and Debt collection incl associated requirements	Implement Odour Release Plan or EPRP as applicable. Immediate route cause analysis and corrective action. Engage Odour consultant to further investigate. Consult community to alleviate concerns & abate reputation issues arising	Possible	Minor	Medium	Y	LL - Stake holders - Some of this already lies with Sydney Water	VWS
Internal															
OHS	Work related illness	WorkCover reporting	Loss of reputation	Possible	Major	V High	N	Have in place stringent OHS Management Plan and enforce it in behavioural based awareness manner	Follow Incident response and management procedure. Report to relevant authorities depending on severity	Reduced	Reduced	Medium	Y	LL	VWS

Most of pipeline is buried	Security fencing; intruder security alarm with back to base notification; Security Community Patrols	Have sufficient insurance spares for critical equipment	Unlikely	Minor/Moderate	Low	Y	LL	LL
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## Wilton Village Rising Main

Context	Potential Immediate	Consequence	Consequence of Occurrence	Risk Evaluation:	Example Risk Treatment	Residual	Residual	Residual Risk	Risk Treatment	Responsibility	Responsibility*				
And category	Adverse Event	Consequence	(Penultimate Risk)	Likelihood (Risk of Occurrence)	(Risk Outcome)	Risk Rating	Acceptable Outcome (Y/N)	to Avert an Adverse Event	Example Risk Treatment to mitigate impact of Adverse Event	Likelihood of occurrence	Consequence	Rating (Significance)	Adequate (Y/N)	Prevention at D&C By	Mitigate impact By
OHS	Work related injury	WorkCover reporting	Loss of reputation	Possible	Major	V High	N	Have in place stringent OHS Management Plan and enforce it in behavioural based awareness manner	Follow incident response and management procedure. Report to relevant authorities depending on severity.	Reduced	Reduced	Medium	Y	LL	VWS
OHS	Inadequate supply of Personal Protection Equipment (PPE)	Unable to do certain works	Loss of production	Rare event	Major	High	N	Robust inventory management system in place	Operate remotely. Source alternate supplies from nearest supplier	Rare event	Minor-moderate	Low	Y	LL	VWS
OHS	Inadequateresources	Staff shortage	Plant failure	possible	moderate	High	N	Train and practice our documented EPRP regularly	Recognise any poor management and replace responsible person	Rare Event	Moderate	Low	Y	VWS	VWS
Environmental	Sewer Overflow spill	Environmental pollution	Fines and litigation	Rare event	Severe	High	N	established procedures; available spill kits; adequate training	Follow procedures including source isolation.	Rare event	Moderate	Low	Y	LL	VWS
Operations	Blockage in Sewerage infrastructure component	Time limited discharge by customers	Customer complaint	Possible	Major	V High	N	Robust preventative maintenance program; refer IOPs	Identify root cause and rectify in timely manner to avert potential for health issue arising	unchanged	Lessened	Low-medium	Y	VWS	VWS
Operations	Sewage quality deteriorates	Plant upset	Loss of production	Possible	Major	V High	N	Educate community. Design infrastructure to have sufficient surge capacity as buffer; in place monitoring downstream	Identify root cause and rectify in timely manner to avert treatment upset	Unchanged	Lessened	Low-medium	Y	LL & VWS	VWS
Operations	Inadequate supply of spares and consumables	Plant interruption	Loss of production	Possible	Major	V High	N	Robust inventory monitoring and procurement system in place by Lend Lease	If necessary use local supplier	Unlikely	lessened	Low-medium	Y	LL & VWS	VWS
IT systems & coms	Loss of telephone, fax and/or mobile phone communication for more than a day	Plant interruption	Loss of production	Possible	Major	V High	N	Radio telemetry link	Ensure 24/7 supplier support	unchanged	lessened	Low-medium	Y	LL	VWS
IT systems & coms	Loss of PLC/SCADA system	Plant interruption	Loss of production	Possible	Major	V High	N	Have critical spares available eg PLC cards, back up program and the like.	Attend site, determine cause and rectify	unchanged	lessened	Low-medium	Y	LL	VWS





Context And category	Adverse Event	Potential Immediate Consequence	Consequence (Penultimate Risk)	Likelihood (Risk of of Occurrence	Consequence of Occurrence (Risk Outcome)	Risk Rating	Risk Evaluation:  Acceptable Outcome (Y/N)	Example Risk Treatment  to Avert an Adverse Event	Example Risk Treatment to mitigate impact of Adverse Event	Residual  Likelihood of occurrence	Residual  Consequence	Residual Risk  Rating (Significance)	Risk Treatment  Adequate (Y/N)	Responsibility  Prevention at D&C By	Responsibility  Mitigate impact By
External															
Access & security	Flood, extreme rain event	No access	Loss of production	Possible	Major	High	N	VWS has no influence over rain event. These will occur	D&C good stormwater management & drainage & ability to run infrastructure remotely. Implement EPRP	Unchanged	Reduced	Low	Y	Not applicable	LL & VWS
Access & security	Lightning	Safety of personnel & plant	Injury or plant failure	Possible	Major	V High	N	VWS has no influence over lightning event. These will occur	Install adequate lightning and surge current protection	Unchanged	Reduced	Low	Y	Not applicable	LL & VWS
Access & security	Bush fire	No access	Loss of production	Possible	Moderate	High	N	VWS has no influence over bush fire event. These may occur	Design and install adequate fire detection and protection	Unchanged	Reduced	Low	Y	Not applicable	LL & VWS
Access & security	Earthquake	Infrastructure damage	Loss of production	Rare event	Major	High	N	VWS has no influence over earthquake event. These may occur	D&C to earthquake standards. Implement EPRP.	Unchanged	Reduced	Low	Y	Not applicable	VWS
Access & security	Road accident restricting access	No access	Loss of production	Possible	Moderate	High	N	VWS has no influence over third party drivers on main or approach roads.	Construct good access roads into <b>and within</b> Bingara Gorge development	Unchanged	Reduced	Low	Y	Not applicable	LL
Access & security	Vandalism or other risk to Treatment Infrastructure	Infrastructure damage	Loss of production	Possible	Major	V High	N	Security fencing; intruder security alarm with back to base notification; <b>Security Company Fairdis</b>	Have sufficient insurance spares for critical equipment	Unlikely	Minor/Moderate	Low	Y	LL	VWS
Utilities, suppliers	Power supply failure	Plant stoppage	Loss of production	Possible	Major	V High	N	VWS has no influence over third party power supply	UPS for PLC. Hire emergency generator if long term event	Unchanged	Minor/Moderate	Low	Y	LL	VWS
Utilities, suppliers	Third party excavation cause damage	Service interruption	Customer complaint	Possible	Major	V High	N	Strict rules on dial before you dig; heavy penalties; visible routes	Emergency call out to repair	Lessened	Minor/Moderate	Low	Y	LL	VWS
Legal & regulatory	WICA licence breach	VWS must consult IPART	Loss of licence	Rare event	Severe	High	N	Have in place excellent contract administration and infrastructure management	Take whatever action is required applicable to the matter to rectify breach	Lessened	Minor/Moderate	Low	Y	LL	VWS
Legal & regulatory	Change in law for licence holder	VWS must consult IPART	Licence amendment	Possible	Moderate	High	N	VWS has no influence over change in law. These may occur	Negotiate sensibly with IPART and LL	No change	Reduced	Low	Y	Not applicable	LL & VWS
Consumer customer	Illegal discharge of contaminants	Process upset	Loss of production	Possible	Major	V High	N	Customer contracts and other documentation including penalties highlighting <b>what is illegal</b>	Sufficient surge capacity in sewage storage to dilute contaminants and procedures to handle various	Reduced	Reduced	Low	Y	LL & VWS	LL & VWS
Consumer customer	Illegal connection of recycle to potable water piping	Consumer Health issue	Consumer fined	Possible	Severe	V High	N	Customer contracts and other documentation including penalties highlighting <b>what is illegal</b>	Refer offenders to counselling and medical practitioners	Reduced	Reduced	Low	Y	LL & VWS	LL & VWS
Stakeholder	Community complaint eg odour (relates to internal context public health)	PR and rectification costs	Loss of reputation or litigation	Possible	Severe	V High	N	Infrastructure design to have eg adequate odour control. Operate, maintain and monitor treatment infrastructure to high standard. Refer IOPs. Have in place Codes for Complaints Handling and Debt collection incl associated requirements	Implement Odour Release Plan or EPRP as applicable. Immediate route cause analysis and corrective action. Engage Odour consultant to further investigate. Consult community to alleviate concerns & abate reputation issues arising	Reduced	Reduced	Medium	Y	LL & VWS	LL & VWS
Stakeholder	Shire council complaint eg odour (refer to internal context public health)	PR and rectification costs	Loss of reputation or litigation	Possible	Severe	V High	N	Refer above	Refer above	Refer above	Refer above	Refer above	Refer above	Refer above	Refer above
Stakeholder	Facilities mgt complaint eg odour (refer to internal context public health)	PR and rectification costs	Loss of reputation or litigation	Possible	Severe	V High	N	Refer above	Refer above	Refer above	Refer above	Refer above	Refer above	Refer above	Refer above
Stakeholder	Golf course complaint eg odour (relates to internal context public health)	PR and rectification costs	Loss of reputation or litigation	Possible	Severe	V High	N	Refer above	Refer above	Refer above	Refer above	Refer above	Refer above	Refer above	Refer above
Stakeholder	Possibility of any perceived or actual threat to customers or public health as a result of the company's operations	PR and rectification costs	Loss of reputation or litigation	Possible	Severe	V High	N	Have in place excellent communications and marketing material in place for customers including emergency contact information	Implement that section of EPRP	Reduced	Reduced	Medium	Y	LL & VWS	LL & VWS
Internal															
Public Health	Sewage odour (sewage itself)	Fines & rectification costs	Fines & loss of reputation	Possible	Severe	V High	N	Infrastructure design to have adequate odour control to DECC standards. Operate, maintain & monitor treatment infrastructure to high standard. Refer IOPs.	Follow standard procedure in O&M manual for determining cause and corrective action. Engage odour consultant if needed.	Reduced	Reduced	Medium	Y	LL & VWS	VWS
Public Health	Recycle water odour (product water)	Fines & rectification costs	Fines & loss of reputation	Possible	Severe	V High	N	Infrastructure design to have adequate odour control to DECC standards. Operate, maintain & monitor treatment infrastructure to high standard. Refer IOPs.	Follow standard procedure in O&M manual for determining cause and corrective action. Engage odour consultant if needed.	Reduced	Reduced	Medium	Y	VWS	VWS
Public Health	Treatment Infrastructure odour (sewerage and treatment facilities)	Fines & rectification costs	Fines & loss of reputation	Possible	Severe	V High	N	Infrastructure design to have adequate odour control to DECC standards. Operate, maintain & monitor treatment infrastructure to high standard. Refer IOPs.	Follow standard procedure in O&M manual for determining cause and corrective action. Engage odour consultant if needed.	Reduced	Reduced	Medium	Y	LL & VWS	VWS
Public Health	Recycle water quality below specification;	Potential for health issues	Fines and litigation	Unlikely	Severe	V High	N	Infrastructure design to be specific for producing odourless and colourless treated water	Follow standard procedure in O&M manual for determining cause and corrective action.	Reduced	Reduced	Medium	Y	VWS	VWS

OHS	Work related illness	WorkCover reporting	Loss of reputation	Possible	Major	V High	N	Have in place stringent OHS Management Plan and enforce it in behavioural based awareness manner	Follow Incident response and management procedure. Report to relevant authorities depending on severity	Reduced	Reduced	Medium	Y	LL & VWS	LL & VWS
OHS	Work related injury	WorkCover reporting	Loss of reputation	Possible	Major	V High	N	Have in place stringent OHS Management Plan and enforce it in behavioural based awareness manner	Follow Incident response and management procedure. Report to relevant authorities depending on severity	Reduced	Reduced	Medium	Y	LL & VWS	LL & VWS
OHS	Inadequate supply of Personal Protection Equipment (PPE)	Unable to do certain works	Loss of production	Rare event	Major	High	N	Inventory management system in place	Operate remotely. Source alternate supplies from nearest supplier	Rare event	Minor-moderate	Low	Y	LL & VWS	LL & VWS
OHS	Inadequateresources	Staff shortage	Plant failure	possible	moderate	High	N	Train and practice our documented EPRP regularly	Recognise any poor management and replace responsible person	Rare Event	Moderate	Low	Y	VWS	VWS
Environmental	Chemical spill	Environmental pollution	Fines and litigation	Rare event	Severe	High	N	Permanent bunding; established procedures; available spill kits; adequate training	Follow procedures including source isolation.	Rare event	Moderate	Low	Y	VWS	VWS
Environmental	Fire	Community Complaint, Environmental pollution	Fines and litigation	Possible	Severe	V High	N	Regular Maintenance of grounds and boundary interfaces to prevent vermins and reduce possibilities of fire; educate community with housekeeping rules	Use existing security to monitor and take appropriate steps and co-ordinate with VWS	Reduced	Reduced	Medium	Y	LL	LL & VWS
Environmental	Operational noise.	Community complaint	Fines & loss of reputation	Unlikely	Major	High	N	Design and build to meet or better minimum noise levels; monitor noise	ID and isolate the offending equipment; determine root cause and rectify. Implement community consultation if needed	unchanged	Moderate	Low-medium	Y	VWS	VWS
Environmental	Excessive birdlife on storage pond	Pollution of treated water	Retreatment	Possible	Severe	V High	N	Possibly install netting; limit bird life by way of removal	Relocate birds; potentially may need to have VWS re-treat effluent	unchanged	Moderate	Low-medium	Y	LL	LL
Environmental	Excessive aquatic plants/algae in storage pond	Pollution of treated water	Retreatment	Possible	Severe	V High	N	Pond maintenance program	Concerted eradication	unchanged	Moderate	Low-medium	Y	LL	LL
Environmental	High numbers of mosquitoes	Mosquito borne diseases	Fines & loss of reputation	Possible	Severe	V High	N	Pond Maintenance program including spraying	Concerted eradication	unchanged	Moderate	Low-medium	Y	LL	LL
Environmental	Integrity of storage pond breached	Flooding of environment	Loss of treated water	Rare event	Severe	High	N	Pond design integrity and maintenance program	Implement LL EPRP	unchanged	Moderate	Low-medium	Y	LL	LL

Note while the above environmental concerns related to the storage pond are documented, the management and care of the storage pond is not in VWS scope. Nonetheless there could be a perception that VWS is at fault which could impact on VWS reputation.

Operations	Plant electrical failure	Partial or full shutdown	Loss of production	Possible	Moderate	High	N	Preventative maintenance program; refer IOPs	Identify root cause and rectify to mitigate loss of production	unchanged	Lessened	Low-medium	Y	VWS	VWS
Operations	Pressure sewerage pumping station failure	Time limited discharge by customers	Customer complaint	Possible	Major	V High	N	Preventative maintenance program; refer IOPs	Identify root cause and rectify in timely manner to avert potential for health issue arising	unchanged	Lessened	Low-medium	Y	LL & VWS	LL & VWS
Operations	Blockage in Sewerage infrastructure component	Time limited discharge by customers	Customer complaint	Possible	Major	V High	N	Preventative maintenance program; refer IOPs	Identify root cause and rectify in timely manner to avert potential for health issue arising	unchanged	Lessened	Low-medium	Y	LL	LL & VWS
Operations	Customer sewage pump fails	Time limited discharge by customers	Customer complaint	Possible	Major	V High	N	Customer information centre directs customer to advise VWS	Rectification in accordance with procedure; crew mobilization. If needed pump(s) to be replaced. Spares available with LL on Site.	unchanged	Lessened	Low-medium	Y	LL	VWS
Operations	Sewage surge	Sewage overflows	Health issues	Rare event	Severe	High	N	Treatment infrastructure to have adequate surge capacity; refer IOP for design and O&M.	Manage surges effectively following O&M procedures	unchanged	Lessened	Low-medium	Y	LL & VWS	VWS
Operations	Sewage quality deteriorates	Plant upset	Loss of production	Possible	Major	V High	N	Educate community. Design infrastructure to have sufficient surge capacity as buffer; in place monitoring downstream	Identify root cause and rectify in timely manner to avert treatment upset	Unchanged	Lessened	Low-medium	Y	LL & VWS	VWS
Operations	Sewage transfer pump fails	No feed to Plant	Loss of production	Possible	Major	V High	N	Current design has 100% redundancy. (1 Duty and 1 standby). In case of any issue, Customer information centre directs customer to advise VWS	Identify root cause and rectify in timely manner to avert treatment upset or odour or health issues	unchanged	lessened	Low-medium	Y	LL & VWS	VWS
Operations	Screening plant fails	No feed to Plant	Loss of production	Possible	Major	V High	N	Regular Preventative maintenance program; refer IOPs	Identify root cause and rectify in timely manner to avert treatment upset or odour or health issues	unchanged	lessened	Low-medium	Y	VWS	VWS
Operations	Ecodisk failure	Reduced production	Loss of production	Possible	Major	V High	N	Regular Preventative maintenance program; refer IOPs	Identify root cause and rectify in timely manner to avert treatment upset or odour or health issues	unchanged	lessened	Low-medium	Y	VWS	VWS
Operations	Drum filter failure	Production stops	Loss of production	Possible	Major	V High	N	Regular Preventative maintenance program; refer IOPs	Identify root cause and rectify in timely manner to avert treatment upset or odour or health issues	unchanged	lessened	Low-medium	Y	VWS	VWS
Operations	Sludge Thickener failure	Production stops	Loss of production	Possible	Major	V High	N	Regular Preventative maintenance program; refer IOPs	Identify root cause and rectify in timely manner to avert treatment upset or odour or health issues	unchanged	lessened	Low-medium	Y	VWS	VWS
Operations	Ultrafiltration failure	Production stops	Loss of production	Possible	Major	V High	N	Regular Preventative maintenance program; refer IOPs	Identify root cause and rectify in timely manner to avert treatment upset or odour or health issues	unchanged	lessened	Low-medium	Y	VWS	VWS
Operations	UV failure Chlorination failure	Production stops	Loss of production	Possible	Major	V High	N	Regular Preventative maintenance program; refer IOPs	Identify root cause and rectify in timely manner to avert treatment upset or odour or health issues	unchanged	lessened	Low-medium	Y	VWS	VWS

This to be a shared responsibility - VWS for its own and Subcon staff, LL for its own and subcon staff



Operations	CIP failure	Production reduced	Loss of production	Possible	Major	V High	N	Regular Preventative maintenance program; refer IOPs	Identify root cause and rectify in timely manner to avert treatment upset or odour or health issues	unchanged	lessened	Low-medium	Y	VWS	VWS
Operations	Insufficient lab equipment and reagents	Product quality not assessed	Poor quality product	Possible	Major	V High	N	Inventory monitoring and procurement system in place	If necessary use third party NATA services	Unlikely	lessened	Low-medium	Y	VWS	VWS
Operations	Partial or full loss of supply of chemicals - Sodium Hypochlorite	Plant output out of specification	Poor quality product	Possible	Major	V High	N	Inventory monitoring and procurement system in place. Robust tank design including bunding to avert environmental release	Activate emergency response EPRP if storage tank failure. Arrange for immediate Chem delivery	Unlikely	lessened	Low-medium	Y	VWS	VWS
Operations	Partial or full loss of supply of chemicals - Antiscalant	Plant output out of specification	Poor quality product	Possible	Major	V High	N								
Operations	Partial or full loss of supply of chemicals - Citric Acid	Plant output out of specification	Poor quality product	Possible	Major	V High	N								
Operations	Storage tank failure	Loss of sewage or water	Environmental and contract breaches	Rare event	Major	V High	N	Storage tank design, fabrication and bunding to Australian Standards.	Activate emergency response EPRP if storage tank failure. Arrange for temporary storage and immediate Chem delivery	Rare event	lessened	Low-medium	Y	VWS	VWS
Operations	Recycled water main failure or burst (not part of current licence scope)	Loss of water to customers	Potential health issues	Possible	Major	V High	N	Design with buried route marked above and below grade	Immediate response to determine location as well as remedial action. tanker in potable water if needed	unchanged	lessened	Low-medium	Y	LL	VWS
Operations	Plant fire	Plant stoppage	Loss of production	Unlikely	Major	V High	N	Adequate fire detection and protection installed and personnel trained in use; refer to IOPs;	Activate EPRP and extinguish fire	unchanged	lessened	Low-medium	Y	LL	VWS
Operations	Compressed air system failure	Plant stoppage	Loss of production	Possible	Major	V High	N	Preventative maintenance program; refer IOPs	Identify root cause and rectify in timely manner to avert treatment upset or odour or health issues	unchanged	lessened	Low-medium	Y	VWS	VWS
Operations	Control instrumentation failure	Plant interruption	Loss of production	Possible	Major	V High	N	Robust preventative maintenance program; refer IOPs	Identify root cause and rectify in timely manner to avert treatment upset or odour or health issues	unchanged	lessened	Low-medium	Y	VWS	VWS
Operations	Inadequate supply of spares and consumables	Plant interruption	Loss of production	Possible	Major	V High	N	Inventory monitoring and procurement system in place	If necessary use local supplier	Unlikely	lessened	Low-medium	Y	VWS	VWS
IT systems & coms	Loss of telephone, fax and/or mobile phone communication for more than a day	Plant interruption	Loss of production	Possible	Major	V High	N	No real control over third party supplier of these services; however, have in place adequate supplier services agreement	Ensure site attendance within 24 hours rather than remote monitoring	unchanged	lessened	Low-medium	Y	VWS	VWS
IT systems & coms	Server and internet failure	Plant interruption	Loss of production	Possible	Major	V High	N	Robust back up; disaster recovery plan in place	Implement normal recovery or disaster recovery if needed	unchanged	lessened	Low-medium	Y	VWS	VWS
IT systems & coms	Loss of PLC/SCADA system	Plant interruption	Loss of production	Possible	Major	V High	N	Back up program and keep it available	Attend site, determine cause and rectify by updating from the backup program	unchanged	lessened	Low-medium	Y	VWS	VWS
Contractual	Material breach (eg unable to meet obligations)	Litigation	Loss of contract	Rare event	Severe	High	N	Understand contract before signing and properly administer by competent personnel	Meet with LL and authorities to mitigate negative outcomes	unchanged	lessened	Low-medium	Y	LL & VWS	LL & VWS
Contractual	Change in law	Contract amendment	Increase costs	Possible	Moderate	High	N	Potential for amending contract in equitable way	Meet with LL and authorities to amend contract equitably	unchanged	lessened	Low-medium	Y	LL & VWS	LL & VWS
Financial	Bankruptcy by VWS	Breach of contract	Loss of contract	Rare event	Severe	High	N	VWS Corporate Governance at the highest of levels	Internal and external audits	unchanged	lessened	Low-medium	Y	VWS	VWS
Financial	VWS losing money on job	Work to contract	Loss of reputation	Rare event	Severe	High	N	All contingencies covered prior to signing contract	If due to change in law or variations, negotiate accordingly for a fair resolution	unchanged	lessened	Low-medium	Y	VWS	VWS
VWS compliance	IMS - loss of certification	Not a material breach	Loss of reputation	Unlikely	Moderate	Medium	N	VWS compliance group performs its duties	Regain certification with urgency to mitigate loss of reputation	lessened	lessened	Low	Y	VWS	VWS
VWS compliance	Failure to submit reports on time – contract, EPA, Work cover	Potential breach	Penalties	Unlikely	Severe	V High	N	VWS to have in place organisation and sufficient resources to ensure this does not occur	Increase resources and work overtime to mitigate this possibility	lessened	lessened	Low	Y	VWS	VWS
VWS compliance	Not keeping licences up to date (driver, trade, confined space and the like)	Potential breach	Penalties	Unlikely	Major	High	N	VWS administration regularly to monitor and manage	Replace any unqualified resource with qualified resource, if such matter encountered.	unchanged	lessened	Low-medium	Y	VWS	VWS
VWS compliance	Contract non-compliance - reporting requirements	Potential breach	Penalties	Unlikely	Major	High	N	Understand contract before signing and properly administer by competent personnel	Identify and rectify in timely manner	unchanged	lessened	Low-medium	Y	VWS	VWS
Organisational	Loss of key staff due to resignation	Dearth of supervision	Multiple	Unlikely	Severe	V High	N	Have in place succession or support duties plan	Call-out if needed	unchanged	lessened	Low-medium	Y	VWS	VWS

**Legend:**  
IMS: Intergrated Management System  
LL - Lend Lease Communities (Wilton) Pty. Ltd.  
VWS: Veolia Water Solutions & Technologies (Australia) Pty. Ltd.



VICTORIA  
Barwon Melbourne

# Barwon Heads Golf Club

Barwon Heads, VIC

Municipal wastewater reuse



## Customer

■ **Barwon Heads Golf Club** is located on the Bellarine Peninsula in Southern Victoria. With over 100 years of history, the club is regularly rated in Australia's top 30 courses and was awarded **Golf Club of the Year** in the 2006 Clubs Victoria Awards.

■ The turf is maintained to the highest standard. The greens are predominantly of *Poa Annua* and are maintained to the highest standard.



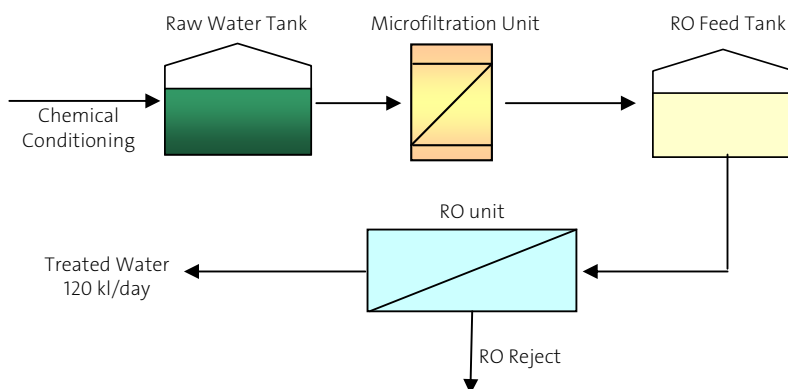
## Needs

- With the drought continuing in Australia and water restrictions in place, Golf Courses are suffering from a lack of water supplies. Barwon Heads Golf Course on the Bellarine Peninsula in Southern Victoria receives only 600mm of rainfall each year, which is low for a heavily populated area
- Barwon Heads Golf Club has been using Class C recycled water from Barwon Water's Black Rock STP on the majority of the golf course
- Unfortunately, the TDS in the water is too high for certain parts of the course, and hence a water treatment plant was proposed to reduce the TDS

## Our Solution (120 kL/day)

- Veolia Water Solutions & Technologies Australia was awarded a contract for the Design, Supply & Commissioning of a Reuse Water Treatment Plant to produce desalinated recycled water for use on the golf clubs fairways and greens
- The Microfiltration/Reverse Osmosis plant produces 120 kL/day of treated water, with a reduction in Total Dissolved Solids (TDS), using Class C reuse water from Barwon Water's Black Rock Sewage Treatment Plant
- The scope of works is for the supply and commissioning of a Microfiltration and Reverse Osmosis Plant, including dosing packages and Microfiltration Clean In Place (CIP) system.
- Hydrex® Water Treatment Chemicals: Hydrex® 4100 antiscalants for the RO

## Process



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# Brampton Island Sewage Treatment Plant

*Whitsundays, QLD*

*Biological treatment of wastewater*

## Customer

■ The GPT Group is one of Australia's largest diversified listed property groups, with total assets of \$14 billion, focusing on ownership, management and development of real estate.

■ A division of the GPT Group, Voyages is a unique Australian company offering holiday experiences in the Great Barrier Reef, the Red Centre, Tasmania...

■ Located in the world-renowned Whitsundays Island on the Great Barrier Reef, Brampton Island is a large and beautiful national park island. The Voyages Brampton Island resort offers a wide range of water and sport activities in a unique and fragile marine environment..

## Needs

- Located 32 km off the coast of Mackay in the Whitsundays, Brampton Island is a prestigious tourist island
- Brampton Island is isolated from the main land, and there are no rivers or streams on the island. Also, much of the groundwater is very saline.
- There are 3 dams located on the island, however, with rainfall in short supply, there was a strained demand on the water collected
- Water is very scarce on the island and the use is restricted to the hotel guests and staff on site
- Annual in-house water requirements for the resort are approximately 30 ML in the dry season and 25 ML in the wet season
- The Great Barrier Reef is a very sensitive marine environment, with stringent environmental requirements. The quality of the water discharged needed to be improved to meet with QLD EPA requirements.

## Our Solution (100 kL/day)

- Veolia Water Solutions & Technologies was awarded a contract for the upgrade of the existing biological treatment- Brampton Island Sewage Treatment Plant
- The process uses a Neosep® Membrane Bioreactor (MBR®) pack with Ultrafiltration to produce class A quality treated water suitable for golf course irrigation and for discharge into sensitive environment
- The conventional process with sand filter remains available as a stand-by plant

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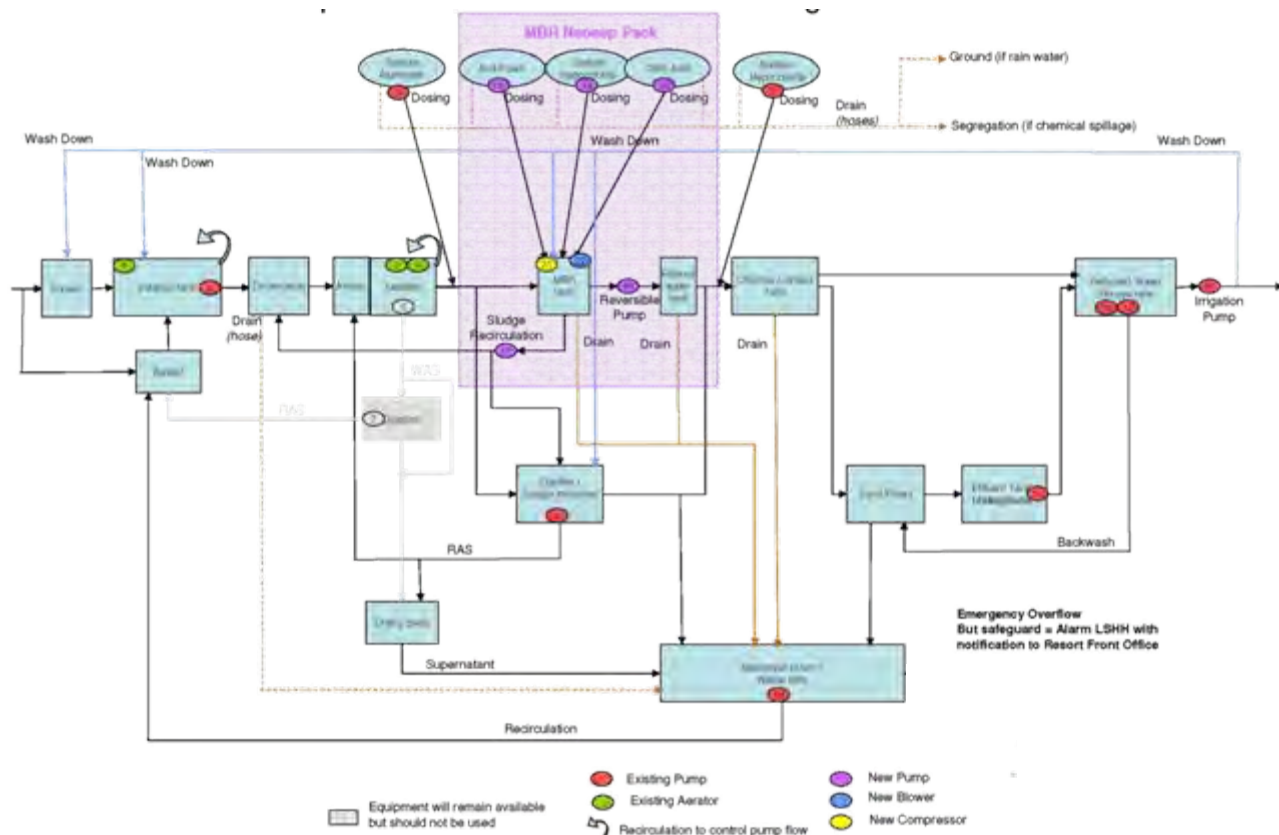




## ■ Neosep® Membrane Bioreactor

- Neosep® is an advanced Membrane Bioreactor technology compact process that produces high quality recycled water from industrial or municipal wastewater. The immersed membrane bioreactor combines activated sludge biological treatment with immersed membrane filtration
- Neosep® produces a very high quality water with a significant reduction in carbon and nitrogen and a very high removal of bacteria, suitable for irrigation, industrial reuse or discharge into environmentally sensitive areas
- The Neosep® process is very compact and easy to implement. The membranes offer a true physical barrier for extremely high removal efficiency of bacteria and suspended solids

## ■ Process Scheme



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QUEENSLAND

Brisbane  
Bundamba

# Bundamba Advanced WTP

*Western Corridor Project, QLD*

*Wastewater reuse by power stations*



## Customer

■ **Western Corridor Project Company** was established in 2006 and is wholly owned by the Queensland Government

■ It is responsible for delivering the Western Corridor Recycled Water Project by December 2008

■ In order to deliver the project within this timeframe, the company has coordinated a whole-of-industry response involving the world's leading engineering and construction companies

■ Together, Western Corridor Recycled Water Pty Ltd and five Alliances will deliver the Western Corridor Recycled Water Project

## Needs

- The Western Corridor Project is part of the Queensland Government's \$9 billion South East Queensland Water Grid, which is the largest urban drought response in Australia
- The objective of the Western Corridor Recycled Water Project is to enhance the security of water supply in South East Queensland through increasing available water supplies that are less dependent on climate trends, providing a system to supply purified recycled water to power stations, industry and agriculture and to replenish drinking water reserves
- The Bundamba Advanced Water Treatment Plant is part of the project, located in Ipswich, QLD and will produce up to 66 ML/day of treated water upon completion

## Our Solution (15.5 ML/day)

- Veolia Water Solutions & Technologies, with subsidiary AnoxKaldnes, was awarded the contract for the Biological Nitrification System for Bundamba Advanced Water Treatment Plant Stage 1B
- Veolia Water Solutions & Technologies have the contract for the design, equipment supply, testing and commissioning of a Moving Bed Biofilm Reactor (MBBR™) nitrification process for treatment of the reverse osmosis concentrate (ROC)
- This treats water for use by Swanbank and Tarong Power Stations
- The innovative MBBR™ treatment process will give a very high removal efficiency for ammonia, producing an effluent ammonia < 0.9 mg/L
  - Design Flow = 15,500 m<sup>3</sup>/day
  - MBBR Influent BOD<sub>5</sub> = < 20 mg/L
  - MBBR Influent TSS = < 5 mg/L
  - MBBR Influent NH<sub>3</sub>-N = 6 mg/L (93 kg/d at design flows)
  - MBBR Effluent Soluble BOD<sub>5</sub> = < 5 mg/L
  - MBBR Effluent NH<sub>3</sub>-N = < 0.9 mg/L
  - MBBR Influent TDS = 2,700 – 6,700 mg/L
  - Wastewater temperature = 18 – 30 degrees

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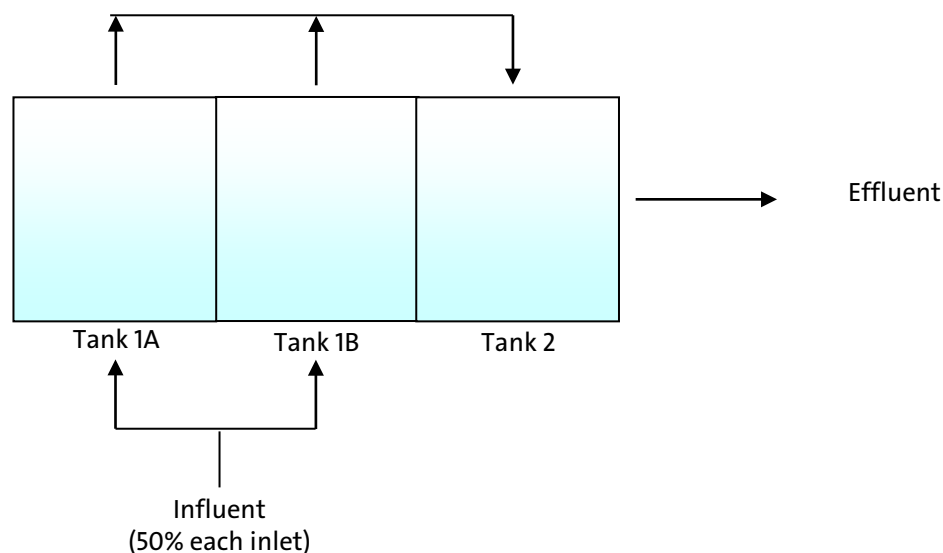


QUEENSLAND

Brisbane  
Bundamba

## Process scheme

- The **Moving Bed™ biofilm technology** be used at Bundamba has been used for over 20 years for greenfield wastewater treatment plants as well as augmenting existing plants
- The Moving Bed Biofilm Reactor (MBBR™) System is specifically designed as a nitrification system for the reverse osmosis concentrate (ROC) at the Bundamba AWTP
- The process is a stand alone process without a need for backwashing, returning sludge, or recycling wastewater
- The design is based on using media to supply surface area for the nitrifying bacteria that will then oxidise the ammonia in the ROC to nitrite/nitrate
- **Natrix™ biofilm process:** The principle behind the Natrix™ biofilm process is to have a continuously operating, non-cloggable biofilm reactor with no need for backwashing, low head loss and high specific biofilm surface area
- This is achieved by growing biofilm on small carrier elements that move along with air and water in the reactor
- The movement is caused by the aeration in the reactor. The carrier element is made of polyethylene or polypropylene with a density of slightly less than water and shaped like small cylinders or discs about 9-64 mm in diameter, depending on the application
- The filling rate of carriers in the reactor may vary between 10% and 65%, depending on the application



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# Darling Walk Recycled Water Plant

## Bovis Lend Lease - NSW

Sewage treatment for reuse

### Customer

■ **Bovis Lend Lease** is a leading project management and construction company operating in more than 30 countries worldwide and employing over 8,000 people

■ They work with clients to create high quality, sustainable property assets and are committed to operating Incident & Injury Free

■ Bovis Lend Lease have aspired to create a sustainable company and implementing this within their operations and design

### Needs

- The Darling Walk development is a low rise commercial office and leisure space currently being constructed in Sydney's Darling Harbour and is expected to be completed in 2011
- The Darling Walk Development has implemented many sustainable design features including the recycled water plant, to reduce their potable water consumption
- Bovis Lend Lease are committed to implementing sustainable design into their new developments in order to achieve Green Star ratings and reduce the developments impact on the environment

### Our Solution (245 kL/day)

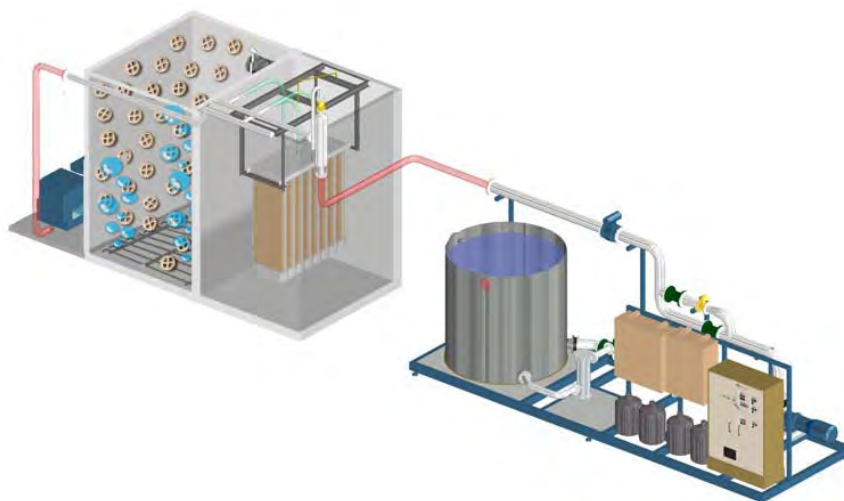
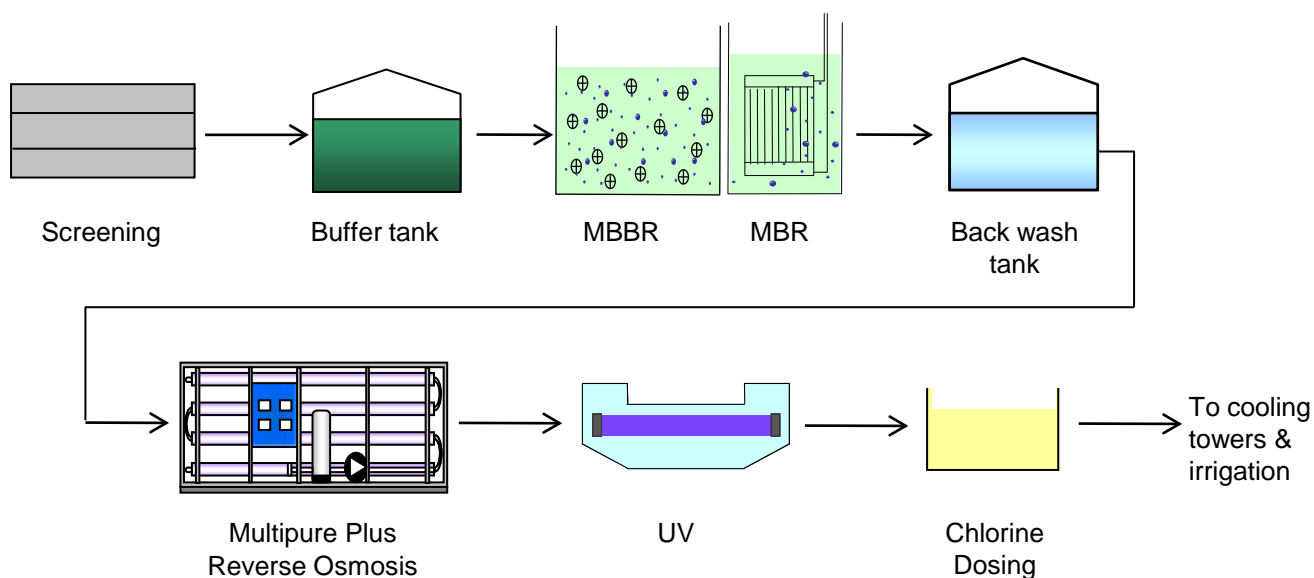
- Veolia Water Solutions & Technologies has won a contract with Bovis Lend Lease for the design, supply and commissioning of a recycled water plant as part of their Darling Walk development
- The recycled water plant will combine **innovative technologies**:
  - **Moving Bed Biofilm Reactor (MBBR)**
  - **Neosep® Membrane Bioreactor**
  - **Multipure Plus Reverse Osmosis unit**
- The process will treat 245 kilolitres a day of sewage through sewer mining to produce **high quality recycled water** for **reuse for toilet flushing, irrigation and cooling tower make up water**
- The recycled water treatment plant was designed to fit within the restricted space determined by Bovis Lend Lease
- The MBBR and Neosep® MBR technologies are ideal for sewage water treatment to withstand variations in the load and can provide high removal of bacteria and suspended solids
- Reverse osmosis will remove salts from the feed water
- VWS will commission the project in August 2010 with testing to be completed once the building has been constructed

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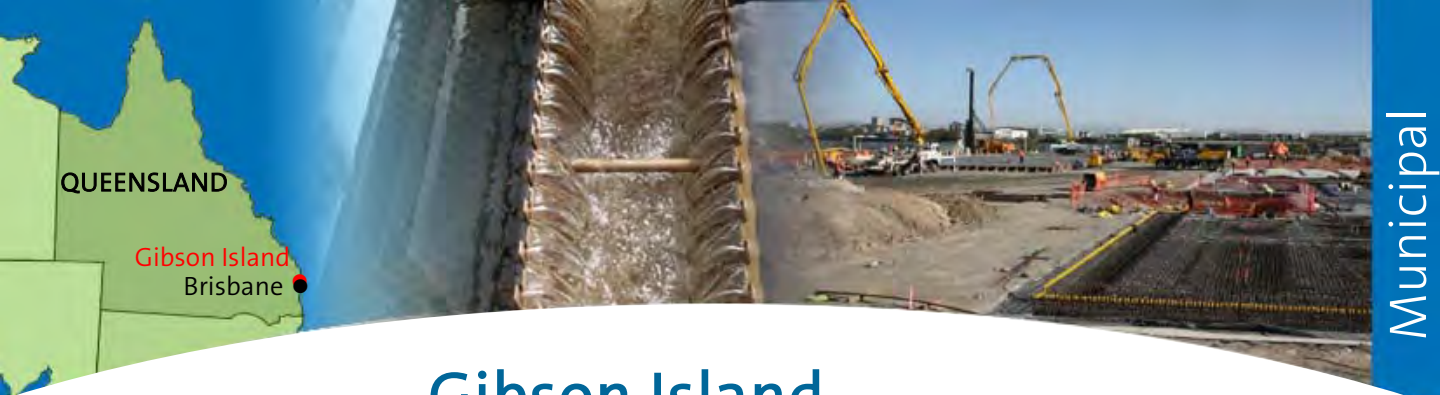
## Process Scheme



3D image of the MBBR + Neosep® MBR technologies

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# Gibson Island

## Western Corridor Recycled Water Project, QLD

*Phosphorous Reduction before MF and RO for a Reuse Application*



### Customer

- The *Western Corridor Recycled Water Project company* was established in March 2006.
- It is wholly owned by the Queensland Government and is responsible for delivering the Western Corridor Recycled Water Project by December 2008.
- Veolia Water Australia is Scheme Operator of the Western Corridor Recycled Water Project.

### Needs

- The objective of the Western Corridor Recycled Water Project is to enhance the security of water supply in South East Queensland through:
  - Increasing available water supplies that are less dependent on climate trends
  - Providing a system to supply purified recycled water to power stations, industry and agriculture and to replenish drinking water reserves
  - Establishing a sustainable commercial basis for the ongoing operations of the infrastructure developed as part of the Project
  - Delivering in accordance with the community's expected best practice
- From completion in December 2008, the Western Corridor project supplies up to 232 ML/day of purified recycled water with the capacity to increase to 310 ML/ day when more wastewater becomes available
- Gibson Island Advanced Water Treatment Plant was converted from an original 35-50 ML/ day plant design to an innovative design for a 100 ML/ day plant

### Our Solution (132 ML/day)

- Veolia Water Solutions & Technologies was awarded a contract for the design & supply of 6 Actiflo® ACP 750L units and chemical dosing equipment which forms part of the Gibson Island Project for the Western Corridor Recycled Water Project.
- The Actiflo® Clarification units, designed to treat 132 ML/day of treated effluent, will be installed for phosphorous reduction prior to the microfiltration and reverse osmosis units.

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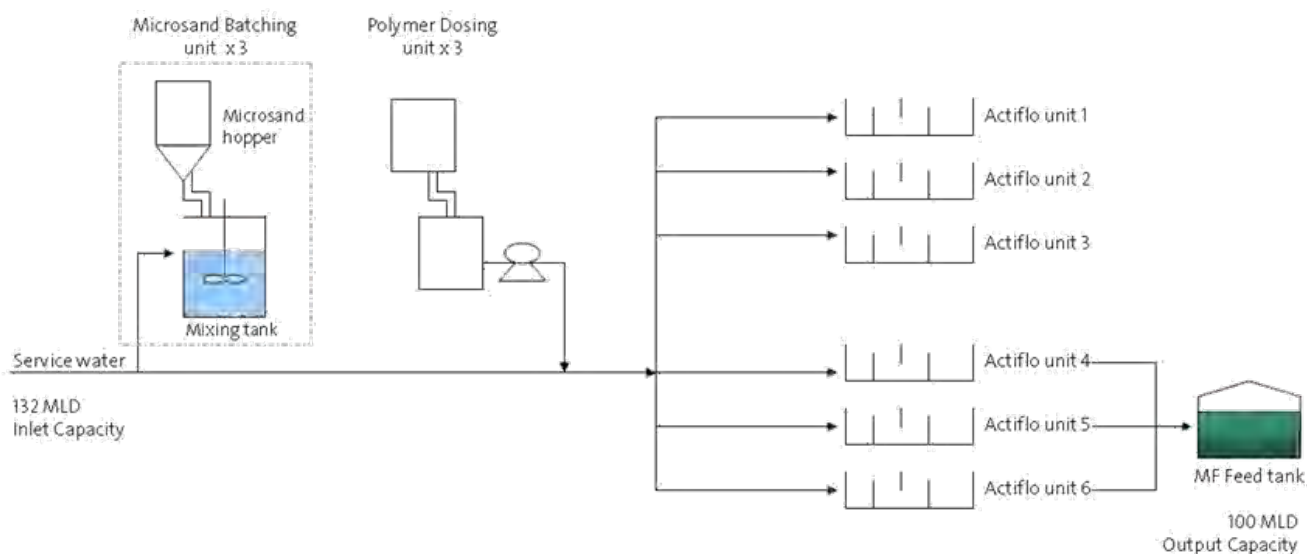




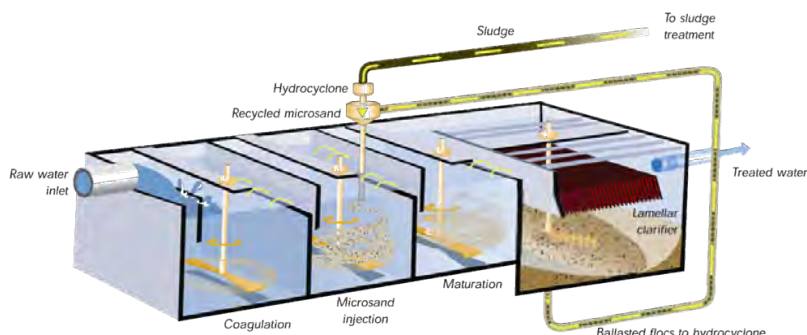
## Actiflo Clarification

- Actiflo® is a compact process that utilises microsand as a seed for floc formation. The microsand provides surface area that enhances flocculation and also acts as a ballast or weight.
- The resulting microsand ballasted floc display unique settling characteristics, which allow for clarifier designs with high overflow rates and short retention times.
- These designs result in system footprints that are between 5 and 20 times smaller than conventional clarification systems of similar capacity, with an ability to start up from a “standby” mode of operation to a steady state operating mode within minutes.

## Process Scheme



## Actiflo Process



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# Huntingdale Golf Club

South Oakleigh, VIC

Bore water desalination

## Customer

■ **Huntingdale Golf Club** is a premier championship 18 hole "sandbelt" course

■ It is home to the Australian Masters and has played host to some of the most famous names in international golf, including Jack Nicklaus, Greg Norman, Ian Baker-Finch, Nick Price and Tiger Woods

■ It proudly takes its place among the unique group of world class courses of which Melbourne is justly proud

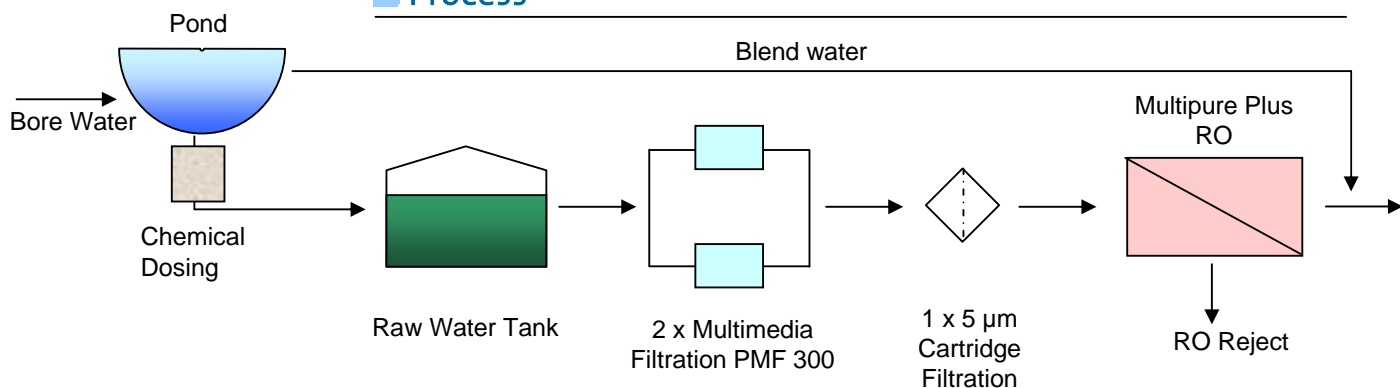
## Needs

- With the drought continuing in Australia and water restrictions in place, Golf Courses are suffering from a lack of water supplies
- Being a prestigious golf club means that the course has to meet the high standards of their members – ensuring that the course remains green requires water
- Bore water currently being utilised was too saline for irrigation of the golf course

## Our Solution (340 kL/day)

- Veolia Water Solutions & Technologies Australia was awarded a contract for the Design, Supply & Commissioning of a Bore Water Treatment Plant
- The bore water had high manganese and iron content which meant that we had to develop a detailed solution to prevent fouling of the reverse osmosis membranes
- The plant consists of chemical dosing, settling tank, pre-treatment, and a Multipure Plus Reverse Osmosis unit
- The plant treats bore water to reduce the salinity suitable for irrigation of the golf course fairways and tees
- Hydrex® Specialty Water Chemicals are used on the equipment to ensure optimum performance of the plant

## Process



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NEW SOUTH WALES

Sydney  
Wollongong

# Illawarra WTP

*Sydney Water - Wollongong, NSW*



*Municipal Wastewater Reuse*

*One of the most advanced coastal treatments plants in the world*

## Customer

■ **Sydney Water** supplies more than 1.7 billion litres of water to more than 1.6 million homes and businesses each day. It provides drinking water, wastewater services, and some stormwater services to customers in the communities of Sydney, the Blue Mountains and the Illawarra.



## Needs

- Improving water quality at Illawarra beaches, particularly those near Sewage Treatment plants
- Protecting coastal waters and reducing impact on sensitive marine ecosystems, and the desire to minimize the effluents negative impacts when released to the environment
- Supply high-quality recycled water for industrial reuse
- Saving drinking water

## Our Solution (320 ML/day)

- Veolia Water Solutions & Technologies was contracted by Sydney Water Corporation to **design, build and provide operational advice** for upgrading 3 wastewater treatment plants south of Sydney (Bellambi, Port Kembla, Wollongong) to serve 300,000 residents
- The heart of this project is a **Wastewater Recycling Plant** which will use microfiltration and reverse osmosis (RO) technologies to recycle 20 ML/d of sewage for reuse by BlueScope Steel at Port Kembla
- The scope of the project:
  - Upgrade and augmentation of Wollongong STP by moving to full tertiary treatment and UV disinfection
  - Conversion of existing Bellambi and Port Kembla STPs to storm sewage treatment plants to store and treat wastewater
  - Construction of a Water Reclamation Plant at Wollongong STP to supply 20 ML/day high quality water for industrial reuse by BlueScope Steel, at Port Kembla.
  - Sewage pumping stations and transfer pipelines to carry flows from Bellambi and Port Kembla STPs
  - Construction of a new 1 km twin pipe ocean outfall at Wollongong
- So far, wastewater from the Illawarra region was receiving treatment at three separate facilities –Wollongong, Port Kembla and Bellambi

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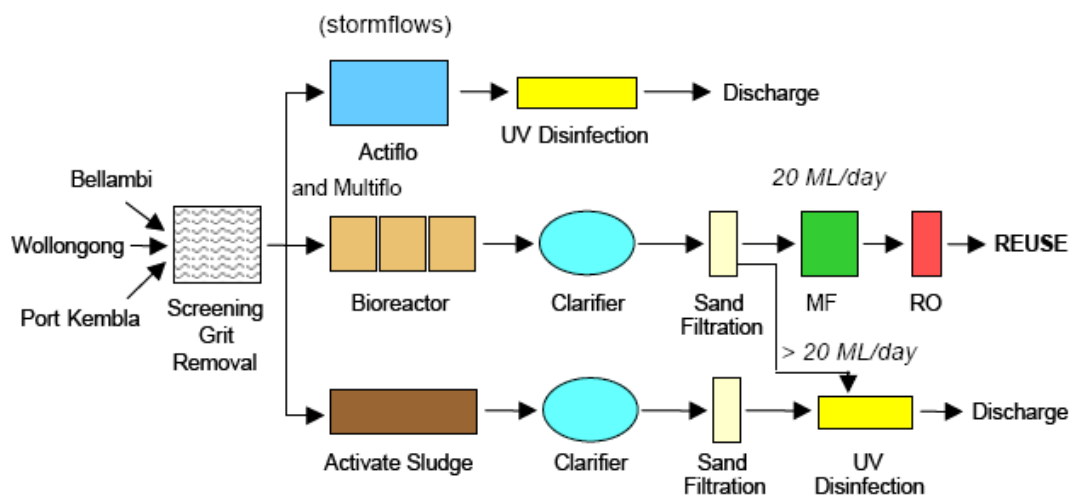
## Our Solution (320 ML/day)

- The Illawarra Wastewater Strategy involves the consolidation of flows from these three sewerage catchments and their transfer, via new pipelines, to an upgraded facility at Wollongong for high-level treatment and reuse
- The upgraded facility at Wollongong will provide biological treatment to flows of up to 177ML/day(three times ADWF). Flows in excess of this, up to maximum of 320ML/day, will be treated using the high rate ballasted flocculation process, Actiflo®, followed by UV disinfection
- A new Biological Nutrient Removal plant, encompassing biological nitrogen and phosphorous removal using the BioDeniphoprocess, will augment the existing activated sludge system. Biological treatment is followed by sand filtration. Effluent will then either undergo UV disinfection prior to discharge, or be further processed by the new Water Recycling Plant (WRP)
- The WRP will use Continuous Membrane Filtration (MF) and Reverse Osmosis (RO) to produce 20ML of reclaimed effluent per day for use at the nearby BlueScope Steel

## Results

- When the project is completed by 2006, the city of Wollongong will have one of the most advanced coastal treatment plants in the world, with the best possible outcome for the ocean environment and beaches. In addition, this project will return the picturesque Bellambi Headland to the public for recreational use and provide high quality water for industrial reuse by BlueScope Steel at Port Kembla
- It will be one of the largest wastewater reuse facilities in Australia, equipped with the dual environmental benefits of decreasing ocean wastewater discharge volume by 40%, and decreasing the use of potable water in the steel-making process by more than 60%

## Process Scheme



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WESTERN  
AUSTRALIA

Kwinana  
Perth

# Kwinana

Water Corporation - WA

Municipal Wastewater Treatment



## Customer

■ **The Water Corporation** (previously known as the Water Authority of Western Australia) is one of Australia's largest and most successful service providers, providing water and wastewater services to the Perth Metropolitan area and to hundreds of other towns and communities

■ **The Kwinana Industrial Area (KIA)** is the primary heavy industrial centre in the State of Western Australia, located 40 km south of Perth, that contributes to more than 10% of the State industry output.

## Needs

- 60% of the total industrial demand of the Kwinana Industrial Area was provided through self-supplied groundwater. The proposed industrial expansion schemes will significantly increase the groundwater demand that exceeds the available capacity
- The most important challenge for the Water Corporation was to propose alternative water resources in order to avoid the potential loss of its important industrial customers
- Considerable public demand for a better quality effluent being discharged from Woodman Point Wastewater Treatment Plant. This necessitated the implementation of a higher level of treatment process
- Significant decrease in rainfall and runoff within the region in the past 25 years. Approximately a 25% reduction in rainfall, and a 40% reduction in runoff over the period

## Our Solution

- The Kwinana Water Reclamation Plant (KWRP) is a Design and Build project
- The plant was officially opened in November 2004. VWS' technology was chosen to match water needs, and to provide high quality water from wastewater, with processes that had recently been used elsewhere in Australia
- Veolia Water Solutions & Technologies was contracted by the Corporation to design and build Kwinana Water Reclamation Plant (KWRP)
- This new source will provide at least 5.5 Mm<sup>3</sup>/year of high quality water for use by large industrial customers in the Kwinana Industrial Area; Rio Tinto for its Hls melt pig iron plant, power generation company Edison Mission Energy, chemical fertiliser manufacturer CSBP and petroleum giant BP

**Enhance industrial expansion**  
**Awarded AWA Water Environment Merit Award 2005**  
**National winner**

### Contact:

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Level 4, 65 Pirrama Road, Pyrmont NSW 2009  
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systems@veoliawater.com  
www.veoliawaterst.com.au





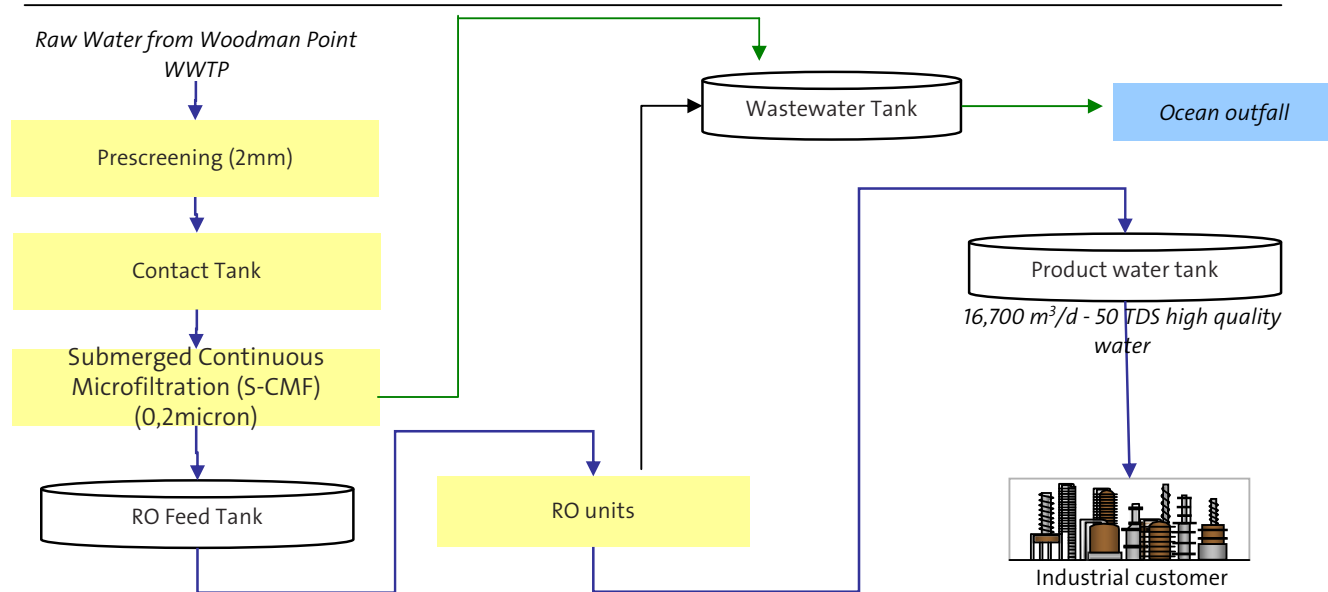
## Process

- The reclamation scheme treats effluent from the nearby Woodman Point Wastewater Treatment Plant. Effluent is pumped to a 280 m<sup>3</sup> contact tank on the KWRP site. The effluent is pre-screened to 2 mm, then dosed with sodium hypochlorite (NaOCl) to control biological fouling and small quantity of sulphuric acid (H<sub>2</sub>SO<sub>4</sub>) to slightly reduce pH. The screened and dosed effluent then flows into Submerged Continuous Microfiltration cells (MF-S) prior to passing through two stages of Reverse Osmosis. High water quality is produced and distributed to industrial customers.
- KWRP was designed and constructed to continuously provide 16,700 m<sup>3</sup>/d of 50 mg/L Total Dissolved Solids (TDS) product water.
- The design takes into account the fact that the plant will be expanded at a later date to produce 6,700 m<sup>3</sup>/d of reclaimed water of 50 mg/L TDS.

## Result

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## Water Reclamation Process Scheme



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# Metropolitan Golf Club

South Oakleigh, VIC

Bore water desalination

## Customer

■ **Metropolitan Golf Club** is one of Melbourne's renowned 'sandbelt' courses and widely regarded as one of the finest championship courses in Australia

■ It is a private members Club

■ In total over the years the Club has hosted seven Australian Opens, five Australian P.G.As, ten other Professional tournaments and in 2001 it will host the Australian Amateur Championship for the fifth time

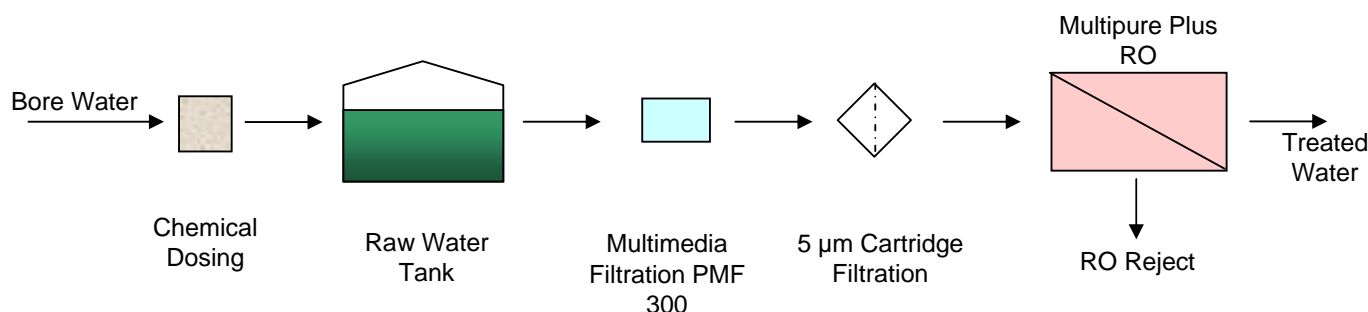
## Needs

- With the drought continuing in Australia and water restrictions in place, Golf Courses are suffering from a lack of water supplies
- Metropolitan enjoys a reputation as one of the best-conditioned and most beautiful courses in the country
- The pure couch grass fairways with large, fast bent-grass greens require constant up-keep and water to ensure that the members receive the high standards expected of this prestigious golf course

## Our Solution (115 kL/day)

- Veolia Water Solutions & Technologies Australia was awarded a contract for the Design, Supply & Commissioning of a Bore Water Treatment Plant to produce desalinated water for use on the golf clubs fairways and greens
- The bore water had high iron content which meant that Veolia Water Solutions & Technologies had to develop a detailed solution to reduce the potential for reverse osmosis membrane fouling
- We supplied & commissioned a brackish water reverse osmosis plant (Multipure Plus) including pretreatment & chemical dosing
- We also supply Hydrex® Specialty treatment chemicals to ensure optimum long term performance of the reverse osmosis membranes

## Process



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VICTORIA

Melbourne

Portsea

# Portsea Golf Club

Portsea, VIC

Desalinated bore water for irrigation



## Customer

■ **Portsea Golf Course** established in 1924, ranks in the top 25 golf courses in Australia and in the very best golf courses on the Mornington Peninsula in Victoria, one of the most popular recreational areas in Victoria.

■ Portsea Golf Club offers a unique mix of coastal undulation, picturesque views, challenging links golf and a colourful history.



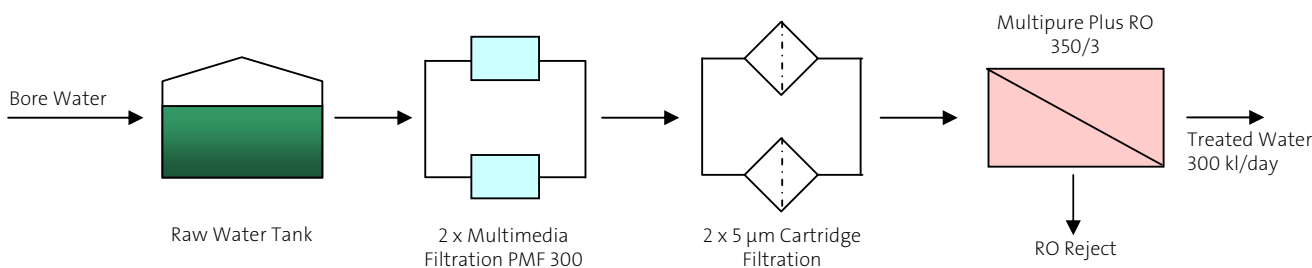
## Needs

- With the drought continuing in Australia and water restrictions in place, golf courses are suffering from lack of water supplies
- Level 3a water restrictions implemented in Victoria, with level 4 restrictions expected for the summer of 2007
- Portsea Golf Course wanted to secure desalinated bore water to substitute the potable water which was being used for certain TDS sensitive parts of the golf course

## Our Solution (300 kL/day)

- Veolia Water Solutions & Technologies Australia was awarded a contract for the Design, Supply and Commissioning of a Brackish Water Reverse Osmosis Plant with media filters
- The RO unit produces 300 kl/day of RO permeate water to irrigate the greens and tees of the golf course
- VWS also provides Hydrex® specialty water treatment chemicals including antiscalant chemicals for the RO unit to prevent scaling
- “Our club is looking forward to working with Veolia Water Solutions & Technologies on this exciting new project, which is projected to save around 35 Megalitres of potable water per annum,” Portsea Golf Club General Manager Andrew Kelly

## Process



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# Standard Products & Services **Creating Water Solutions**



Solutions & Technologies





## Creating Service Solutions for Industrial and Municipal Customers

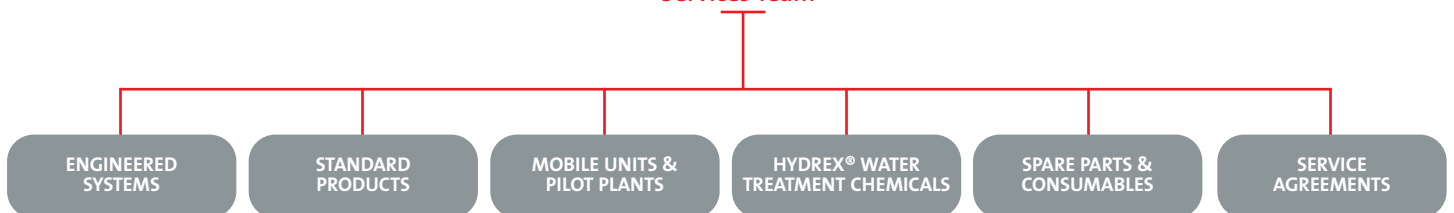
**Customer Service** has always been given priority at Veolia Water Solutions & Technologies. Customers choose us because they know they can rely on our team to provide the highest possible levels of service and support, not just during the buying decision, but throughout the long life of our water treatment systems and equipment.

We work in partnership with you to guarantee that your water quality and availability meet your expectations. Our objective is to provide a first class service, that is backed by a service team throughout Australia and New Zealand with over 70 years of **experience**.

We can propose **customised** water management solutions, focusing on technical performance, **compliance** with process and environmental requirements and **long-term cost effectiveness**, in order to fulfil the most demanding **reliability, health & safety**, and **quality** standards. Our products, services & activities are certified to **ISO 14001, ISO 9001 and AS/NZS 4801** by Benchmark Certification.



### Services Team



### Customers

#### > Industrial customers

- Power
- Oil & Gas
- Chemicals
- Mining & Minerals
- Metal Processing

#### > Municipal customers and water authorities

- Food & Beverage, including Dairy
- Pharmaceuticals
- Pulp & Paper

# Engineered Systems

- > A range of **modular and customised** integrated systems for drinking water, process water, wastewater and water reuse.
- > We can offer cost-effective tailor made solutions, guaranteed quality & safety of equipment within tight timeframe.
- > Excellent project delivery skills, and leveraging of experience & expertise from Veolia Group.

## Key Standard Products & Technologies

### > Microfiltration & Ultrafiltration

- > **Membrane filtration** including microfiltration, pressurised submerged microfiltration and nanofiltration.
- > Can be used as a pre-treatment process for Reverse Osmosis or as a stand alone process for producing high quality water.



### > Reverse Osmosis (RO)

- > A **membrane** process used extensively for removing salt and contaminants from seawater, brackish water or surface water.
- > Robust and proven technology that is easy to operate.



### > Hydrotech® Discfilters

- > **Tertiary treatment** producing effluent with both low turbidity and low total suspended solids.
- > Suitable for wastewater treatment plants, primarily for effluent polishing and for pre-treatment (water reuse) as well as algae removal.
- > Small footprint, automatic backwash, low maintenance, minimum equipment and operational flexibility.



[Ask for our brochure](#)

### > Softeners

- > Used for boiler feed, Reverse Osmosis feed, glass washing, food processing and general manufacturing applications.
- > Flexible design, control systems enable to minimise wastewater and salt usage.



### > Filters

- > Used for removing suspended matter, turbidity, iron, chlorine taste, colour and odour from feedwater through media filtration through a bed of media such as fine sand, anthracite, activated carbon or manganese dioxide.
- > Suitable for general industrial process water.



### > Deionisers

- > Used for producing **ultra pure water** on low TDS feedwater (< 100 mg/l).
- > Low installation and operating costs, minimum start up time, small footprint, efficient chemical usage.



### > Continuous Electro-Deionisers (CDI)

- > Used for producing **ultra pure water** for power industry, pharmaceuticals, boiler feed in general industry.
- > Reliable and skid-mounted systems, compact design, easy to transport.
- > Low power consumption, low operating costs, high recovery, chemical-free process.



## Mobile Units & Pilot Plants

### > Aquamove® Reverse Osmosis Mobile Units

- > Containerised mobile Reverse Osmosis units for use as water demineralisation, desalination and clarification units.
- > Capacity: 250 to 1,000 kL/day or higher.
- > Provides a quick response to emergency or **temporary water needs**.
- > Cost effective short-term water treatment solution. Units can be leased from 1 month up to 10 years.
- > Units can be purchased or leased from 1 month up to 10 years.



[Ask for our brochure](#)

### Actiflo® Clarification Packaged & Mobile Plants

- > A compact, high-rate water and wastewater **clarification** process combining micro-sand enhanced flocculation and settling.
- > An ideal solution to treat raw water or recycle valuable process water to provide boiler feed, process water or cooling tower make up.
- > Packaged plants (1,000 to 3,000 kL/day) and engineered systems are available.
- > A containerised Actiflo® mobile pilot plant fully equipped with laboratory equipment can be delivered to site and be operational within a day, to demonstrate the effectiveness of the Actiflo® process.

[Ask for our brochure](#)



## Hydrex® Water Treatment Chemicals

- > A complete range of **specialty water treatment chemicals** including Reverse Osmosis antiscalants, biocides, cleaners, preservatives, chlorine removal chemicals, corrosion inhibitors, boiler scale inhibitors, dispersants, condensate treatments, oxygen scavengers and polymers.
- > Suitable for microfiltration, ultrafiltration, nanofiltration, Reverse Osmosis plants, cooling towers, boilers and wastewater plants.
- > Can significantly improve the management of **scaling, biofouling, corrosion, suspended solids**.



## Spare Parts & Consumables

- > Our 4,000-reference catalogue contains replacement spare parts & consumables.





## Delivering the best possible service & support through SMART

Our Service Engineers are equipped with a Service Management And Reporting Tool using the latest technologies: SMART. Through its Pocket PC-based application, SMART provides updated critical **site specific information** to Service Engineers in the field, an **online inventory data** of all spares & consumables, and a GPRS tracking of service staff to ensure the quickest and most appropriate on site response to all our customers. The performances, technical data, history, specific operating parameters, and electronic Service reports of the customer's plants are electronically archived for easy retrieving and analysis.



## Aquavision®: The 24/7 Remote Monitoring System

The Aquavision® system developed by Veolia Water Solutions & Technologies enables to optimise your plant efficiency, reduce costs, and minimise downtime. It ensures your plants are monitored 24/7:

- > **Key process parameters** (pressure, level, flow...) can be automatically retrieved at specified intervals.
- > In case of **plant alarm**, key personnel is alerted via SMS or e-mail 24/7.
- > The Aquavision® can be configured for **multiple PLCs** (Programmable Logic Controllers).

## Service Contracts Tailored to Meet Your Needs

### > Mechanical Service Agreements

- > Regular on site visits for preventative **maintenance** & checking of **equipment**.
- > Equipment is replaced or upgraded if necessary.
- > Ensure optimal performance and minimise down time, allowing your business and equipment to run smoothly.

### > Chemical Service Agreements

- > Customised chemical water treatment programmes to suit your needs, using our Hydrex® Water Treatment Chemicals, developed in our expert ISO 9001:2000 accredited centre.
- > Ensure **optimal** and **minimal** quantity of chemicals are used in the systems.

### > Technical Consultation Service, Plant Refurbishment & Upgrade Agreements

- > On-site audits and technical reviews of water cycles.
- > Consultation service for plant and system refurbishments and upgrades.
- > Designed to optimise the **performance** of water treatment plants and treat the water to the required specifications.



# Veolia Water Solutions & Technologies Australia and New Zealand

## Creating Water Solutions

Present in Australia and New Zealand for over 70 years, **Veolia Water Solutions & Technologies** is a world leader in Design & Build of water and wastewater treatment plants. Our unique portfolio of differentiating technologies includes drinking water, industrial process water, and wastewater.

We provide Design & Build capabilities, Engineered Systems, Equipment Supply, Leasing of Mobile Plants and Services, focusing on reuse and desalination.

Our approach for delivering innovative water solutions makes us the partner of choice for municipal and industrial customers.

#### Sydney

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#### Melbourne

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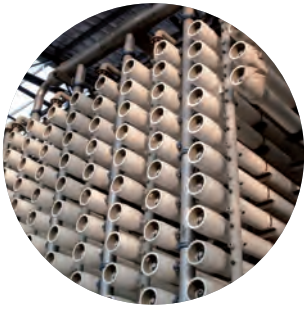




# Australia and New Zealand Creating Water Solutions



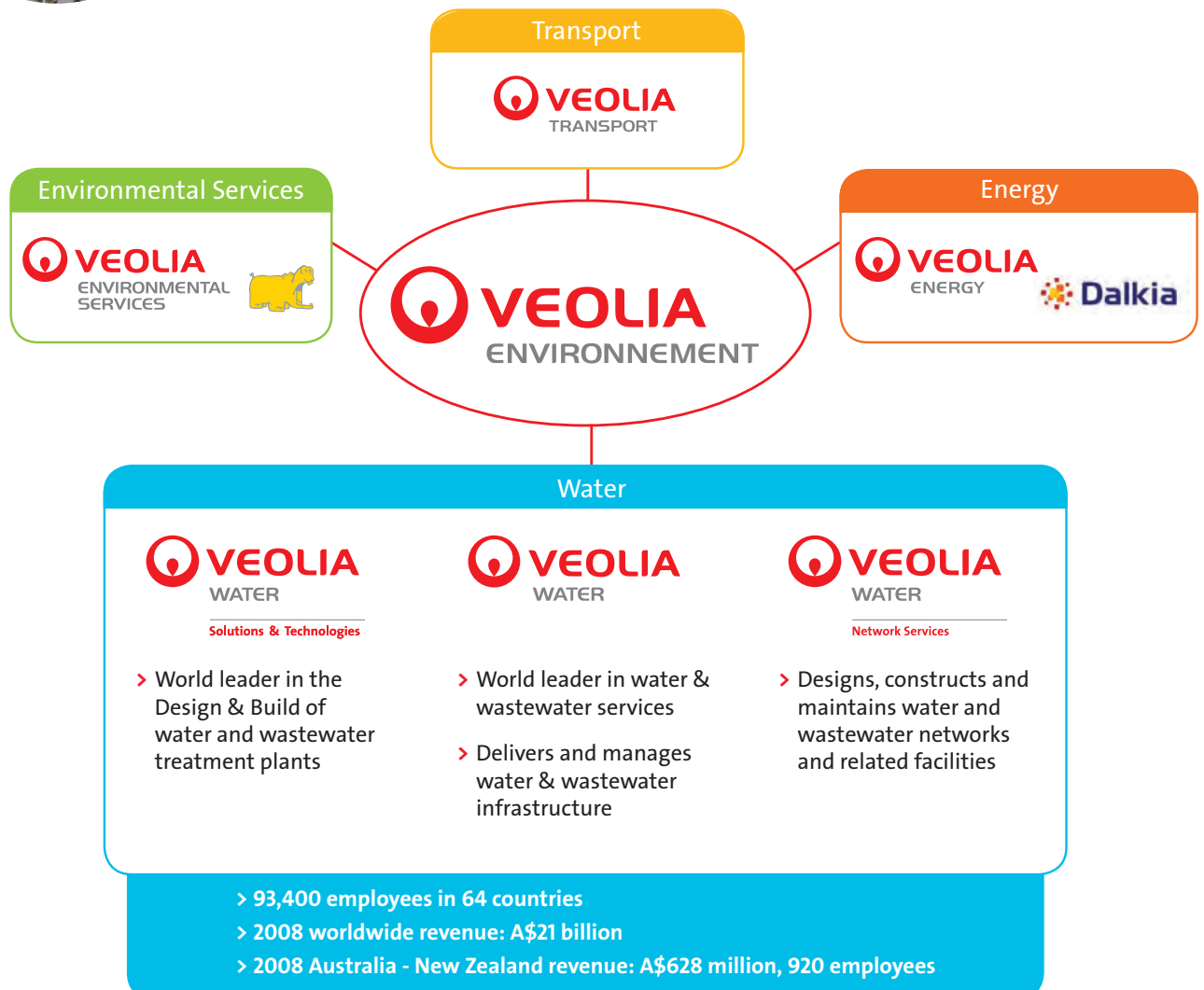
Solutions & Technologies



## World Leader in Environmental Solutions

As the world leader in environmental solutions, **Veolia Environnement** is meeting the biggest environmental challenges of this century, conserving natural resources and fighting climate change, whilst fostering sustainable and equitable means of growth on a global scale.

In 72 countries, generating **revenue of A\$62 billion**, Veolia Environnement has **336,000 employees** offering the entire range of environmental services in water management, waste management, energy and transport for commercial, industrial and public authorities.





# Veolia Water Solutions & Technologies

## Creating Water Solutions



**Veolia Water Solutions & Technologies** is a world leader in Design & Build of water and wastewater treatment plants, focusing on **reuse & desalination**.

We provide Design & Build capabilities, turnkey packaged plants and skid systems incorporating Maintenance & Service and Hydrex® Specialty Chemical agreements.

We have developed a unique range of **differentiating technologies** through our worldwide research and development teams to deliver the most **innovative** and effective **technological solutions** for our customers.

We create water solutions for **drinking water**, **industrial process water** and **wastewater** to meet the needs of municipal, commercial & industrial customers.

## Providing innovative technological solutions & services for our customers

### Design & Build

- **Design, construction and commissioning** of projects on every scale with tailored processes and technological solutions
- Focusing on **reducing operating costs**, and improving flexibility, reliability, environmental protection and safety



### Packaged Plants & Skid Systems

- We offer a range of turnkey packaged plants and skid systems to provide **efficient & cost effective** solutions with short turnaround times
- Easily integrated on **sites** with **space restrictions**
- Leasing of mobile units and pilot plants



### Maintenance & Service

- Our customers benefit from the **highest possible levels of service** and support throughout the long life of our water treatment systems and equipment. We can provide:
  - Hydrex® Specialty Water Treatment Chemicals, PICA Activated Carbon, Spares & Consumables
  - Maintenance & Service Agreements, Chemical Service Agreements
  - Technical consultation including audits and plant refurbishments for power stations



# Municipal Customers



We work with **water authorities, councils and municipal customers** to deliver high quality drinking water and advanced wastewater solutions.

We help our customers to secure a drought proof water supply, ensure the security and safety of drinking and recycled water processes, and provide effluent treatment to protect the **environment**.

We can provide **innovative water solutions** for:

- > **Highest quality potable water** from rivers, dams, groundwater and desalination of seawater or borewater
- > Advanced **tertiary treatment** for recycling of municipal wastewater for new housing developments, high rise buildings, tourist developments and golf courses
- > **Sewer mining, blackwater treatment** and **recycling** for local recycled water schemes
- > **Treatment of wastewater, storm flow and phosphorous removal** before discharge into sensitive environment

## > World Leader in Water Reuse

**Recycling water for industrial and agricultural use is of key importance in Australia.**

Veolia Water is a world leader in water reuse, with over **50 water reuse projects** in Australia, **recycling up to 600 Megalitres a day**, producing high quality treated water.

Treated water is suitable for irrigation of fields, recreational areas, for industrial reuse (process water, boiler feed water, cooling towers, etc), or for discharge into sensitive environments.



## > World Leader in Desalination

**Desalination plays a key role in overcoming Australia's scarce water resources and creates an alternative drought-proof water supply.**

Veolia Water is a world leader in desalination, with over **2,000 desalination installations worldwide**, using Reverse Osmosis or thermal processes.





# Industrial Customers



## > Power

**We work with power companies throughout Australia and New Zealand.**

**We can provide:**

- > Boiler feed water production for steam generators
- > Cooling water production and management
- > Water chemical conditioning, including Legionella control
- > Effluent treatment and reuse, including Zero Liquid Discharge (ZLD), sludge treatment and disposal

***Some of our customers: Macquarie Generation, Eraring Energy, Stanwell Corporation, Redbank Power, Griffin Energy, Delta Electricity, Alstom, Genesis Energy, ERM Power, Austrian Energy.***



## > Oil & Gas

**We have developed specific processes suitable for water and wastewater treatment for Liquefied Natural Gas, Coal Seam Gas, oil and petrochemical production and exploration. We can provide:**

- > Treatment of produced water to remove pollutants for reuse or environmental discharge
- > Treatment of sea water or groundwater for producing high quality demineralised water, process water or drinking water
- > Integrated and packaged plants on skids

***Some of our customers: Woodside, Esso, Caltex, Technip, Shell, BP, Chevron, Queensland Gas Company/ BG Group, Arrow Energy.***



## > Mining & Metal Processing

**Our robust and reliable process technologies are ideally suited to the mining industry. We can provide:**

- > Microfiltration and desalination systems for water reuse and drinking water supply
- > Water solutions for complex mineral processing, recovery applications and treatment of contaminated pond or underground mine water
- > Pre-engineered packaged plants for fast and effective remote construction

***Some of our customers: BHP Billiton, Rio Tinto, Vale Inco, Lihir Gold, Dampier Salt, Queensland Nickel, Perseverance, BlueScope Steel, Bendigo Mining.***



## > Food & Beverage

**Water is widely used in the Food & Beverage industry as process water, as an ingredient, for industrial use, treatment of effluents, and water recycling. We offer:**

- > Consistent production of high quality water, compliant with Health and Food safety legislation
- > Effluent treatment and reuse, including treatment of oil, fat & grease
- > Prevention of Legionella and management of health risks through our preventative solutions

***Some of our customers: Coca Cola Amatil, Warrnambool Cheese & Butter Factory, Arnotts, d'Vineripe, Tatura Milk, Cadbury, Cargill, Fonterra, Freshpak, CUB, Masterfoods.***



## > Pharmaceuticals

**We can provide pharmaceutical companies with water treatment solutions such as:**

- > Production of Purified Water, highly purified water, pyrogen free water and water for injection (WFI)
- > Specific treatment technologies for manufacturing facilities, from process water to waste water and sludge treatment

***Some of our customers: Astra Zeneca, CSL, Probiotec, Pharmaxis, Hospira, Baxter Healthcare***

# Innovative Technologies

## Actiflo® Clarification

- > Actiflo® is a **compact, high performance water clarification system** combining the advantages of microsand enhanced flocculation with fast lamella clarification – particularly suited for high turbidity water
- > Key features: **flexibility** (reacts quickly to changing raw water quality), **efficiency** (removal rate of turbidity exceeding 99%), start up to steady state within minutes
- > Strong 18-year operating experience with over **530 Actiflo® plants worldwide**
- > Available: **Actiflo®** and **Actifloc®** (with filtration) clarification packaged plants (1,000 to approx. 3,000 kL/day), **Actiflo® HCS** (High Concentration Sludge), **Actiflo® Turbo** and engineered solutions for larger plants



## Hydrotech® Discfilters

- > **Tertiary treatment** capable of producing effluent with both low turbidity and low total suspended solids. Discfilters are utilised in treatment plants primarily for effluent polishing
- > Key features: robust construction, low headloss, **small footprint**, automatic backwash, **low maintenance**, easy access, **minimal equipment and operational flexibility**
- > Strong 10-year operating experience with more than **6,000 Hydrotech® installations worldwide**
- > Capacity: 10 to 4,000 kL/hour

*To achieve higher clarification and filtration of suspended solids water, or phosphorous removal, the compact and efficient Actidisk® process is recommended (Actiflo® + Discfilters).*



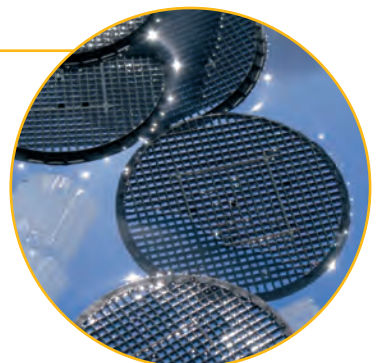
## Neosep® Membrane Bioreactor

- > A new generation membrane biological process for **producing high quality recycled water** from industrial or municipal wastewater
- > Key features: **high quality reuse water** (class A++), high BOD/COD removal rate, small footprint
- > 12-year operating experience with **75 Neosep® plants worldwide**
- > Available: Neosep® packaged plants (50 kL/day to 1 Megalitre/day) or engineered system



## Moving Bed Biofilm Reactor (AnoxKaldnes™ MBBR)

- > Leading-edge biological solution for wastewater treatment combining the advantages of activated sludge & fixed biofilm systems
- > The biofilm attached to a carrier achieves **high BOD, organic & nitrogen pollutant removal**
- > The MBBR process can be used as a standalone solution or combined with activated sludge
- > Key features: **very flexible, easy to operate**, can easily be installed in existing tanks or basins
- > More than **500 installations worldwide** across 50 countries



## Ultrafiltration

- > **Membrane filtration** range including ultrafiltration, microfiltration and nanofiltration
- > Can be used as a **pre-treatment for RO**, or as a standalone process for producing high quality water
- > Key features: robust proven technology, barrier filtration (ideal for reuse applications), low cost, small footprint
- > Available: packaged plants up to 96 kL/hour or engineered solution



## Reverse Osmosis

- > A membrane process used extensively for **removing salt from seawater or brackish water** and even dissolved contaminants from sewage
- > Key features: robust proven process technology, **small footprint, easy to operate**
- > Available: skid-mounted packaged plant (12 to 2,520 kL/day) or engineered solution
- > **Aquamove® Mobile Units:** containerised reverse osmosis units for water demineralisation or desalination which provide a quick, cost effective response for short or mid-term water treatment needs



## Ion Exchange

- > A packaged or individually tailored solution ideally suited for ultra pure water for boiler feed
- > Key features: **low operating costs**, small footprint, **efficient chemical usage**
- > Available: countercurrent or packed bed designs



## Packaged Plants & Skid Systems

- > Standard products & equipment including **Actiflo® Clarification** packaged plants, Desalator Reverse Osmosis systems, Multipure Plus & Midi **Reverse Osmosis** units, Continuous and Rapide Strata **Deionisation** systems, **softeners** and filters
- > Packaged plants specific for purified water treatment for the pharmaceutical industry include Orion II™, Polaris™, IonPro-LX™ and Quattro™



## Hydrex® Specialty Water Treatment Chemicals

- > A complete range of specialty water treatment chemicals for boiler & cooling water systems including Legionella control, Reverse Osmosis **antiscalants**, **biocides**, **cleaners**, **inhibitors**, **dispersants** and **polymers**
- > Can significantly improve the management of **scaling**, **biofouling**, **corrosion**, **suspended solids**





# Creating Water Solutions for municipal customers

## > RECYCLING TREATED WASTEWATER FOR INDUSTRIAL REUSE

### Rosehill Recycled Water Scheme for Sydney Water Corporation - NSW

- > Design, build, own and operate (20 years) of a **water recycling plant** to treat municipal wastewater for **reuse by local industry**
- > Capacity: 20 Megalitres/day
- > Process: **ultrafiltration** and **reverse osmosis** will treat secondary effluent from the Liverpool Sewerage Treatment Plant
- > Application: the plant will **produce 4.3 billion litres a year** (upgradable to 7.3 billion litres) for reuse by major industrial and commercial customers, reducing demands on drinking water supplies



### Illawarra Recycled Water Plant for Sydney Water Corporation – NSW

- > Advanced wastewater treatment plant in Wollongong treating the wastewater from 300,000 residents
- > Capacity: 320 Megalitres/day (ADWF: 59 ML/day)
- > Process: using **membrane filtration**, and **reverse osmosis** to recycle 20 Megalitres/day
- > Application: produce high quality water suitable for industrial reuse by BlueScope Steel at Port Kembla



## > REDUCING WASTEWATER & STORMWATER ENVIRONMENTAL IMPACT

### Actiflo® Clarification Packaged Plants for Rodney District Council & Gore District Council – New Zealand

- > Design & supply **Actiflo® Clarification** packaged plants
- > Rodney DC: **treat peak storm flows to reduce Total Suspended Solids (TSS) & phosphorous** before discharge into environment. Capacity: 9 Megalitres/day
- > Gore DC: **reduce phosphorous from municipal wastewater** before discharge into nearby river. Capacity: 7.5 Megalitres/day



### Maroochydore Sewage Treatment Plant for Maroochy Waters Alliance – QLD

- > Upgrade of Sewage Treatment plant to advanced tertiary filtration
- > Capacity: 36 Megalitres/day (ADWF: 12 ML/day)
- > Process: 2 **Hydrotech® Discfilters** used for tertiary effluent filtration
- > Application: provide class A water for agricultural reuse and irrigation, as well as improve the quality of water discharge into the Maroochy river



## > RECYCLING WASTEWATER USING BIOLOGICAL TREATMENT FOR IRRIGATION

### Brampton Island Sewage Treatment Plant - Whitsundays, QLD

- > Design & Build contract for the upgrade of Brampton Island Sewage Treatment Plant
- > Capacity: 100 Kilolitres/day
- > Process: **Neosep® Pack Membrane Bioreactor**, Ultrafiltration
- > Application: class A quality treated water suitable for irrigation of the resort grounds and golf course





## > TREATING BORE WATER & WASTEWATER TO MEET TIGHTER CONSENT REQUIREMENTS

### Water treatment plants for Barwon Heads & Portsea Golf Clubs – VIC

- > Reduce salinity of bore water or wastewater using microfiltration and/or reverse osmosis
- > Barwon Heads Golf Club: Design & Supply of a **Microfiltration/ Reverse Osmosis** plant to treat Class C water from a nearby sewage treatment plant. Capacity: 120 kL/day
- > Portsea Golf Club: Design & Supply of a Multipure Plus **Reverse Osmosis** packaged plant to reduce the salinity of bore water. Capacity: 300 kL/day
- > Application: produce **high quality treated water** to irrigate the golf course fairways & tees



## > PROVIDING SAFE DRINKING WATER THROUGH MICROFILTRATION OF RAW WATER

### Three Villages Water Microfiltration Plants, Wauchope WTP and Port Macquarie Reclaimed Water Plant for Port Macquarie Hastings Council – NSW

- > Design and installation of 4 water filtration plants, using continuous **submerged microfiltration** and a water reclamation plant at Port Macquarie using **reverse osmosis**
- > Total capacity: 9.3 Megalitres/day upgradable to 22.3 Megalitres/day
- > Application: the 4 water filtration plants **produce high quality drinking water** (8.3 Megalitres/day) and the Reclaimed Water Plant treats tertiary effluent using **ultrafiltration, Reverse Osmosis, UV disinfection and chlorine** to provide an alternative source of water for **agricultural and playing fields irrigation** (1 Megalitre/day)



*2009 Engineering Excellence NSW Awards: Award for Excellence & Innovation in Sustainable Engineering Excellence (Wauchope WTP)*

## > PROVIDING SAFE DRINKING WATER THROUGH DESALINATION OF SEAWATER

### Sydney Desalination Plant for Sydney Water – NSW

- > 20-year Design, Build & Operate contract for a **Sea Water Reverse Osmosis desalination** plant
- > Capacity: 250 Megalitres/day upgradable to 500 Megalitres/day
- > Process: using **pre-treatment, 2-pass Reverse Osmosis** and **post-treatment**
- > Minimise environmental impacts through protection of coastal waters and **reducing the impact on sensitive marine ecosystems**. The plant will be powered by green energy and energy recovery devices are used to **reduce energy consumption**
- > Application: **drinking water** will be provided to **1.5 million people in Sydney**



### Gold Coast Desalination Plant for WaterSecure – QLD

- > 10-year Design, Build & Operate contract for a **Sea Water Reverse Osmosis desalination** plant
- > Capacity: 125 Megalitres/day
- > Process: using **pre-treatment, 2-pass Reverse Osmosis** and **post-treatment**
- > Application: provide **drinking water for 450,000 people** of South East Queensland



*2009 Global Water Awards: Membrane desalination plant of the year*

# Creating Water Solutions for industrial customers

## > TREATING UNDERGROUND MINE WATER FOR REUSE

### Bendigo Mining Water Treatment Plant for Bendigo Mining - VIC

- > **Treatment of underground mine water** at the New Moon gold mine site, to remove heavy metals, arsenic and other contaminants
- > Capacity: 7 Megalitres/day
- > Process: **Actiflo® Clarification** unit used for pre-treatment of feedwater, manganese greensand filters and **Reverse Osmosis**
- > Application: treated mine water suitable for irrigation, supply of environmental flows and other community uses



## > TREATING SURFACE WATER FOR INDUSTRIAL PROCESS WATER

### Bayswater Power Station Water Treatment Plants for Macquarie Generation – NSW

- > Design, Build & Operate 4 Water Treatment Plants at Bayswater Power Station, one of Australia's largest power stations
- > Capacity: 2,640 MW (power station) and 120 Megalitres/day (WTPs)
- > Process: **lime softening, reverse osmosis, 8 Actiflo® clarification units, ion exchange, filtration, HPD brine concentrator and crystalliser**
- > Application: industrial process water
- > Protect the environment by reducing the salinity of nearby Lake Liddell, through an increased salt removal capacity, as well as maintain Bayswater as a **Zero Liquid Discharge (ZLD)** Power Station



## > TREATING WASTEWATER FOR REUSE

### Water Treatment Plant for d'Vineripe at Two Wells Hydroponic Tomato Glasshouse - SA

- > Design, supply & build of a Microfiltration/Reverse Osmosis Plant treating water sourced from the Bolivar Water Reuse Project
- > Capacity: 1 Megalitre/day
- > Process: **Microfiltration & Reverse Osmosis**
- > Application: provide high quality water for **irrigation of hydroponic tomato crops** and provide **cooling water** for the evaporation system



## > REMOVING IMPURITIES TO PRODUCE PROCESS WATER

### Condensate Polishing Plant for Huntly Power Station - New Zealand

- > Design, supply, install & construct a new **Condensate Polishing Plant**
- > Capacity: 360 m<sup>3</sup>/hour
- > Process: **Tripol® condensate polishing** system with 3 regenerator vessels
- > Application: **remove impurities** from **condensed steam** from the power plant steam turbine for the high pressure boiler



## > PROVIDING HIGH QUALITY DRINKING & DEMIN WATER FOR REMOTE SITES

### Desalination Plants for Woodside's North Rankin A and North Rankin 2 Redevelopment Project offshore platforms

- > North Rankin A: Design and build of a sea water **reverse osmosis** (SWRO) plant providing high quality **drinking water** for employees. Ongoing **service** and maintenance for the offshore platform. Capacity: 70 m<sup>3</sup>/day
- > North Rankin 2: design and supply of a **brackish water reverse osmosis** plant, treating potable water from the North Rankin A SWRO unit to produce **demin water** with low chloride levels for the tempered water system. Capacity: 120 m<sup>3</sup>/day



## > PROVIDING WATER SERVICES TO PRODUCE HIGH QUALITY WATER FOR FOOD & BEVERAGE

### Warrnambool Cheese & Butter Factory – VIC

- > **Multi-year service contract** & supply of Hydrex® Specialty Water Treatment Chemicals
- > New state-of-the art automated dosing equipment for cooling, boiler and closed loop systems
- > Service of the demineralisation plant and softening plants onsite



## > TREATING CONTAMINATED WATER FOR INDUSTRIAL REUSE

### Orica Groundwater Treatment Plant for Orica Australia Pty – NSW

- > Design & supply of the final purification components for a Groundwater Treatment Plant treating contaminated groundwater to remove dissolved solids, organic acids and organic contaminants
- > Capacity: treating up to 15 Megalitres/day
- > Process: 2 **Actiflo®** units, **reverse osmosis** and **sludge thickening**
- > Application: high quality treated water used by local industry for cooling tower make-up and other industrial uses



### Effluent Polishing Plant for Woodside Pluto Project, WA

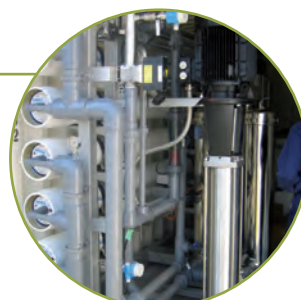
- > Design and supply of an Effluent Polishing Plant for the Pluto Onshore Liquefied Natural Gas (LNG) Plant
- > Capacity: 43 m<sup>3</sup>/hour
- > Process: **Tilted Plate Interceptor (TPI)**, **Macro Porous Polymer Extraction (MPPE®)**, Chillers & Coolers, **Membrane Bioreactor (MBR®)**, **Filtration & Advanced Oxidation Systems**, **PICA Activated Carbon**
- > Application: Effluent water streams are treated for **removal of contaminants** for reuse in the demineralised plant or for discharge into environment



## > PROVIDING A MID OR SHORT-TERM LEASING SOLUTION FOR TEMPORARY PURIFIED WATER NEEDS

### Aquamove® Reverse Osmosis Mobile Units for BlueScope Steel – NSW

- > Multi-year lease agreement of 3 **Aquamove® 1000** & 1 **Aquamove® 500** reverse osmosis mobile units and skid-mounted submerged **microfiltration** units for pre-treatment
- > Capacity: 3.5 Megalitres/day
- > Mobile units manufactured in Australia, guarantee given on treated water conductivity



# Committed to Sustainable Development

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Dow Jones Sustainability Indexes and the FTSE4Good index (London-based Socially Responsible Investment Index).

At Veolia Water Solutions & Technologies Australia & New Zealand, we are committed to fostering sustainable development and operating our business to the highest environmental standards. We aim to create sustainable water solutions for industrial and municipal customer.

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# EIS Addendum

## Part 4 – EP&A Act, 1979

Proposed Sewer Rising Main  
Condell Park Road Reserve & Hornby Street Road Reserve, Wilton



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## Review and Amendments Schedule – PLANIT CONSULTING PTY LTD

		Date
Authors	LN	February 2014
Reviewer	AS	February 2014

Amendments

The content of this report was prepared for the exclusive use of the proponent for the purposes of seeking development consent for a sewer rising main and is not to be used for any other purpose or by any other person or corporation.

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**PLANIT CONSULTING PTY LTD<sup>®</sup>**  
February 2014

# 1 – Introduction

## 1.1 Brief

Planit Consulting has been commissioned by Solo Water Pty Ltd to prepare and submit an addendum to the existing EIS (TBA14-10611P2) currently before Council for the Bingara Gorge Sewage Treatment Plant.

This addendum adds to the proposal the sewer rising main which is required to connect the existing Wilton Village to the proposed Bingara Gorge Estate Sewage Treatment Plant. The proposed rising main and connection of Wilton Village to the Bingara Gorge Estate Sewage Treatment Plant is being proposed in accord with relevant approvals and voluntary planning agreement relating to development of the estate.

The proposal is consistent with the defined use of 'Sewage Reticulation System' any reference to Sewer Rising Main (SRM) within the report is considered to be a reference to 'Sewage Reticulation System'.

## 1.2 The Proposed Development

The proposal is for the construction of a SRM. The works are located between the township of Wilton and existing pressure sewer transfer main located within the Condell Park Road Reserve. The works associated with the construction of the SRM will be undertaken up to a depth of 1.5m and will be for a length of approximately 3km from the township of Wilton to the connection point with the existing pressure sewer transfer main. The SRM will be 200mm in diameter and constructed from Polyethylene. The proposed route is shown with the **Appendix A – Proposal Plans** and detailed discussion of the design is contained within **Appendix D – Detailed Design Report**.

## 1.3 Integrated Development

Integrated development is development that, in order to be carried out, requires development consent and one or more specified approvals under a number of other Acts that address environmental issues. This is detailed in Section 91 of the EP&A Act 1979. The consent authority for integrated development is not able to determine the DA until all approval authorities have provided to the consent authority their General Terms of Approval (GTA).

Under the provisions of the EP&A Act 1979, the proposed development is classified as 'integrated development' as it requires the following approvals:

- An approval to alter or erect improvements within a mine subsidence district or to subdivide land therein under Mine Subsidence Compensation Act 1961;
- A controlled activity approval under *Water Management Act 2000*;

## 1.4 Objectives of the Proposal

The objectives of the proposal are:

- To provide best practice sewage treatment and waste water minimisation for the locality;
- To fulfil development consent requirements for the Bingara Gorge Estate;

## 2 - Site & It's Surrounds

### 2.1 Property Description

The proposed SRM is approximately 3km in length and runs through the Condell Park Road Reserve and Hornby Street Road Reserve. The location of the SRM within the road reserves is shown on **Appendix A – Proposal Plans**. Any reference to 'site' within the report is considered a reference to the above road reserves.

### 2.2 Location / Context

#### 2.2.1 Location

The SRM is associated with the Lend Lease Communities, Bingara Gorge residential development site near the existing village of Wilton in NSW, approximately 90 km south west of the Sydney CBD. The site is located near the intersection of the Hume Highway and Picton Road approximately half way between Picton and Wollongong, as indicated below in Figure 1.



Figure 1: Site Locality.

An overview of the Bingara Gorge development site and the approximate location of the SRM site are provided below in Figure 2.



Figure 2: Site Location

## 2.2.2 Context

Previous development approval has been granted by Wollondilly Shire Council to Lend Lease Communities for the 1165 lot Bingara Gorge subdivision, associated non-residential development, an 18-hole golf course, the golf club house, a temporary onsite wastewater treatment plant and an irrigation system.

The Bingara Gorge development is subject to a voluntary planning agreement. This agreement requires that the Sewage Treatment Plant (STP) for the Bingara Gorge development incorporate capacity to service three hundred (300) lots within the Wilton Village and that it be developed at the expense of the developer. The proposed SRM is required to connect these existing lots to the STP for the Bingara Gorge development.

## 2.3 Roads and Access

The site of the SRM is located within existing formed road reserves, being Condell Park Road and Hornby Street. Access for construction equipment can be facilitated via these existing roads.

## 2.4 Statutory Zoning

The site on which the SRM is to be constructed is zoned RU2 Rural Landscape and RU4 Rural Small Holdings under the Wollondilly Local Environmental Plan (WLEP) 2011. An extract from the WLEP 2011 zone maps is provided in Figure 3.



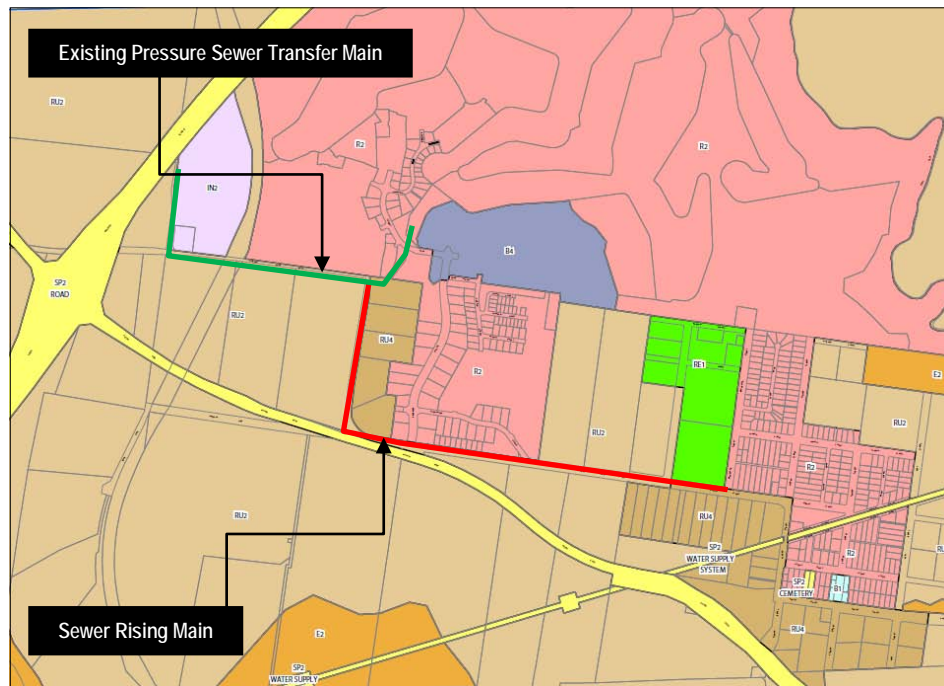


Figure 3: WLEP 2011 Zoning. Source WLEP 2012.

The surrounding area includes a number of land uses and zonings. In the immediate vicinity the following land use zonings are present:

- SP2 Roads;
- R2 Low Density Residential;
- RU2 Rural Landscape;
- RU4 Rural Small Holdings;
- B4 Mixed Use.

## 2.6 Environmental Considerations

### 2.6.1 Topography

The proposed site is situated within an existing urban urbanised area and the SRM route does not present any significant topography constraints.

### 2.6.2 Heritage Items

The site is not mapped as containing any heritage items under the WLEP 2011. Refer Figure 4 for mapping extract. We note that the broader Bingara Gorge estate area has been subject to detailed heritage assessment and that items of aboriginal heritage have been identified within the broader land area of the estate. The proposed SRM is located clear of these identified areas.

To address aboriginal heritage items outside of the estate footprint a due diligence assessment has been undertaken and is included under **Appendix B**. This assessment indicates that the potential for Aboriginal objects to present is very low.

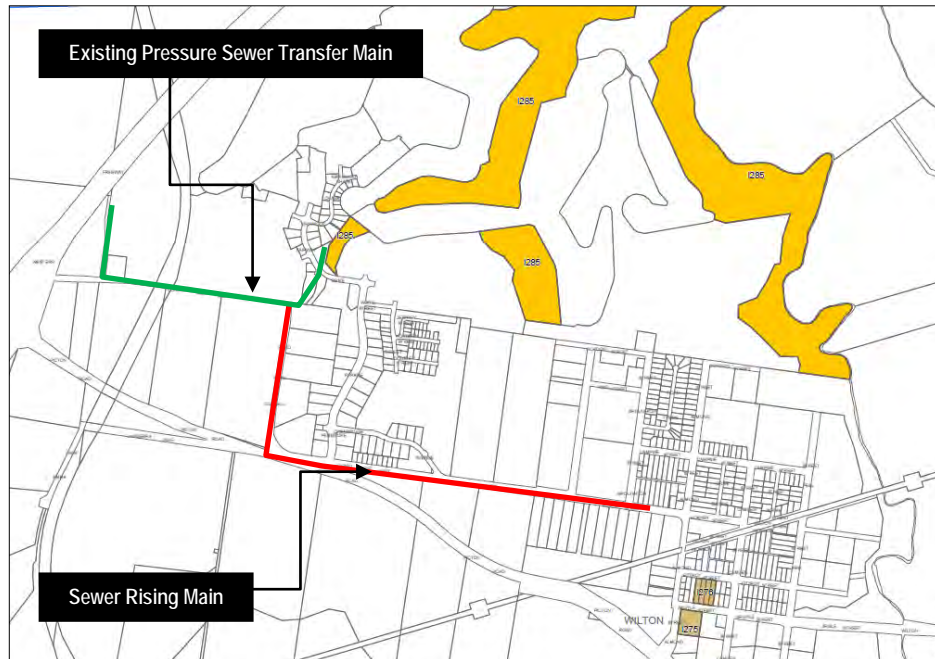


Figure 4: Heritage Item Mapping. Source WLEP 2011

### 2.6.3 Biodiversity

Part of the SRM route/alignment includes vegetation. The proposed alignment is to be restricted to the road reserves to avoid the need for tree removal and minimise the impact upon flora and fauna. A Flora and Fauna Assessment has been prepared to address the vegetated parts of the proposed alignment. A copy of this Flora and Fauna assessment is provided under **Appendix C**.

The flora and fauna assessment found that eleven (11) threatened fauna species are considered likely to occur within the study area, while TEC's Cumberland Plain Woodland and Shale Sandstone Transition Forest occur. Providing the mitigation measures recommended are implemented, impacts to threatened species and TEC's will be avoided.

The Flora and Fauna report considers the proposal against the factors outlined in Section 5A of the EP&A Act. This assessment concludes the proposal is unlikely to have a significant impact on threatened fauna species considered likely to occur or TEC's within the study area. As such a SIS is not required.

The EPBC Significant Impact Criteria for Vulnerable species as well as Critically Endangered and Endangered ecological communities have also been considered in regard to the potential impact of the proposal. This assessment concluded the proposal does not meet any of the EPBC Act Significant Impact Criteria and as such a referral of the proposal to Department of the Environment is not required.

### 2.6.4 Sydney Drinking Water Catchment

Parts of the Wollondilly Shire are contained within the Sydney Drinking Water Catchment. However as identified on map SEPP\_SDWC\_014\_20101215, the proposed development area is located outside of the drinking water catchment. Refer Figure 5 for mapping extract.

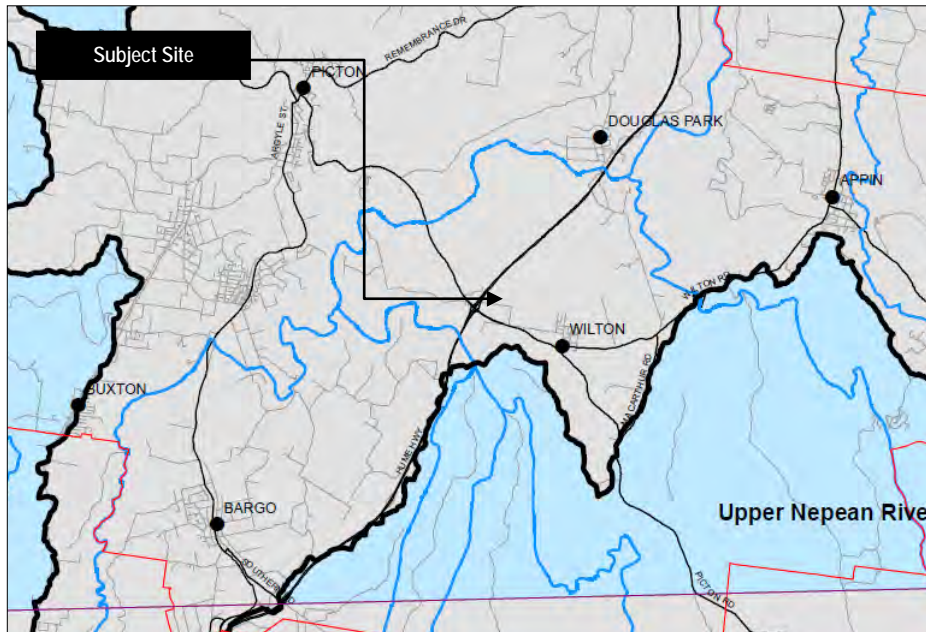


Figure 5: Sydney Drinking Water Catchment Mapping. Source: SEPP SDWC

## 2.6.5 Hawkesbury-Nepean River

The site is located within the bounds of the Hawkesbury-Nepean River catchment. Refer Figure 6 for mapping extract for Sydney Regional Environmental Plan 20. All works will be undertaken in accord with an approved erosion and sediment control plan approved under S68 of the Local Government Act 1993.

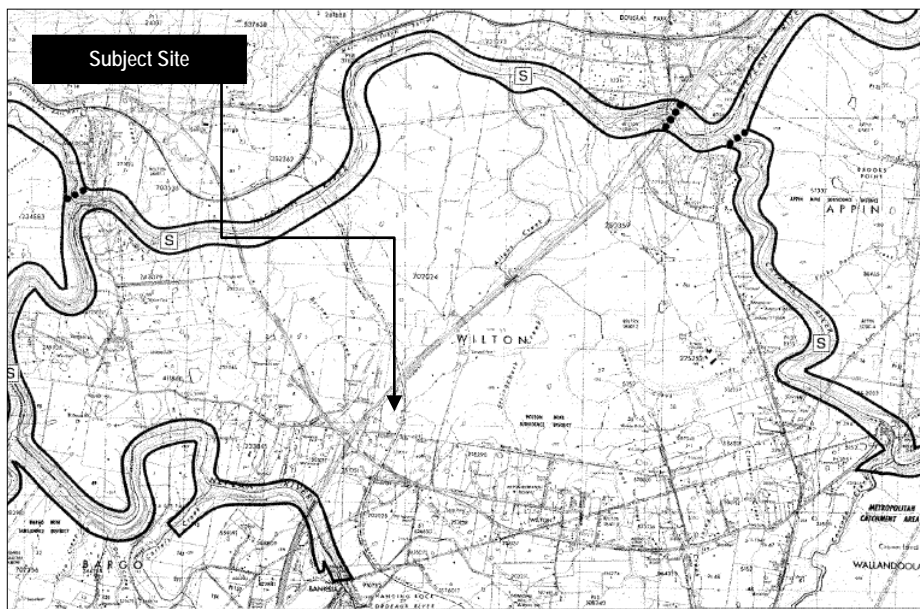


Figure 6: Hawkesbury Nepean River Catchment. Source: SREP 20

## 2.6.6 Salinity

No Salinity Mapping is available for the site; however salinity is a known constraint in the general area.

## 2.8 Mineral Resources

Part of the subject site is included in land subject to authorised underground coal mining operations being underground coal mining operations carried out under mining leases or exploration licenses. Activities associated with authorised underground coal mining operations include:

- underground coal mining;
- coal bed methane gas extraction requiring surface vents, subsurface drilling and pipes for collection and reticulation of gas
- air vent shaft to circulate air for underground mining.

Councils Development Control Plan for the area identifies existing mining infrastructure in the area, refer Figure 7 below. The proposal will have no impact upon this infrastructure or mining operations in the area.

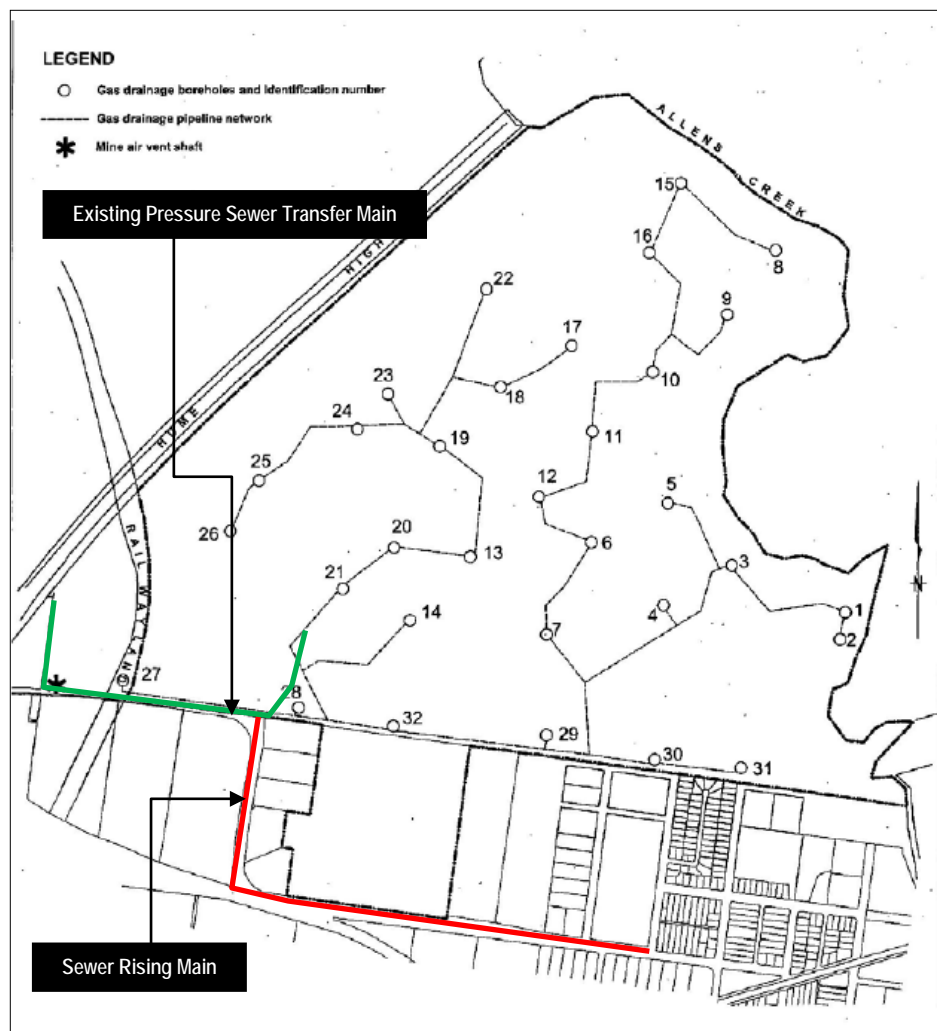


Figure 7: Mining Infrastructure. Source: WDCP 2011 Volume 7



## 3 - Description of the Proposal

### 3.1 General Summary & Route

The proposal is for the construction of a SRM. The works are located between the township of Wilton and existing pressure sewer transfer main located within the Condell Park Road Reserve. The works associated with the construction of the SRM will be undertaken up to a depth of 1.5m and will be for a length of approximately 3km from the township of Wilton to the connection point with the existing pressure sewer transfer main. The SRM will be 200mm in diameter and constructed from Polyethylene.

The proposed route is shown with the **Appendix A – Proposal Plans** and detailed discussion of the design is contained within **Appendix D – Detailed Design Report**.

### 3.2 Construction

The proposed construction is expected to take approximately 8 weeks and will be undertaken during the following hours

- Monday to Friday - 7:00am to 6:00pm
- Saturday - 7:00am to 1:00pm
- Sunday - by arrangement between Lend Lease and EPA

Equipment used during the construction will include Excavator (with rock-breaker where required), 12t trucks, delivery trucks, laser level, survey equipment.

### 3.3 Tree Removal

No trees are to be removed as part of the proposal.

### 3.4 Construction EMP

A Construction Environmental Management Plan (CEMP) would be prepared for the construction and commissioning phase. The proponent would be responsible for ensuring that the CEMP adequately addresses environmental issues and the conditions of approval. The CEMP would include the following information and control plans:

**Project Objectives and Scope** – Once approval of the proposal has been obtained, the project scope and objectives would be reassessed within the terms of any approval conditions.

**Permits and Approvals** – All permits and approvals required prior to and during the construction of the proposal would be identified in the CEMP. This would provide a checklist for construction contractors to ensure all permits and regulations are complied with and relevant approvals are obtained.

**Consent Conditions** – Consent conditions would be outlined within the CEMP with instructions on how to meet the conditions of approval. This would provide a checklist for construction contractors to ensure that consent conditions are met in the most effective manner.

**Complaints Procedure** – A procedure for managing complaints received during construction would be provided in the CEMP. The procedure would provide details on undertaking and monitoring actions following receipt of a complaint.

**Construction Methods and Environmental Management Procedures** – This section would provide an accurate description of the proposed construction activities. Location plans would be provided. Environmental considerations to be taken into account during all construction activities would be provided. Specific requirements relating noise, dust, traffic, etc would be outlined in other sections of the CEMP and would include timing details and who is responsible for their implementation.

**Soil and Water Management** – An erosion and sediment control plan would be prepared as part of the CEMP. The plan would detail the methods of erosion and sediment control, maintenance requirements, location requisites for effective operation of erosion and sediment control measures and related monitoring and reporting requirements.

**Waste Management** – This section would outline waste management procedures, including waste recycling and reuse measures, waste disposal measures (when reuse is not feasible), and the identification of the closest waste disposal areas. The waste management plan would be developed to minimise the generation of waste during construction and maximise reuse, recovery and recycling of waste products.

The CEMP would be reviewed on a regular basis and would incorporate the result of any monitoring undertaken in the previous period.

## 4 - Statutory Framework

### 4.1 Commonwealth Legislation

#### 4.1.1 Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act 1999)

The EPBC Significant Impact Criteria for Vulnerable species as well as Critically Endangered and Endangered ecological communities have been considered in regard to the potential impact of the proposal, refer **Appendix C**. This assessment concluded the proposal does not meet any of the EPBC Act Significant Impact Criteria and as such a referral of the proposal to Department of the Environment is not required.

### 4.2 State Legislation

#### 4.2.1 Environmental Planning and Assessment Act 1979 (EP&A Act 1979)

The EP&A Act 1979 outlines the requirements for development applications within the State of New South Wales. Development consent is required for the development under Part 4 of the EP&A Act 1979. The proposed development is deemed as integrated development under the Act.

##### Clause 91 – What is “Integrated Development”

Integrated development is development that, in order to be carried out, requires development consent and one (1) or more specified approvals under a number of other Acts. Under the provisions of the EP&A Act, the proposed development is classified as ‘integrated development’ as it requires the following approvals:

- An Approval to alter or erect improvements within a mine subsidence district or to subdivide land therein under Mine Subsidence Compensation Act 1961;
- A controlled activity approval under *Water Management Act 2000*;

#### 4.2.2 Mines Subsidence Compensation Act 1961

In accord with Clause 15 of the Mines Subsidence Act 1961 the proposed site is located within the Wilton Mines subsidence district. As per the requirements of Clause 15 (2A) an approval is required to alter or erect improvements within a mine subsidence district. As listed within Clause 91 of the EP&A Act 1979 an approval under the Mines Subsidence Compensation Act 1961 is integrated development. An integrated approval is sought in this instance.

#### 4.2.3 Water Management Act 2000

The proposed SRM will require works within four (4) intermittent drainage lines associated with Stringybark Creek. As such a control activity approval is required under the Water Management Act 2000. As listed within Clause 91 of the EP&A Act 1979 an approval under the Water Management Act 2000 is integrated development. An integrated approval is sought in this instance.

### 4.3 State Environmental Planning Policies

The following State Environmental Planning Policies are applicable to the proposal:

- State Environmental Planning Policy No. 44 – Koala Habitat Protection;

- State Environmental Planning Policy No. 55 – Remediation of Land;
- State Environmental Planning Policy (Infrastructure) 2007;
- State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011
- Sydney Regional Environmental Plan No.20 – Hawkesbury-Nepean River (No 2 -1997)

The following comment is provided against each:

#### **4.3.1 State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44)**

The flora and fauna assessment undertaken does not identify the site as containing Koala habitat. The proposal will not see any removal of trees. The proposal complies with SEPP 44.

#### **4.3.2 State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55)**

SEPP 55 deals with the remediation of land, with the consent authority required to consider the items listed under Clause 7. As stated by Clause 7:

- (1) A consent authority must not consent to the carrying out of any development on land unless:
  - (a) It has considered whether the land is contaminated, and
  - (b) If the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and
  - (c) If the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.
- (2) Before determining an application for consent to carry out development that would involve a change of use on any of the land specified in subclause (4), the consent authority must consider a report specifying the findings of a preliminary investigation of the land concerned carried out in accordance with the contaminated land planning guidelines.
- (3) The applicant for development consent must carry out the investigation required by subclause (2) and must provide a report on it to the consent authority. The consent authority may require the applicant to carry out, and provide a report on, a detailed investigation (as referred to in the contaminated land planning guidelines) if it considers that the findings of the preliminary investigation warrant such an investigation.
- (4) The land concerned is:
  - (a) Land that is within an investigation area,
  - (b) Land on which development for a purpose referred to in Table 1 to the contaminated land planning guidelines is being, or is known to have been, carried out,
  - (c) To the extent to which it is proposed to carry out development on it for residential, educational, recreational or child care purposes, or for the purposes of a hospital—land:
    - (i) in relation to which there is no knowledge (or incomplete knowledge) as to whether development for a purpose referred to in Table 1 to the contaminated land planning guidelines has been carried out, and
    - (ii) On which it would have been lawful to carry out such development during any period in respect of which there is no knowledge (or incomplete knowledge).



The site is located within road reserves and no uses are known that would raise potential contamination concerns. The proposal is considered compliant with the requirements of SEPP 55.

#### 4.3.3 State Environmental Planning Policy (Infrastructure) 2007

SEPP Infrastructure covers a range of infrastructure facility, development and works and outlines permissibility. The SEPP also includes requirements for referrals to a number of agencies where a proposal may impact upon an element, land or operation controlled by that authority. The following comment is provided against the application clauses:

##### *106 Development permitted with or without consent*

- (1) *Development for the purpose of sewage treatment plants or biosolids treatment facilities may be carried out:*
  - (a) *by or on behalf of a public authority or any person licensed under the [Water Industry Competition Act 2006](#) without consent on land in a prescribed zone, and*
  - (b) *by any other person with consent on land in a prescribed zone.*
- (2) *Development for the purpose of water recycling facilities may be carried out:*
  - (a) *by or on behalf of a public authority or any person licensed under the [Water Industry Competition Act 2006](#) without consent on land in a prescribed zone, and*
  - (b) *by any other person with consent on land in a prescribed zone or on any land where the development is ancillary to an existing land use.*

*However, such development may be carried out on land reserved under the [National Parks and Wildlife Act 1974](#) only if the development is authorised by or under that Act.*

- (3) *Development for the purpose of sewage reticulation systems may be carried out:*
  - (a) *by or on behalf of a public authority or any person licensed under the [Water Industry Competition Act 2006](#) without consent on any land, and*
  - (b) *by any other person with consent on any land.*

*However, such development may be carried out on land reserved under the [National Parks and Wildlife Act 1974](#) only if the development is authorised by or under that Act.*

- (4) *Development for the purpose of the Northside Storage Tunnel may be carried out by or on behalf of Sydney Water Corporation without consent on land in any of the following local government areas:*
  - (a) *Hunters Hill,*
  - (b) *Lane Cove,*
  - (c) *Leichhardt,*
  - (d) *Manly,*
  - (e) *Mosman,*
  - (f) *North Sydney,*
  - (g) *Willoughby.*
- (5) *A reference in this Division to development for the purpose of a sewerage system of any kind includes a reference to development for any of the following purposes if the development is in connection with the sewerage system:*
  - (a) *pumping stations, pipelines and tunnels,*
  - (b) *temporary storage and transfer works to reticulate sewage or treated effluent,*
  - (c) *effluent and biosolids reuse schemes,*
  - (d) *power supply to the development,*
  - (e) *energy generating works,*
  - (f) *construction works,*
  - (g) *routine maintenance works,*
  - (h) *environmental management works.*

As per Clause 106(3)(b) development for the purposes of sewage reticulation system may be carried by any other person on any land with consent. The proposal cannot be undertaken without consent under the SEPP and accordingly the provisions of Part 4 of the EP&A Act 1979 are applicable.

#### 4.3.4 State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011

Parts of the Wollondilly Shire are contained within the Sydney Drinking Water Catchment. However as identified on map SEPP\_SDWC\_014\_20101215, the proposed development area is located outside of the drinking water catchment and as such the provisions of the policy are not applicable in this instance.

#### 4.3.5 Sydney Regional Environmental Plan No.20 – Hawkesbury-Nepean River (No 2-1997)

*Sydney Regional Environmental Plan No 20 – Hawkesbury-Nepean River* (SREP 20) integrates planning with catchment management to protect the river system. The impact of future land use is to be considered in a regional context. The plan covers water quality and quantity, environmentally sensitive areas, riverine scenic quality, agriculture, and urban and rural residential development. It controls development that has the potential to impact on the river environment. The site is located within the area to which SREP 20 applies.

SREP 20 provides a number of specific planning policies and recommended strategies for new developments within the Hawkesbury Nepean River system. Those policies relevant to the proposed STP and Water Recycling Scheme include:

- Total catchment management is to be integrated with environmental planning for the catchment.
- The environmental quality of environmentally sensitive areas must be protected and enhanced through careful control of future land use changes and through management and (where necessary) remediation of existing uses.
- Environmentally sensitive areas in the Hawkesbury-Nepean catchment include riparian land.

The proposal will not see any vegetation removed and will be undertaken in accord with and approved sediment and erosion control plan to ensure water quality is maintained during construction.

#### 4.4 Wollondilly Local Environmental Plan 2011 (WLEP 2011)

The site falls within the legislative boundary of the Wollondilly Local Environmental Plan 2011 (WLEP 2011). The following assessment is made in relation to the proposed development.

##### Clause 2.1 – Land use zones

The site on which the SRM is to be constructed is zoned IN2 Light Industry, R2 Low Density Residential, RU2 Rural Landscape and RU4 Rural Small Holdings under the Wollondilly Local Environmental Plan (WLEP) 2011. SEPP Infrastructure (2007) establishes permissibility for the proposal. Refer Section 4.3.3 above.

##### Clause 5.9 – Preservation of trees or vegetation

The proposal will not require the removal of vegetation.

##### Clause 5.10 – Heritage Conservation

The site is not mapped as containing any heritage items under the WLEP 2011. Refer Figure 4 for mapping extract. We note that the broader Bingara Gorge estate area has been subject to detailed heritage assessment and that items of aboriginal heritage have been identified within the broader land area of the estate. The proposed SRM is located clear of these identified areas.

To address aboriginal heritage items outside of the estate footprint a due diligence assessment has been undertaken and is included under **Appendix B**. This assessment indicates that the potential for Aboriginal objects to present is very low.

However, while the likely hood of relics being on site and disturbing relics on site is low, should relics be found during works all works would cease and the Office of Environmental and Heritage, a qualified archaeologist and the Aboriginal stakeholders would be notified.

#### Clause 7.1 – Essential Services

The proposal will provide an essential service to the adjoining Bingara Gorge estate and the existing Wilton Village. Adequate electricity supply and water service is available to service the development.

#### Clause 7.2 – Biodiversity protection

Part of the SRM route/alignment includes vegetation. The proposed alignment is to be restricted to the road reserves in vegetated areas to avoid the need for tree removal and minimise the impact upon flora and fauna. A Flora and Fauna Assessment has been prepared to address the vegetated parts of the proposed alignment. A copy of this Flora and Fauna assessment is provided under **Appendix C**. No trees are to be removed as part of the proposal.

#### Clause 7.3 – Water Protection

- (1) *The objective of this clause is to maintain the hydrological functions of riparian land, waterways and aquifers, including protecting the following:*
  - (a) *water quality,*
  - (b) *natural water flows,*
  - (c) *the stability of the bed and banks of waterways,*
  - (d) *groundwater systems.*
- (2) *This clause applies to land identified as “sensitive land” on the [Natural Resources—Water Map](#).*
- (3) *Before determining a development application for development on land to which this clause applies, the consent authority must consider any adverse impact of the proposed development on the following:*
  - (a) *the water quality of receiving waters,*
  - (b) *the natural flow regime,*
  - (c) *the natural flow paths of waterways,*
  - (d) *the stability of the bed, shore and banks of waterways,*
  - (e) *the flows, capacity and quality of groundwater systems.*
- (4) *Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:*
  - (a) *the development is designed, sited and will be managed to avoid any adverse environmental impact, or*
  - (b) *if that impact cannot be avoided—the development is designed, sited and will be managed to minimise that impact, or*
  - (c) *if that impact cannot be minimised—the development will be managed to mitigate that impact.*

The proposal will not see any vegetation removed and will be undertaken in accord with and approved sediment and erosion control plan to ensure water quality is maintained during construction.

#### Clause 7.5 – Earth Works

The proposal will include earthworks associated with trenching the alignment. The following comment is provided against Clause 7.5(3)

- (3) *Before granting development consent for earthworks, the consent authority must consider the following matters:*

- (a) *the likely disruption of, or any detrimental effect on, existing drainage patterns and soil stability in the locality,*
- (b) *the effect of the proposed development on the likely future use or redevelopment of the land,*
- (c) *the quality of the fill or the soil to be excavated, or both,*
- (d) *the effect of the proposed development on the existing and likely amenity of adjoining properties,*
- (e) *the source of any fill material and the destination of any excavated material,*
- (f) *the likelihood of disturbing relics,*
- (g) *the proximity to and potential for adverse impacts on any watercourse, drinking water catchment or environmentally sensitive area.*

The proposal includes the excavation of trench and backing filling only, the proposal will not alter the level of the land. The proposal will not see any vegetation removed and will be undertaken in accord with and approved sediment and erosion control plan to ensure water quality is maintained during construction. Aboriginal heritage due diligence assessment indicates that the presentation of heritage items is unlikely.

#### 4.5 Wollondilly Development Control Plans 2011 (WDCP 2011)

The provisions of volume 1, volume 5 and volume 7 of the WDCP 2011 are applicable to the site. The following comment is provided against the relevant parts of each volume

##### Volume 1 – General

##### 2.1 – Advertising and Notification of Development Proposals

The proposed development is not identified as one which will not be notified or advertised in Part 2.1. However, it is considered Council will elect to undertake advertising of the proposal.

##### 2.2 – Heritage Conservation

The site is not mapped as containing any heritage items under the WLEP 2011. Refer Figure 4 for mapping extract. We note that the broader Bingara Gorge estate area has been subject to detailed heritage assessment and that items of aboriginal heritage have been identified within the broader land area of the estate. The proposed SRM is located clear of these identified areas.

To address aboriginal heritage items outside of the estate footprint a due diligence assessment has been undertaken and is included under **Appendix B**. This assessment indicates that the potential for Aboriginal objects to present is very low.

However, while the likelihood of relics being on site and disturbing relics on site is low, should relics be found during works all works would cease and the Office of Environmental and Heritage, a qualified archaeologist and the Aboriginal stakeholders would be notified.

##### 2.3 – Tree and vegetation provisions

The proposal will not require the removal of vegetation.

##### 2.5 – Biodiversity

Part of the SRM route/alignment includes vegetation. The proposed alignment is to be restricted to the road reserves in vegetated areas to avoid the need for tree removal and minimise the impact upon flora and fauna. A Flora and Fauna Assessment has been prepared to address the vegetated parts of the proposed alignment. A copy of this Flora and Fauna assessment is provided under **Appendix C**. No trees are to be removed as part of the proposal.



## 2.6 – Water

The proposal will not see any vegetation removed and will be undertaken in accord with and approved sediment and erosion control plan to ensure water quality is maintained during construction.

## 2.9 – Contaminated Land and Land filling

Refer comment provided under SEPP 55.

## 2.10 – Land slip and subsidence

The site does not have any topography constraints that would raise issues of land slip. It is however noted that the land is located in within a mine subsidence area. The proposal is integrated development and will be forwarded to the mine subsidence board for the review and general terms of approval. The proposal is compliant with clause 2.10.

## 2.12 – Site waste minimisation and management

Construction waste will be managed in accordance with a CEMP. Large quantities of waste will not be generated by the proposal.

## 2.13 – Salinity

The controls relating to salinity do not apply to non residential development, this clause is not applicable in this instance.

## Volume 5 – Industrial & Infrastructure Uses

Volume 5 of the WDCP 2011 does not provide specific development controls relating to the SRM, the following comment are provided against the general objectives:

## 2.2 – General objectives for all industrial and Transport and Infrastructure uses

### *Objectives*

- (a) To provide for development that protects the scenic qualities of Wollondilly Shire.*
- (b) To ensure that industrial development has a neutral or beneficial effect on the natural and built environments.*
- (c) To provide employment opportunities that significantly contributes to economic activity within Wollondilly Shire.*
- (d) To provide controls for industrial development that will encourage the use of land for sustainable and viable industrial activities.*
- (e) To ensure the most efficient use of industrial land is consistent with the existing amenity of the area.*
- (f) To ensure the orderly provision of services and infrastructure.*
- (g) To ensure good vehicular access, circulation and loading facilities on industrial sites and these do not impact on the pedestrian and vehicular mobility in the locality.*
- (h) To ensure adequate on-site car parking is provided.*
- (i) To ensure access to adequate services are provided for the disposal of waste.*
- (j) To promote high standards of architecture, landscaping and building design that is visually attractive in form, design, colour and scale.*
- (k) To ensure that industrial developments are suitably designed and landscaped without restricting their viability through over regulation.*
- (l) To ensure industrial development is undertaken in a manner that minimises land use conflicts.*
- (m) To ensure buildings do not adversely affect views from adjoining zones, classified roads (Picton Road and Remembrance Driveway) or other public spaces.*
- (n) To ensure soil conservation and sediment control measures are implemented during and post-construction.*

- (o) To permit development which serves the daily convenience needs of persons working within industrial areas.*
- (p) To encourage the integration of land use and transport, and provide for environments that are highly accessible and conducive to walking, cycling and the use of public transport.*

The proposed SRM is considered consistent with the general objectives for all industrial and transport and infrastructure uses under the Wollondilly Development Control Plan 2011. The SMR is an essential piece of infrastructure and is required to facilitate the ongoing development of Bingara Gorge estate and facilitate negotiated development requirements.

#### **Volume 7 – Site Specific Controls – Bingara Gorge Estate, Wilton Park**

The provisions of volume 7 of the WDCP 2011 relate to subdivision and built form elements permissible within the estate. It does not provided any specific controls relating to the installation of services independent of a subdivision application. The proposed rising main and connection of Wilton Village to the Bingara Gorge Estate Sewage Treatment Plant is being proposed in accord with relevant approvals and voluntary planning agreement relating to development of the estate. The proposal is considered generally consistent with the requirements of Volume 7 of the WDCP 2011.

## 5 – Conclusion

The proposed rising main and connection of Wilton Village to the Bingara Gorge Estate Sewage Treatment Plant is being proposed in accord with relevant approvals and voluntary planning agreement relating to development of the estate.

The SRM is located such that it will not require the removal of trees ensuring no detrimental impact to flora or fauna. The proposal will be undertaken in accord with an erosion and sediment control plan to ensure water quality is maintained.

The subject site is considered able to accommodate the proposed Sewer Rising Main.

**As such it is respectfully requested that the application be considered favourably and approved subject to reasonable and relevant conditions.**

## A – Proposal Plans

## B – Heritage Assessment



## C – Flora & Fauna Assessment

## D – Detailed Design Report



# WILTON PRESSURE SEWER TRANSFER MAIN

## CONTRACT No. PRESSURE SEWER TRANSFER MAIN DRAWINGS

LEGEND:

- SYDNEY WATER CORPORATION WORKS
- WILTON PROPOSED PRESSURE SEWER TRANSFER MAIN
- EXISTING 125mmØ PRESSURE SEWER TRANSFER MAIN
- SOLO WATER WORKS

DRAWINGS



130830-RM000 - PRESSURE SEWER TRANSFER MAIN COVER SHEET

- 130830-RM001 - PRESSURE SEWER TRANSFER MAIN LAYOUT PLAN & LONGITUDINAL SECTION SHEET 1 OF 5
- 130830-RM002 - PRESSURE SEWER TRANSFER MAIN LAYOUT PLAN & LONGITUDINAL SECTION SHEET 2 OF 5
- 130830-RM003 - PRESSURE SEWER TRANSFER MAIN LAYOUT PLAN & LONGITUDINAL SECTION SHEET 3 OF 5
- 130830-RM004 - PRESSURE SEWER TRANSFER MAIN LAYOUT PLAN & LONGITUDINAL SECTION SHEET 4 OF 5
- 130830-RM005 - PRESSURE SEWER TRANSFER MAIN LAYOUT PLAN & LONGITUDINAL SECTION SHEET 5 OF 5
- 130830-RM006 - PRESSURE SEWER TRANSFER MAIN HIGH PRESSURE GAS EASEMENT CROSSING DETAILS
- 130830-RM101 - PRESSURE SEWER TRANSFER MAIN PINCH VALVE DETAIL
- 130830-RM102 - MISCELLANEOUS DETAILS
- 130830-RM103 - AIR VALVE DETAILS SHEET 1 OF 2
- 130830-RM104 - AIR VALVE DETAILS SHEET 2 OF 2

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2	287667.760	6209168.666	
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4	287559.417	6209184.289	
5	287556.592	6209188.168	
6	287422.696	6209208.561	
7	287402.956	6209212.845	
8	287400.647	6209213.197	
9	287335.348	6209223.142	
10	287323.406	6209224.961	
11	287283.533	6209231.033	
12	287175.363	6209246.672	
13	287062.345	6209263.012	
14	287058.352	6209263.589	
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27	286541.176	6209336.828	
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35	286456.201	6209359.690	
36	286439.184	6209362.196	
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51	286256.678	6209429.389	
52	286255.038	6209431.945	
53	286252.178	6209436.995	
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55	286243.611	6209456.916	
56	286240.702	6209466.619	
57	286239.617	6209471.206	
58	286241.106	6209485.910	
59	286247.653	6209550.535	
60	286250.098	6209574.584	
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67	286284.389	6209780.069	
68	286285.325	6209785.612	
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FOR TENDER

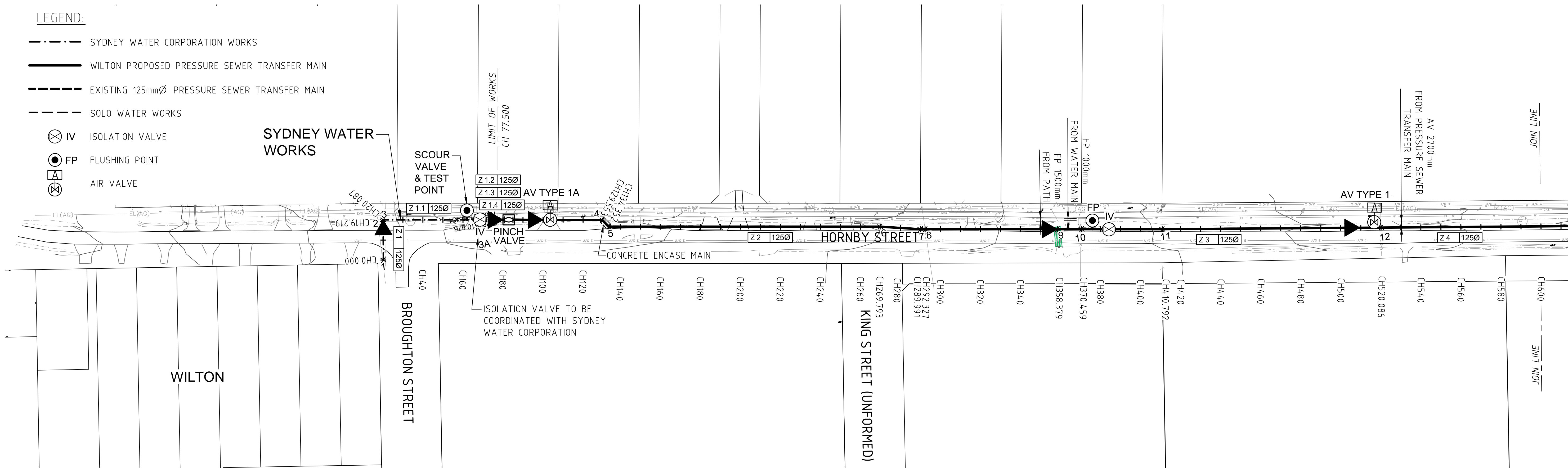
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							CHECKED	RRS	DATE	20/09/13			
							APPROVED	SW	DATE	20/09/13			
		A	FOR TENDER	SW	20/09/13						DRG No.	130830-RM000	REV A
		REV	DESCRIPTION	BY	DATE								



LEGEND:

- SYDNEY WATER CORPORATION WORKS
- WILTON PROPOSED PRESSURE SEWER TRANSFER MAIN
- EXISTING 125mmØ PRESSURE SEWER TRANSFER MAIN
- SOLO WATER WORKS

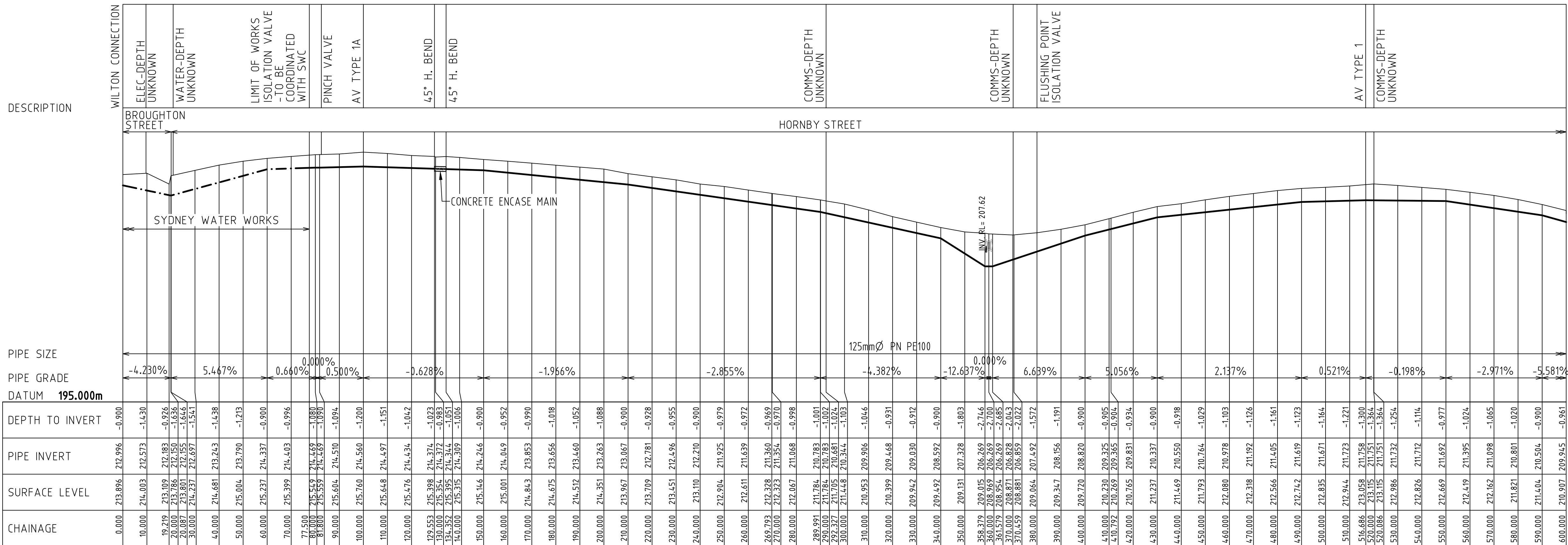
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- FP FLUSHING POINT
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PLAN - CH0.000 - CH600.000

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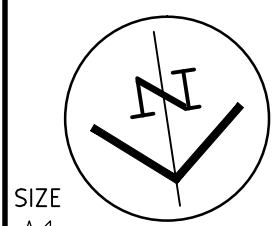
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LONGITUDINAL SECTION

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DRAWN	KG	DATE	20/09/13
CHECKED	RRS	DATE	20/09/13
APPROVED	SW	DATE	20/09/13

VERTICAL SCALE 1:100 AT A1  
HORIZONTAL SCALE 1:1000 AT A1

CLIENT:  
PROJECT: WILTON PRESSURE SEWER TRANSFER MAIN

TITLE:  
PRESSURE SEWER TRANSFER MAIN  
LAYOUT PLAN & LONGITUDINAL SECTION  
SHEET 1 OF 5

DRG No. 130830-RM001

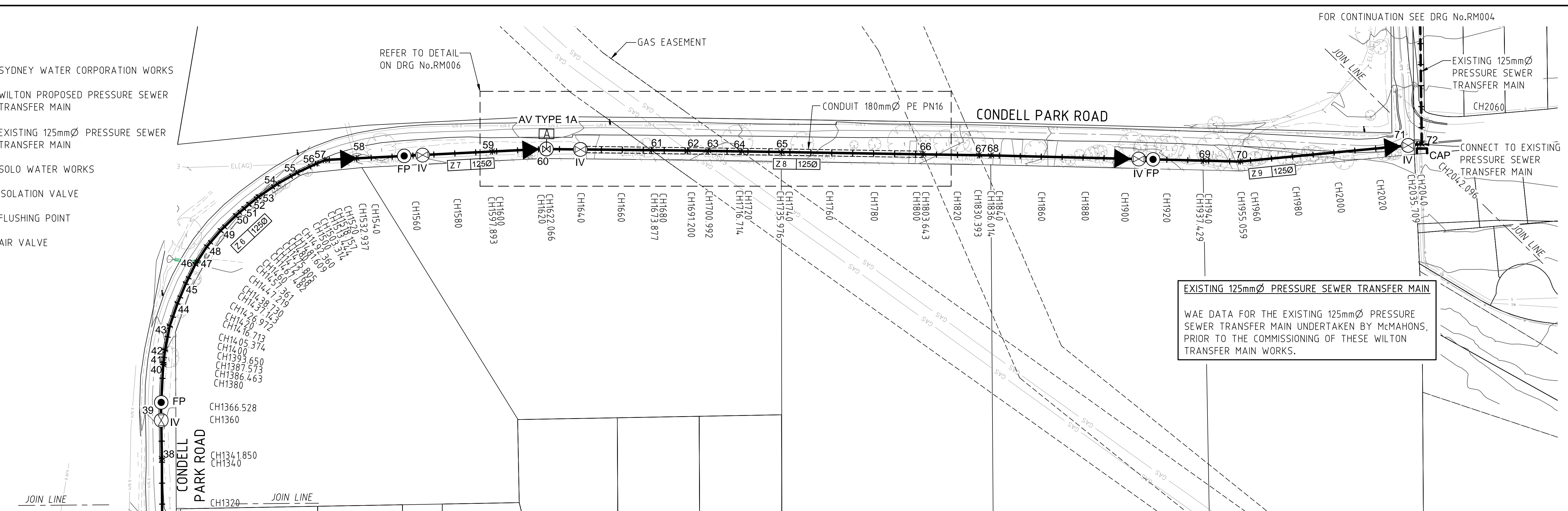
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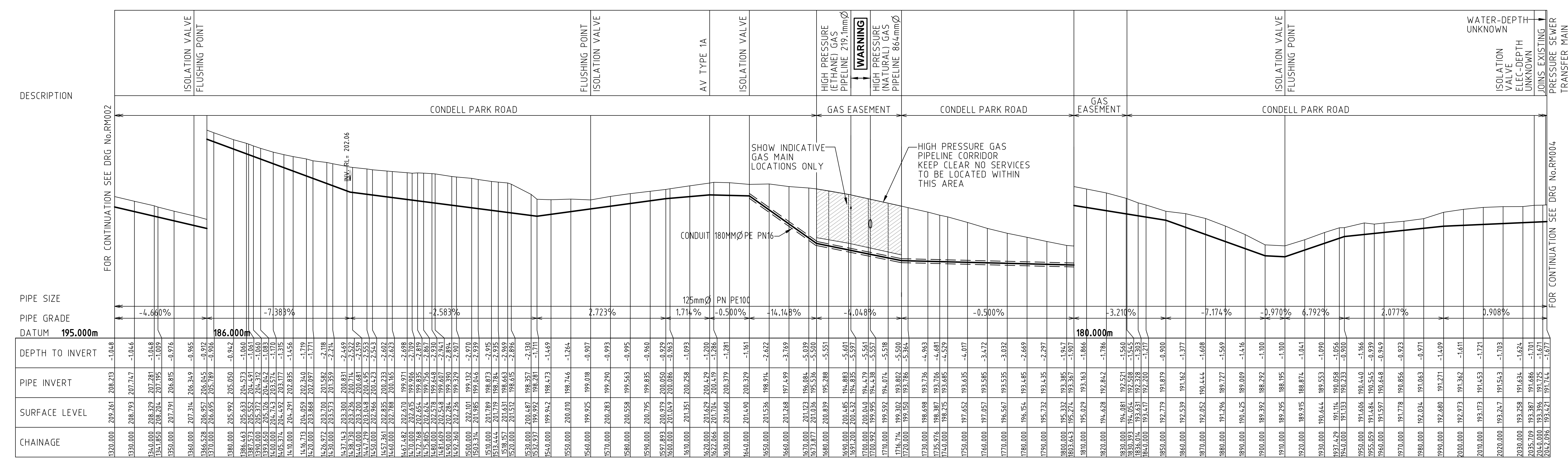


- LEGEND:
- SYDNEY WATER CORPORATION WORKS
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  - EXISTING 125mmØ PRESSURE SEWER TRANSFER MAIN
  - SOLO WATER WORKS
  - IV ISOLATION VALVE
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PLAN - CH1320.000 - CH2042.096

SCALE 1:1000  
NOTE: FOR SET OUT COORDINATES, REFER TO DWG 130830-RM000



LONGITUDINAL SECTION  
SCALE 1:1000 HORIZONTAL, 1:100 VERTICAL

FOR TENDER

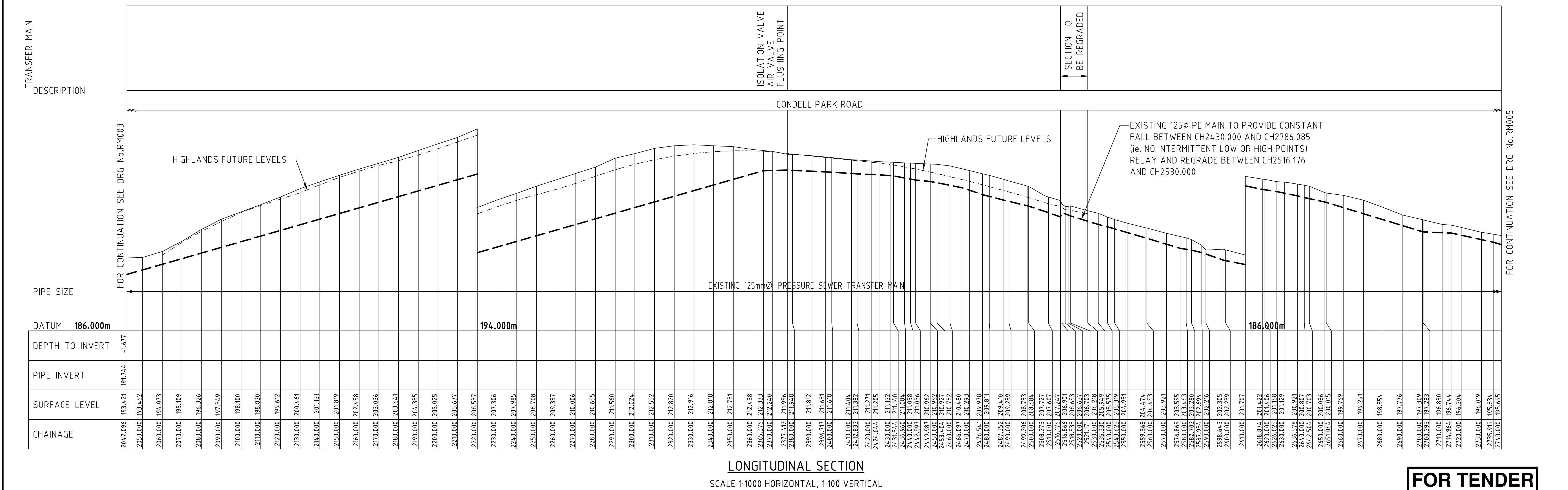
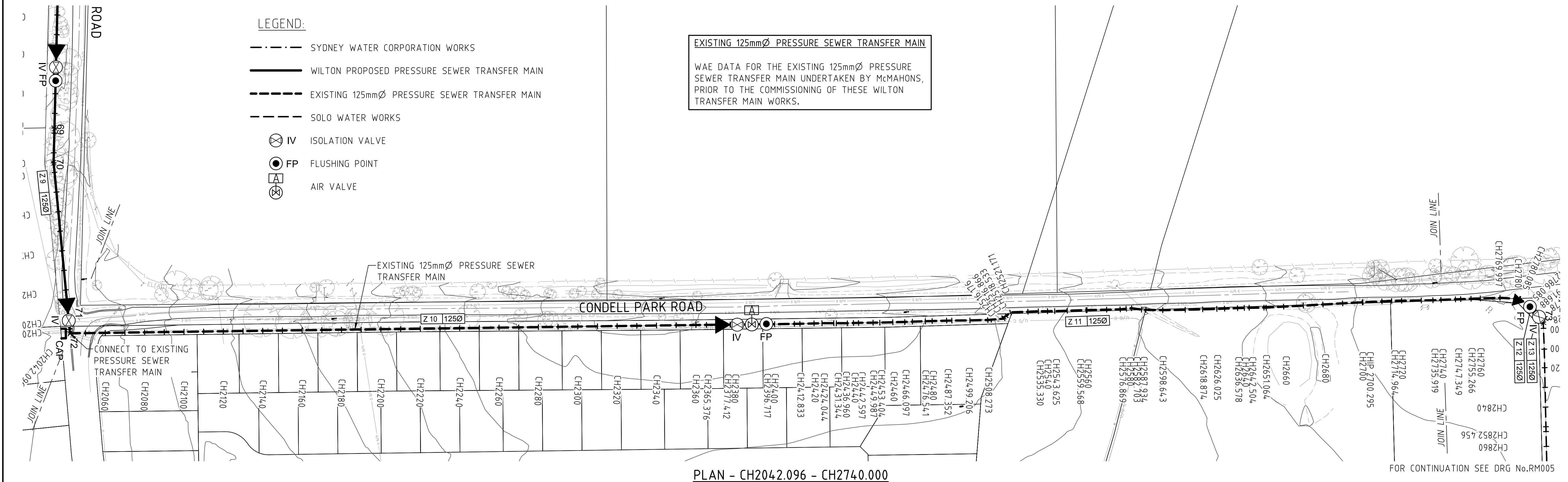
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DRAWN	KG
CHECKED	RRS
APPROVED	SW
DATE	20/09/13

CLIENT:	Solo Water
PROJECT:	WILTON PRESSURE SEWER TRANSFER MAIN

TITLE:	PRESSURE SEWER TRANSFER MAIN LAYOUT PLAN & LONGITUDINAL SECTION SHEET 3 OF 5
DRG No.	130830-RM003
REV	A

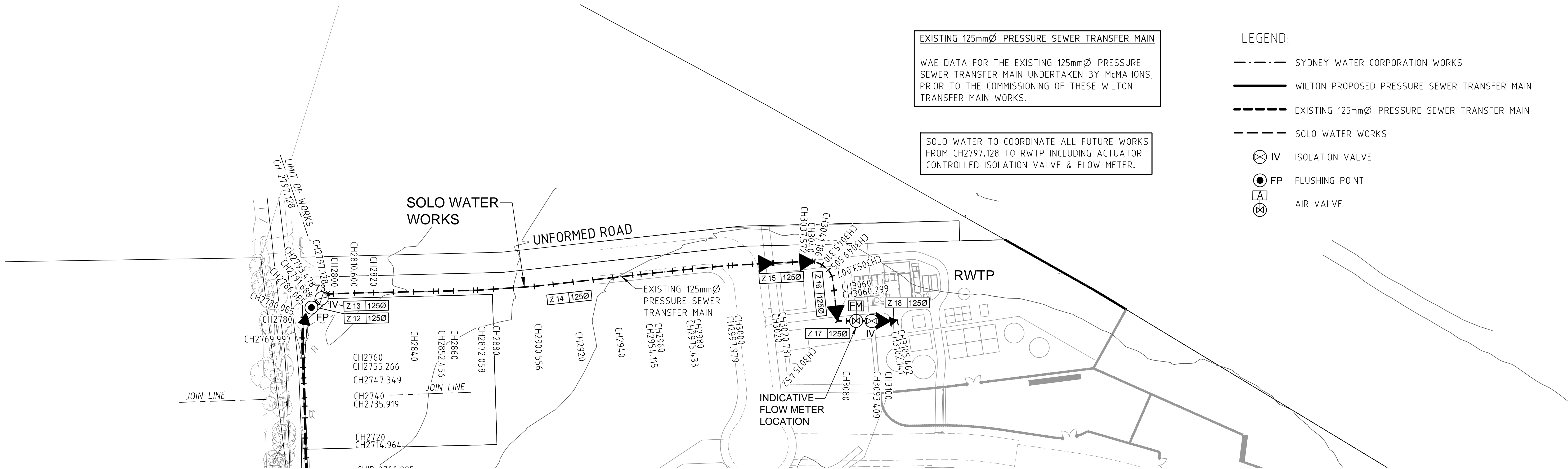




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SIZE A1	<div style="float: right; width: 45%; font-size: small;">           DESIGN BY:  ABN 57 097 164 899         </div> <table style="width: 100%;"> <thead> <tr> <th>A</th><th>FOR TENDER</th><th>SW</th><th>DATE</th></tr> </thead> <tbody> <tr> <td>REV</td><td>DESCRIPTION</td><td>BY</td><td>DATE</td></tr> </tbody> </table>	A	FOR TENDER	SW	DATE	REV	DESCRIPTION	BY	DATE	DRAWN    KG      DATE    20/09/13 CHECKED   RRS         DATE    20/09/13 APPROVED   SW          DATE    20/09/13
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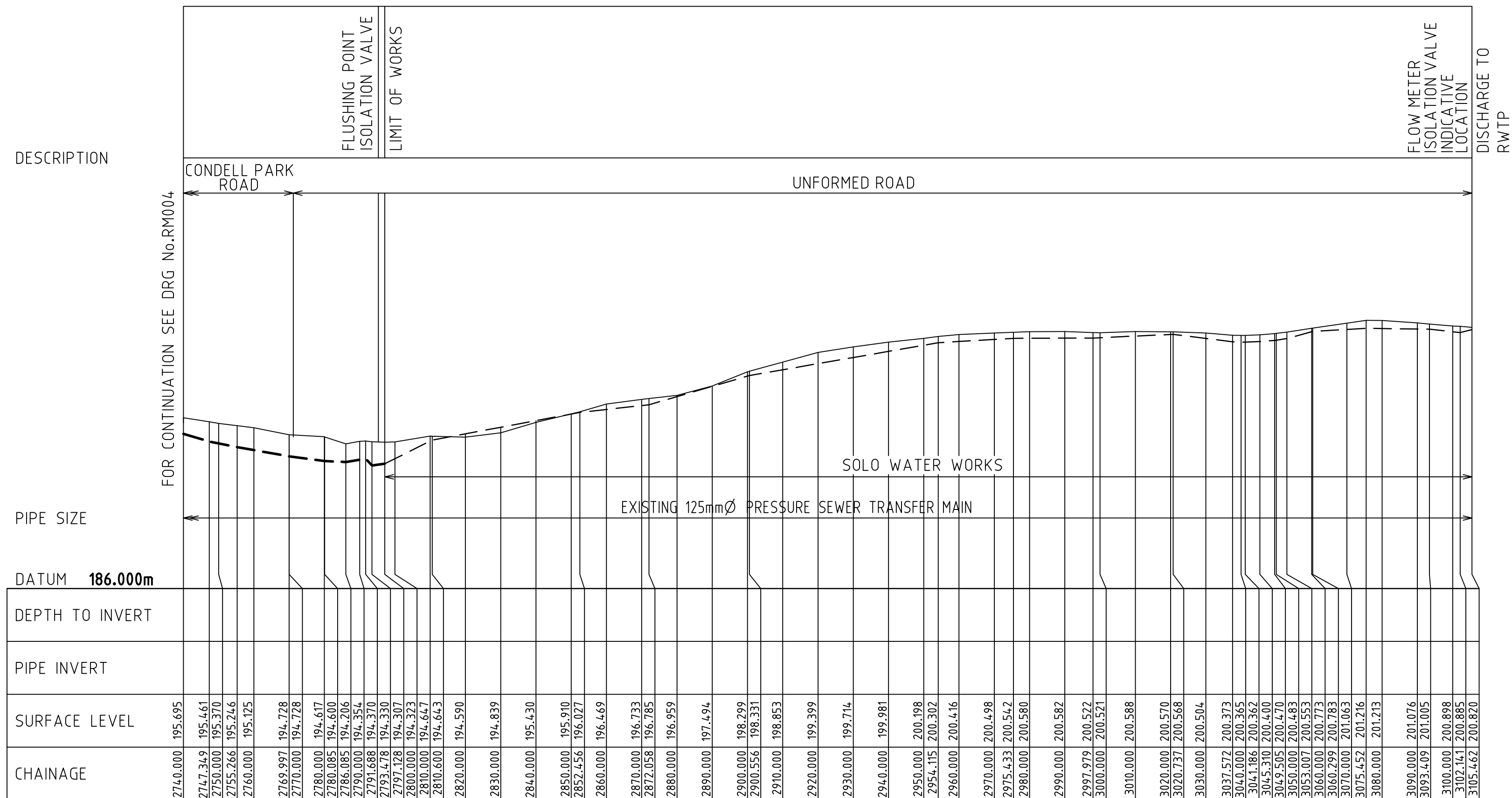




PLAN - CH2740.000 - CH3105.462

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NOTE: FOR SET OUT COORDINATES, REFER TO DWG 130830-RM000



LONGITUDINAL SECTION

SCALE 1:1000 HORIZONTAL, 1:100 VERTICAL

LEGEND:

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- WILTON PROPOSED PRESSURE SEWER TRANSFER MAIN
- EXISTING 125mmØ PRESSURE SEWER TRANSFER MAIN
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REV	DESCRIPTION	BY	DATE
A	FOR TENDER	SW	20/09/13

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APPROVED	SW	DATE	20/09/13

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HORIZONTAL SCALE 1:1000 AT A1

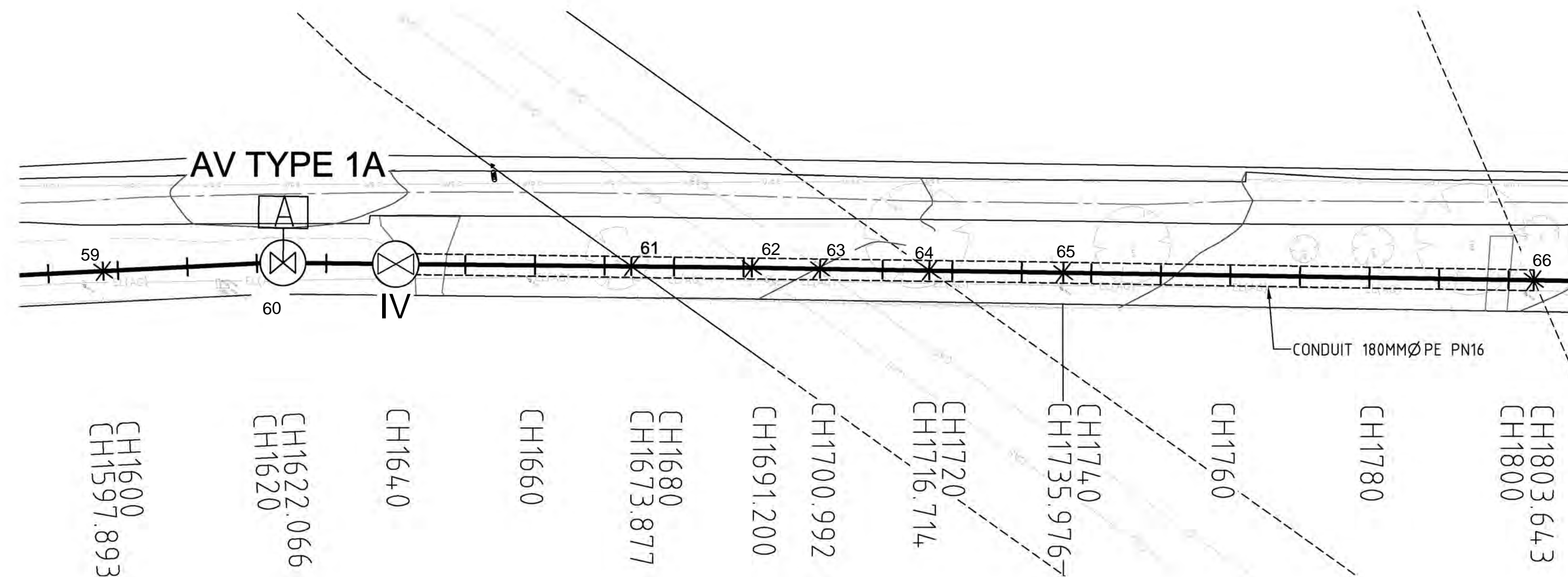
CLIENT:

Solo Water

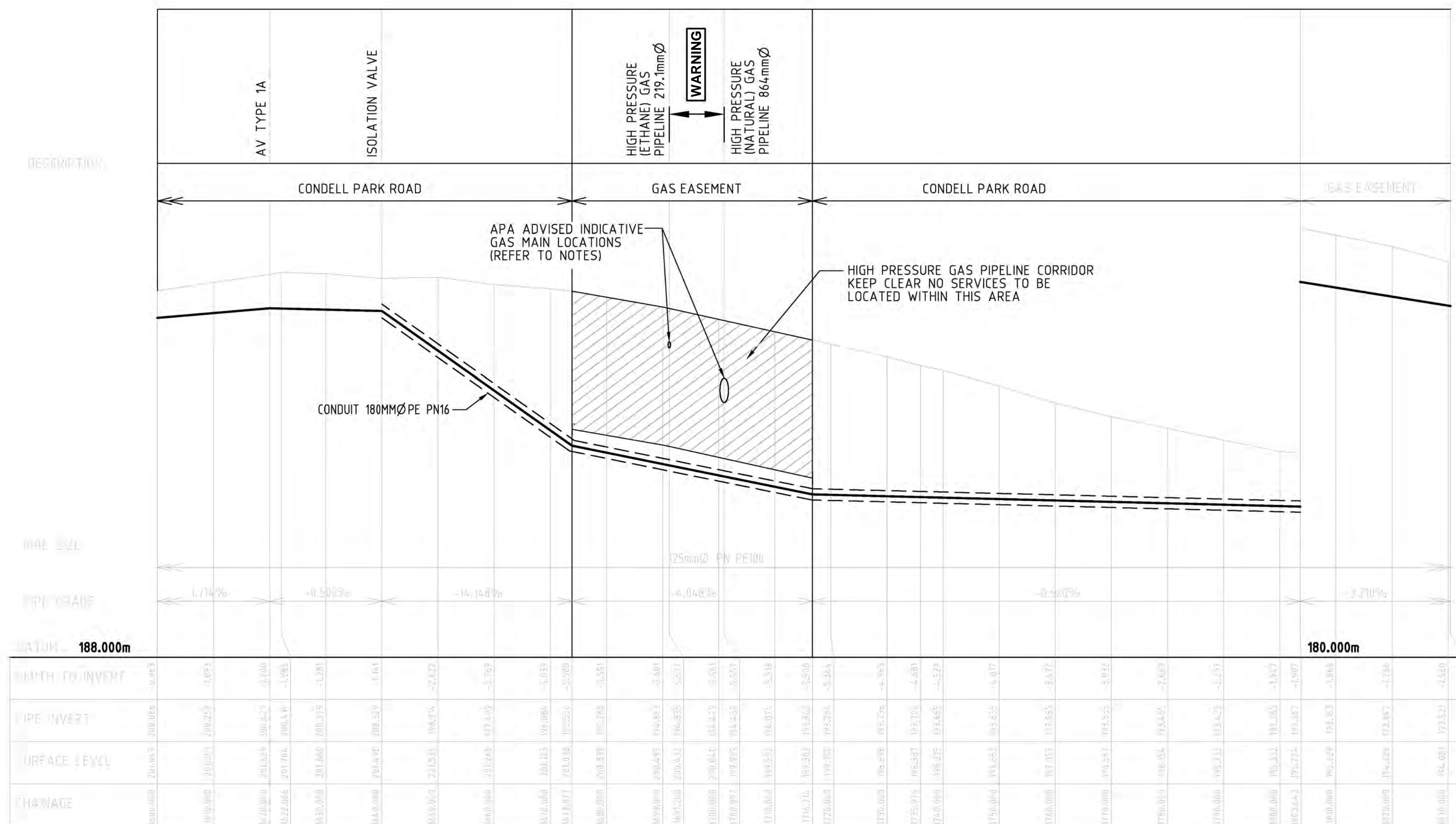
PROJECT: WILTON PRESSURE SEWER TRANSFER MAIN

TITLE:	DRG No.	REV
PRESSURE SEWER TRANSFER MAIN LAYOUT PLAN & LONGITUDINAL SECTION SHEET 5 OF 5	130830-RM005	A





PLAN  
SCALE 1:500



LONGITUDINAL SECTION  
SCALE 1:500 HORIZONTAL, 1:100 VERTICAL

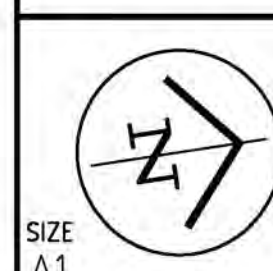
### HIGH PRESSURE GAS MAIN NOTES:

- The 125mm Wilton Village pressure sewer transfer main crosses a gas easement in Condell Park Road.
- The 25 meter wide gas main easement contains two gas mains as follows:-
  - Natural gas (NG) which is 864mm OD Pipe
  - Ethane which is 219.1mm OD Pipe
- APA Group are the responsible Authority, contact detail as follows:-

Michael Parker  
APA Group  
Heritage, Environment & Lands  
Unit 3/1105, Argyle Street  
Wilton NSW 2571  
Direct: +61 2 4630 0102  
Mobile: +61 439 153 288  
Email: michael.parker2@apa.com.au  
www.apa.com.au
- The gas pipe alignment within the easement is approximately as follows:-
  - NG pipe is 6m from the northern/western edge of easement
  - Ethane is approx. 8m from the NG
  - The depth of cover varies considerably with a minimum of 1.2m specified. Indications are that the NG may be up to 2m deep on this area. These are general figures only.
- The proposed pressure sewer main has been reviewed with the APA Group with their advice being "a pressured sewer main in PE may not cause too much problem as it will not impact our cathodic protection systems"
- APA Groups general requirement is that any new service pass under the pipelines but this will depend on a number of items, including size of service, intended depth, method of construction.
- The construction contractor is required to undertake the following gas main location identification and approval works prior to commencing any site construction of the 125mm transfer main and conduit :-
  - Establish contact with APA and determine concept approval and construction requirements.
  - Evaluate gas easement crossing options and choose the most appropriate solution.
  - Determine required construction specification and undertake required investigative works to support the selected crossing solution e.g. Utility search, Geotechnical survey and potholing etc.
  - Undertake a detailed risk assessment and contingency plan for the works .
  - Document selected solution and submit for approval to APA Group.
  - Pay all approval and construction fees such as APA Group supervision fees.
  - Obtain APA Group approval prior to commencing work.
- Complete construction documentation as required by APA Group and Solo Water/Lend Lease.
- Arrange all required APA Group construction supervision.
- Post works develop Work As Executed documentation, provide to APA Group and Solo Water and obtain approvals.

DESIGN SUBJECT TO  
APA GROUP APPROVAL

FOR TENDER



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REV	DESCRIPTION	BY	DATE
A	FOR TENDER	SW	20/09/13

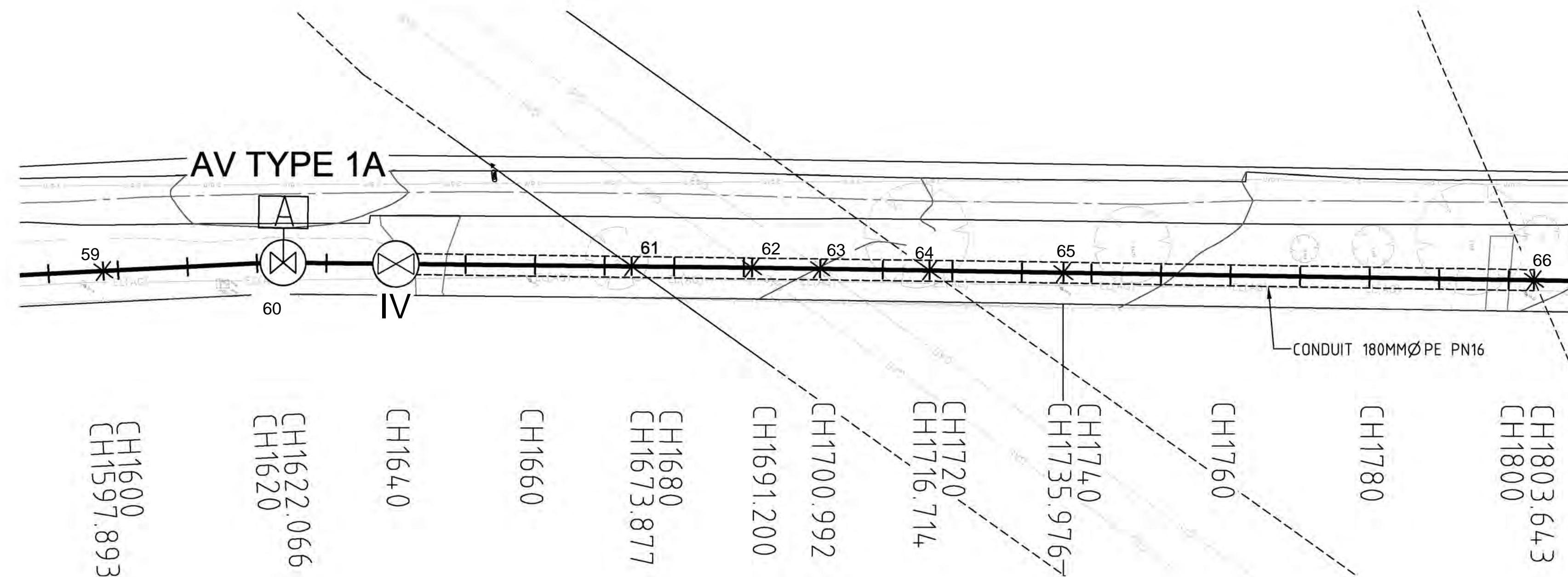
DESIGN BY:  
Pressure System Solutions Pty Ltd  
Unit 1/47-51 Lorraine Street  
Peakhurst NSW 2210  
Sydney Australia  
T: +61 2 9584 1177  
F: +61 2 9584 1477  
E: admin@pssolutions.net.au  
www.pssolutions.net.au

DRAWN	KG	DATE	20/09/13
CHECKED	RRS	DATE	20/09/13
APPROVED	SW	DATE	20/09/13

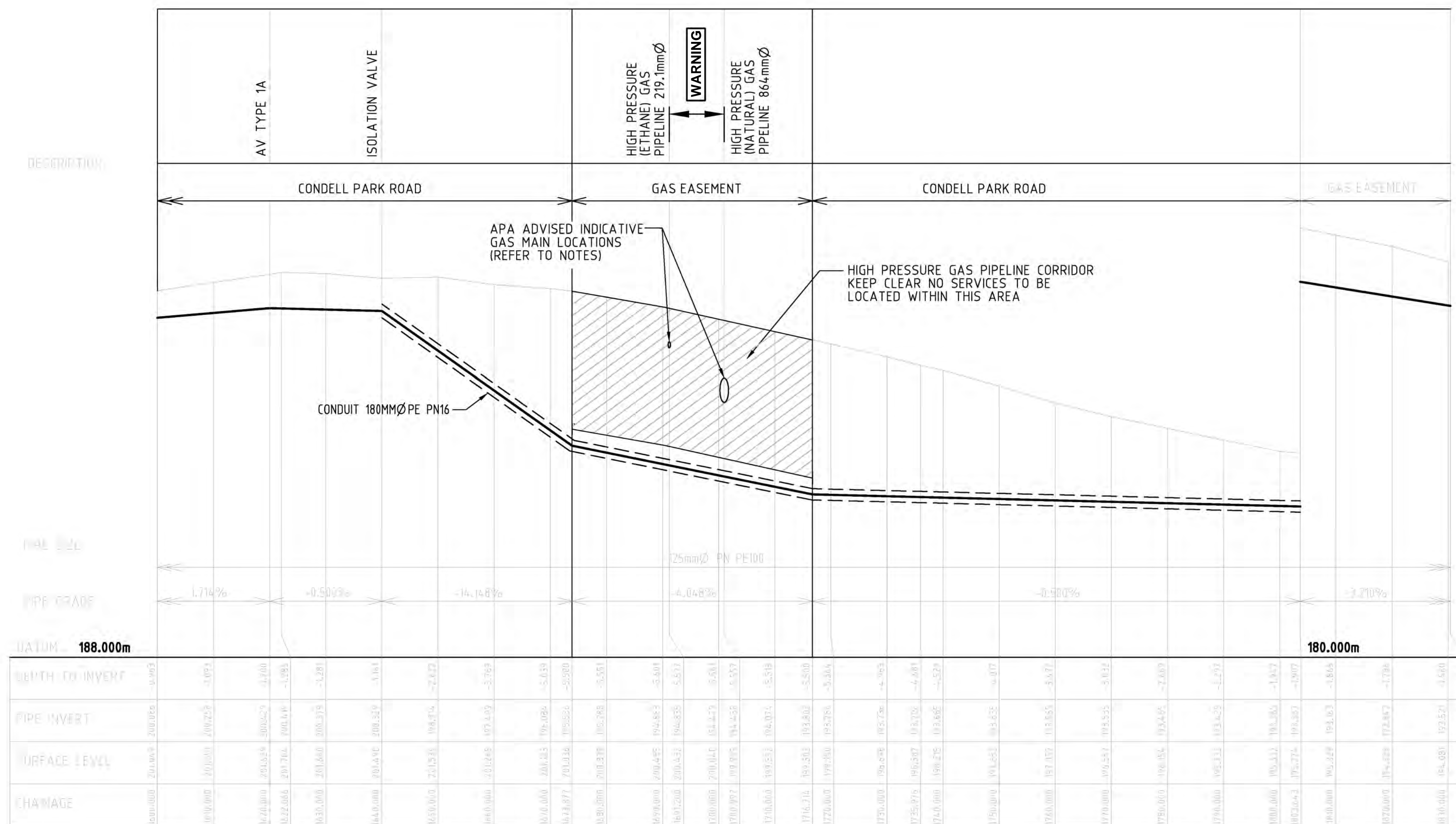
CLIENT:  
**Solo Water**  
PROJECT: WILTON PRESSURE SEWER  
TRANSFER MAIN

TITLE:	PRESSURE SEWER TRANSFER MAIN HIGH PRESSURE GAS EASEMENT CROSSING DETAILS
DRG No.	130830-RM006
REV	A





PLAN  
SCALE 1:500



LONGITUDINAL SECTION  
SCALE 1:500 HORIZONTAL, 1:100 VERTICAL

#### HIGH PRESSURE GAS MAIN NOTES:

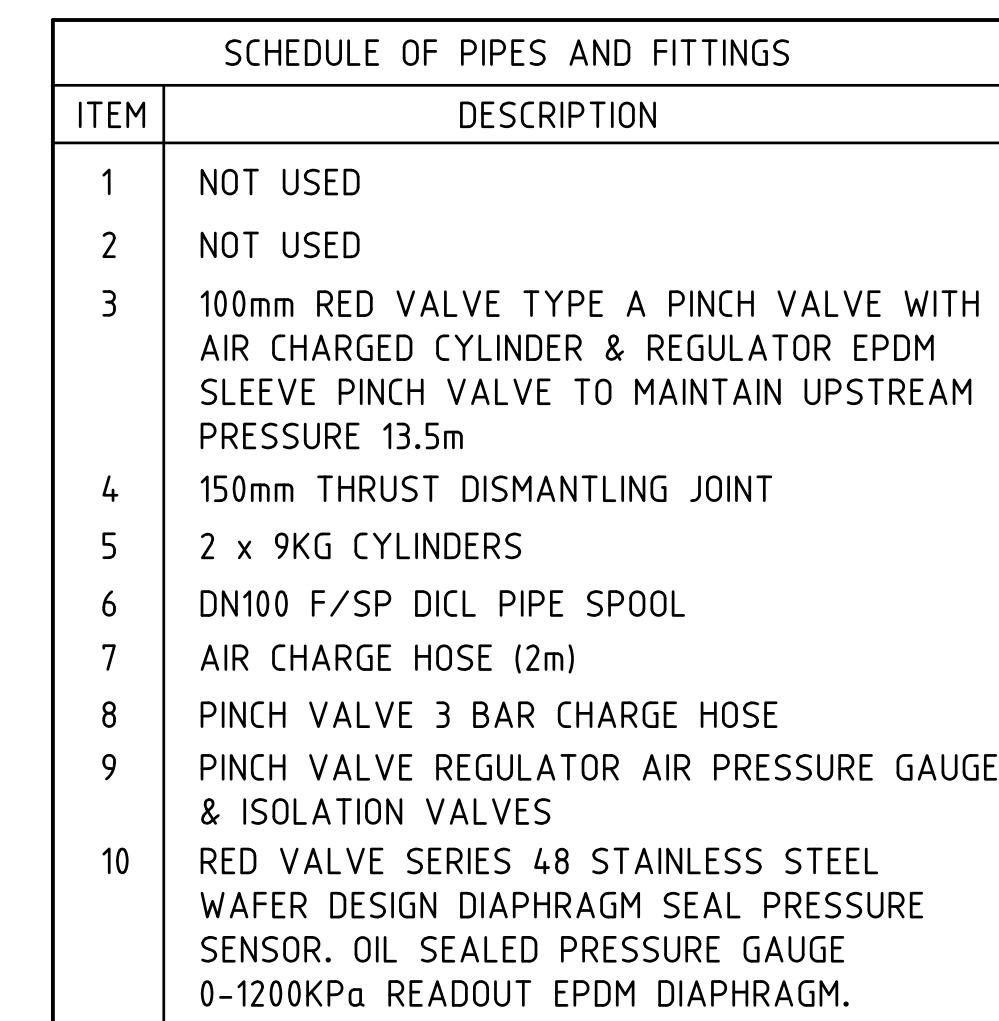
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Michael Parker  
APA Group  
Heritage, Environment & Lands  
Unit 3/1105, Argyle Street  
Wilton NSW 2571  
Direct: +61 2 4630 0102  
Mobile: +61 439 153 288  
Email: michael.parker2@apa.com.au  
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FOR INFORMATION ONLY

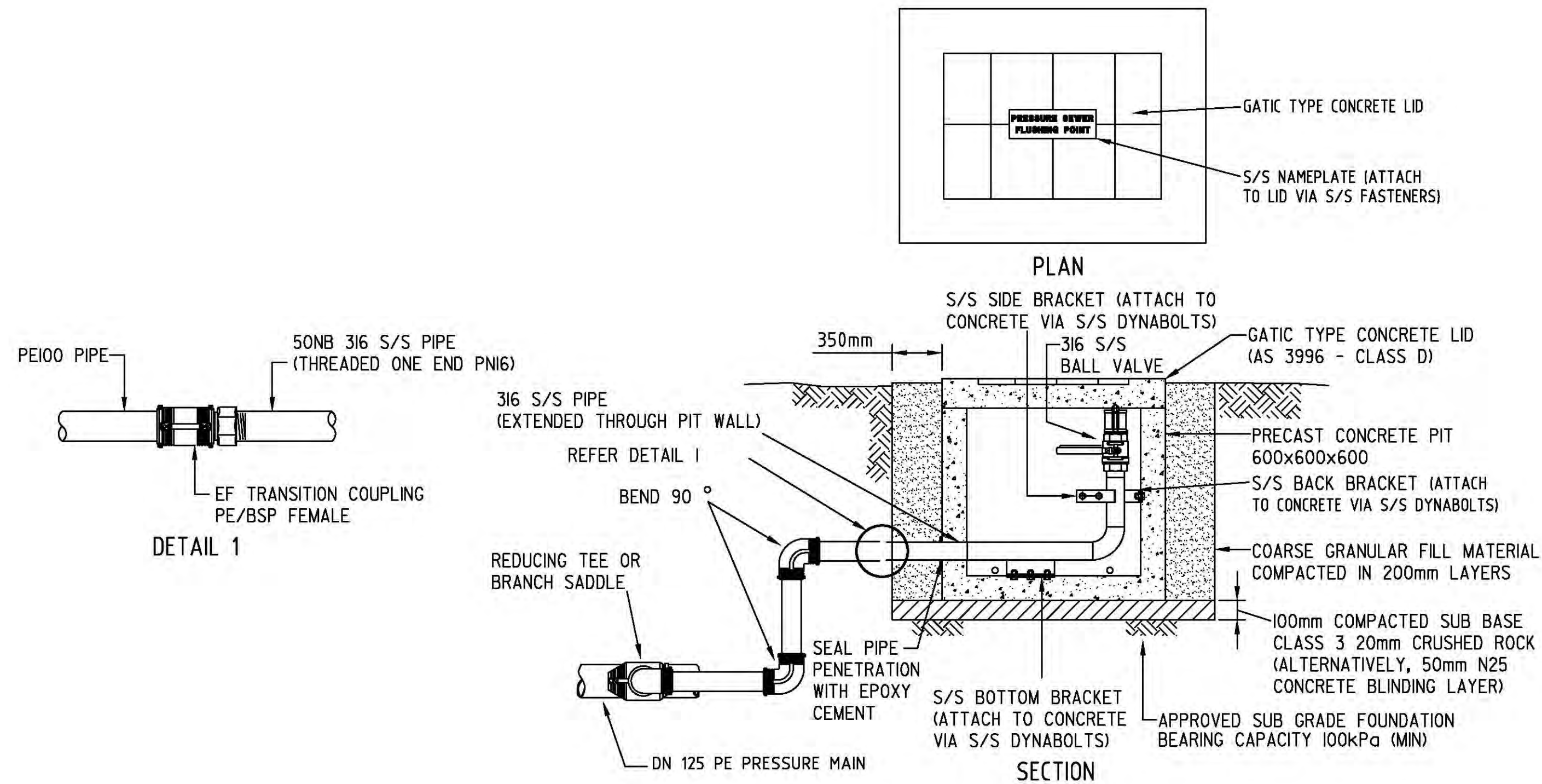
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		A FOR INFORMATION ONLY		SW	20/09/13	PROJECT: WILTON PRESSURE SEWER TRANSFER MAIN		DRG No.	130830-RM006	REV		A	
REV		DESCRIPTION		BY		DATE		VERTICAL SCALE 1:100 AT A1 HORIZONTAL SCALE 1:500 AT A1					



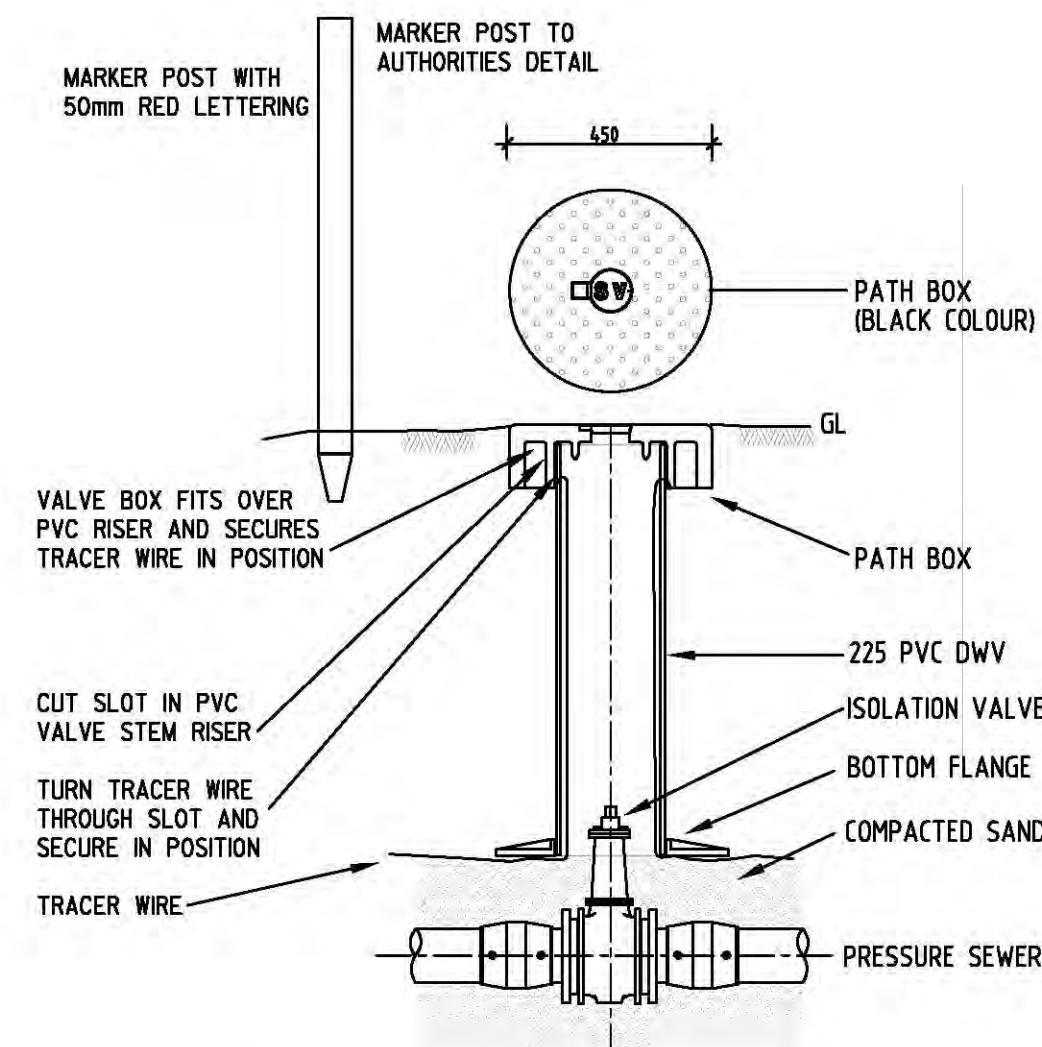


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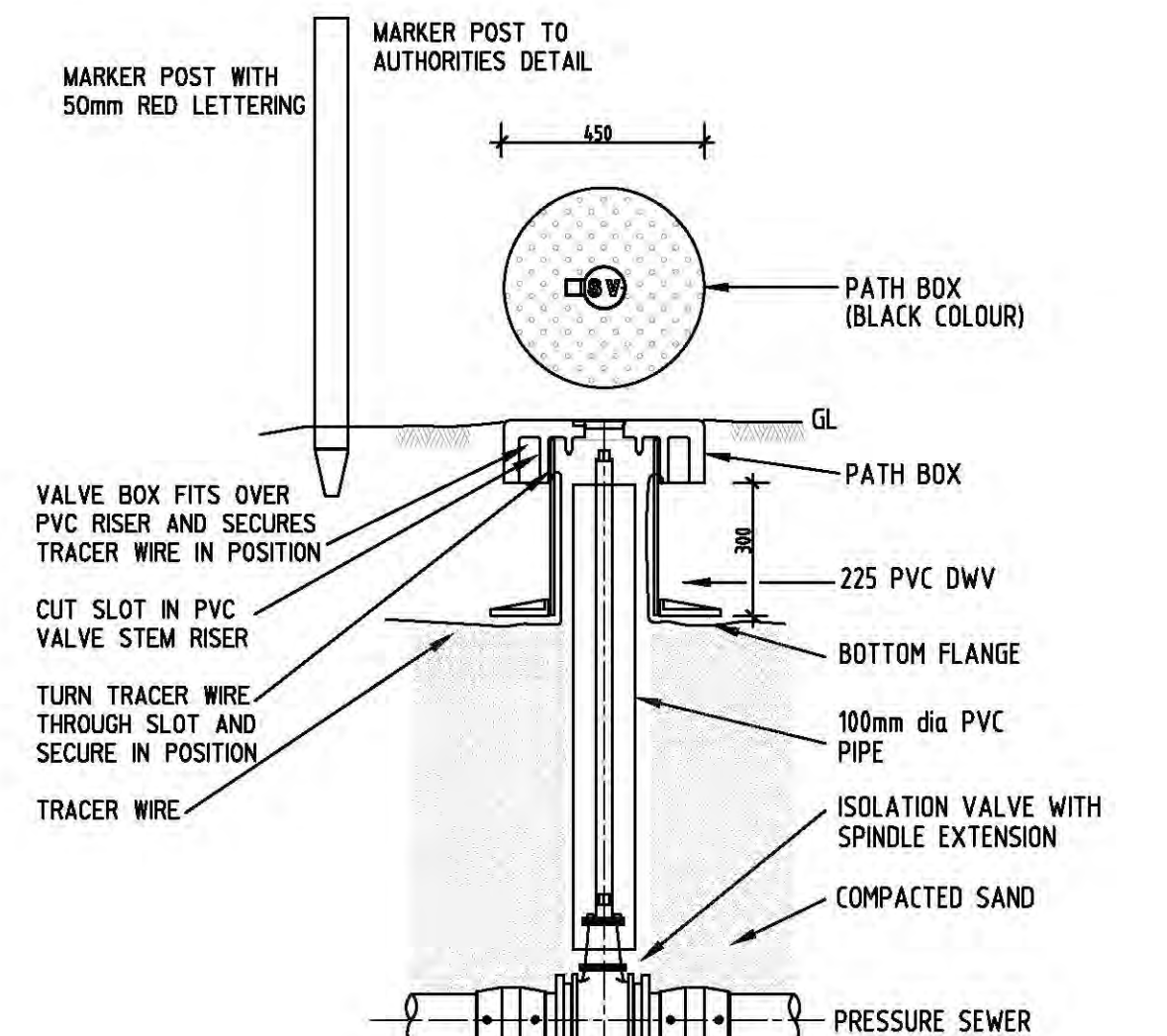




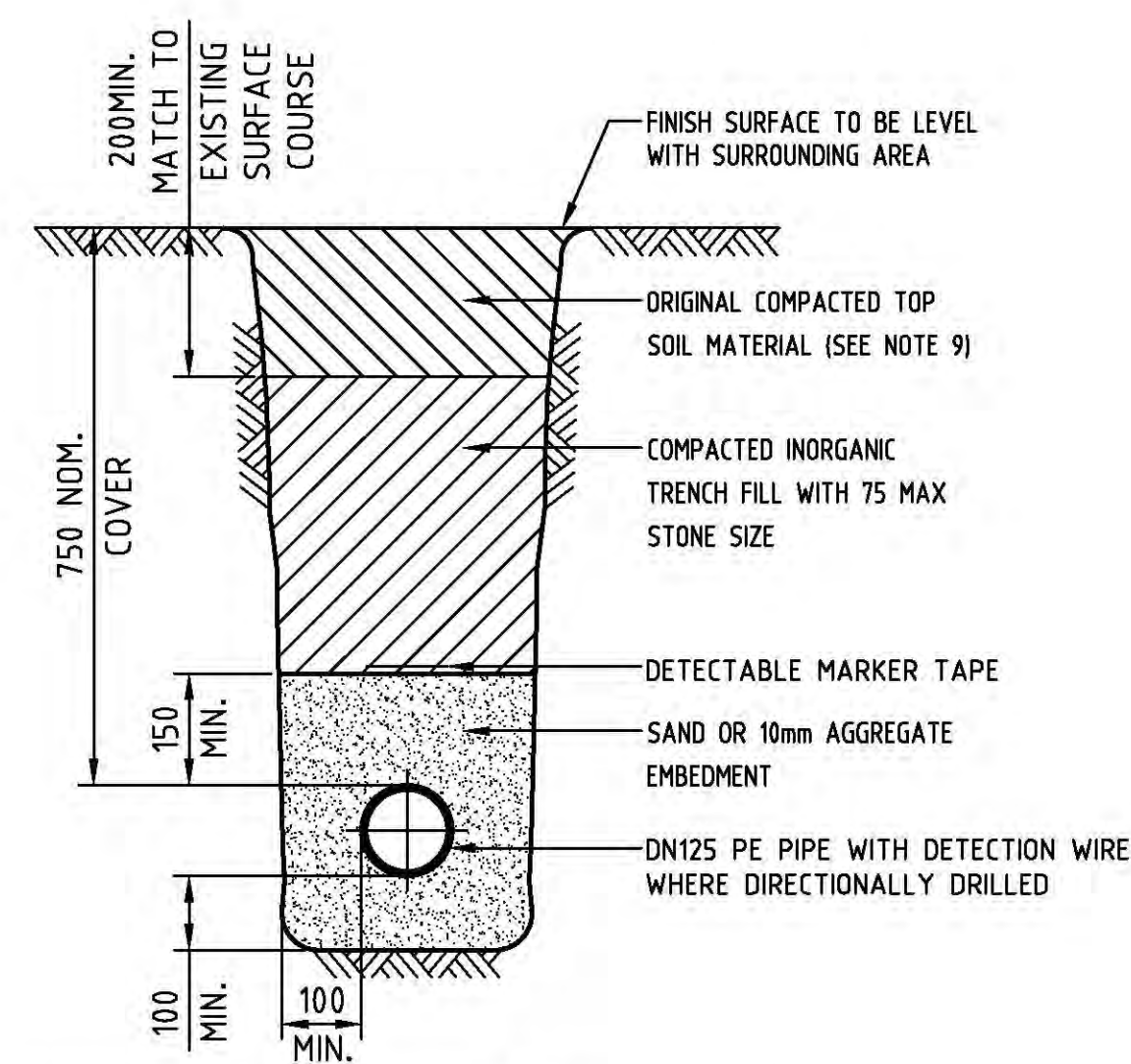
FLUSHING POINT - HEAVY DUTY TRAFFICABLE (AS 3996 CLASS D)



TYPICAL ISOLATION VALVE



TYPICAL ISOLATION VALVE  $\geq 1000\text{mm}$  DEEP



PIPE EMBEDMENT AND TRENCH FILL  
TYPICAL ARRANGEMENT

#### MINIMUM RADIUS OF BENDS

NOTE: ALL BENDS TO COMPLY WITH FOLLOWING RADIUS SPECIFICATION.

OD PIPE SIZE	FITTING BEND RADIUS	SITE FORMED BEND RADIUS (25xPIPE OD)
63mm	225mm	1575mm
125mm	380mm	3125mm

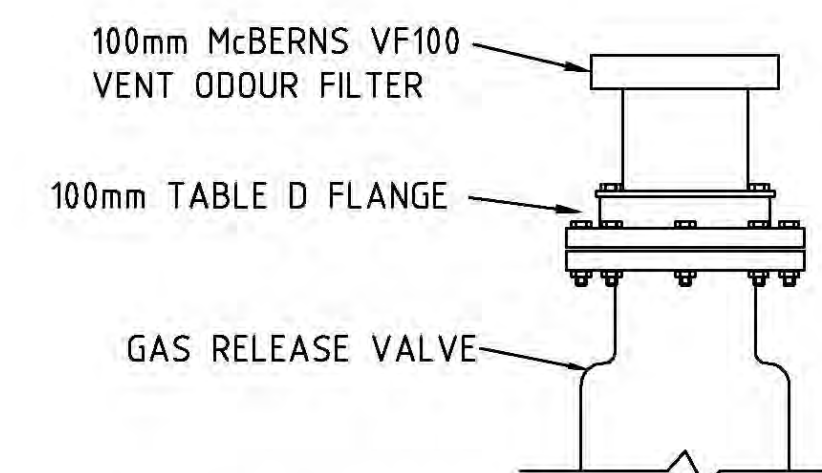
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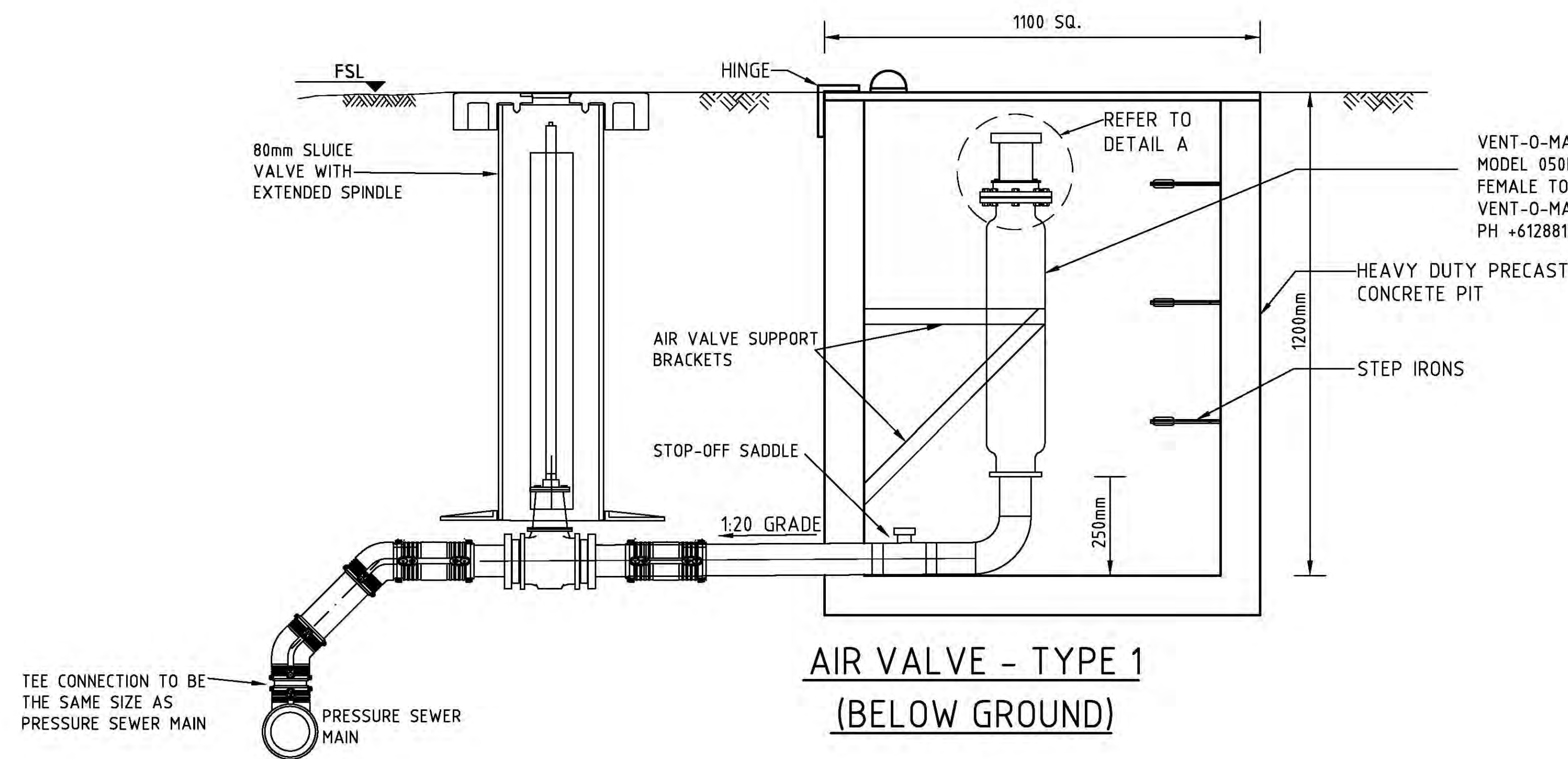




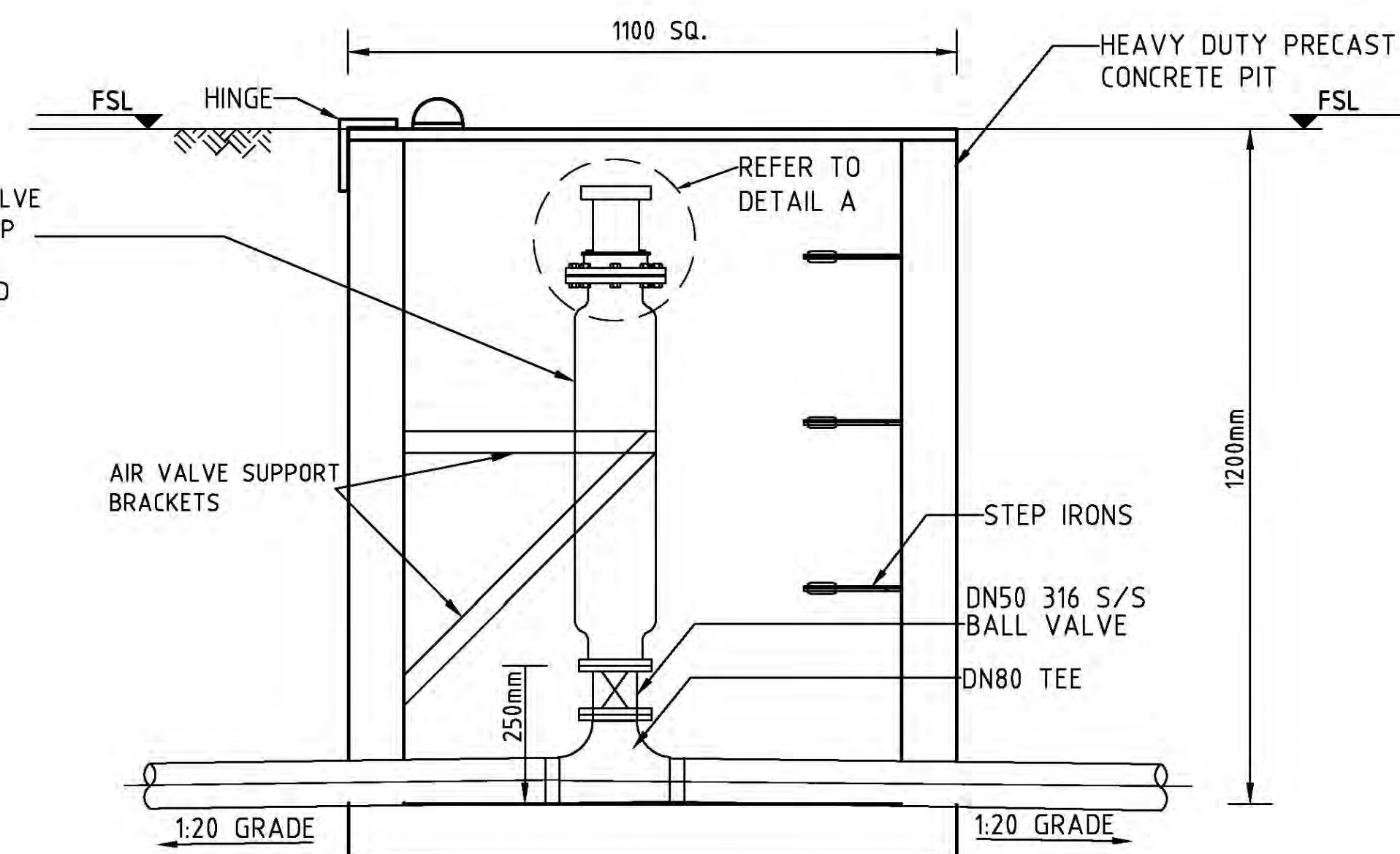




DETAIL A - ODOUR FILTER CONNECTION DETAIL



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AIR VALVE - TYPE 1A  
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17 October 2013

Mr Daniel Thompson  
Environmental Planner  
Cardno  
Level 1 47 Burelli Street  
WOLLONGONG NSW 2500

Dear Daniel

**Re: Due Diligence Advice for Aboriginal archaeological heritage for Bingara Gorge Rising Main  
Project no. 17036**

This letter documents Aboriginal heritage due diligence advice for the proposed Bingara Gorge Rising Main. It has been prepared under the requirements of the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010) and fulfils Land Lease's due diligence obligations under this code. The assessment will inform the REF being prepared by Cardno for the proposed works.

**Project Area**

The Project Area is located within Wilton township in New South Wales (Figure 1) and is located within the Wollondilly Local Government Area. The proposed alignment is approximately three kilometres and follows Condell Park Road and Hornby Street. The study area will include at least a five metre buffer from the road edge as well as an additional area to the south at the eastern end of the straight on Condell Park Road to allow for a possible alignment change.

**Project Background and Proposed Impacts**

The proposed works will consist of excavations to a depth of approximately 1m and laying of the sewer main. This would require the excavation of a trench 1m in width with construction movements to either side of this. The trench will be located within the road reserve for the entire alignment; this will be either right in the middle of the road or along the disturbed edge.

**Project Objectives**

The following is a summary of the major objectives for this due diligence investigation:

- Identify Aboriginal objects and Places known to exist within the Project Area through a search of the Aboriginal Heritage Information System (AHIMS), maintained by the Office of Environment and Heritage (OEH);
- Consult with the Tharawal Local Aboriginal Land Council (LALC);
- Undertake a site visit to relocate any previously recorded sites, assess previous disturbance and the potential for Aboriginal heritage to be present;
- Record and assess sites identified during the site visit in compliance with the guidelines issued by the OEH;
- Identify potential impacts to all identified Aboriginal sites and places based on potential ground disturbance from the works; and



- Make recommendations to minimise or mitigate potential impacts to cultural heritage values within the Project area.

## Legislation

The investigation has been carried out under the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010). The code sets out steps which individuals and organisations need to take to determine if:

- Aboriginal objects are, or are likely to be present in the area; and
- The proposed activity will harm Aboriginal objects.

If it is determined through the due diligence assessment that Aboriginal objects are present, or are likely to be present, and the proposed activity will harm Aboriginal objects, the code requires that:

- Further investigation and consultation under the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010) and the *Aboriginal cultural heritage consultation requirements for proponents 2010* (DECCW 2010) is required; and
- An Aboriginal Heritage Impact Permit (AHIP) application is also required if Aboriginal objects or Places are present and will be harmed.

## Investigation Methodology & Results

### Community Consultation

Consultation with the Aboriginal community is not a formal requirement of the Due Diligence process, however it is recognised in NSW that Aboriginal people are the primary determinants of the significance of their cultural heritage. A landscape may hold intangible values that can be assessed only by the Aboriginal community. This Due Diligence advice has been prepared in consultation with the Tharawal LALC.

Tharawal LALC was invited to send their representative to participate in the site visit on 2 October 2013 with the Biosis archaeologist but they chose not to send the representative. Draft report was sent for their comments on 17 October 2013. Any comments received will be attached to the final report. A copy of the final report will be provided to Tharawal LALC for their records.

### AHIMS Search

The Office of Environment and Heritage (OEH) maintains a database of Aboriginal sites within NSW under Part 6 of the NSW National Parks and Wildlife Act 1974. Aboriginal objects and places in NSW are legally required to be registered on the Aboriginal Heritage Information Management System (AHIMS) register.

A search of the NSW Office of Environment and Heritage (OEH) Aboriginal Heritage Information Management System (AHIMS) was conducted on the 24 September 2013. No Aboriginal archaeological sites listed on AHIMS are currently within the Project Area. There are two Aboriginal sites located within 200m of the Project Area. They are listed in **Table 1**. Previously recorded Aboriginal archaeological sites within 1km of the Project Area are shown in **Figure 3**. *This table and figure contain sensitive information and should not be made public.*

**Table 1: AHIMS sites present within 200m of the Project Area.**

AHIMS Site No.	Site Name	Site Type
52-2-3590	Wilton 01	Scarred Tree
52-2-3032	BC8; Wilton Park 8	Artefact Scatter

## Site Visit

A site visit was undertaken on 2 October 2013, attended by Alexander Beben – Senior Archaeologist (Biosis Pty Ltd).

The objectives of the site visit were to:

- Assess the previous disturbance to the Project Area;
- Assess the potential of the Project Area to possess intact Aboriginal heritage; and
- Locate any Aboriginal objects or Places present within the Project Area.

## Results of the site survey

### *Ground Surface Visibility*

The northern part of Condell Park Road consists of heavily disturbed road easement lined by immature eucalypts. General ground surface visibility was 60% with 40% exposure (**Plate 1** ). Landform associated with this area is a simple slope to the south-east towards a second order tributary creek to Stringybark Creek (**Plate 1** ). Soils are mid brownish-grey silt with 40% angular basalt inclusions (imported).



**Plate 1 : Simple slope overlooking tributary creek to Stringybark Creek, facing south.**



**Plate 2: Example of an exposure adjacent to the tributary creek caused by erosion.**

After the creek the alignment transitions into a lower slope, then an upper waxing slope (Plate 4). The visibility in this area was 10% with 5% exposure. Exposed bedrock is visible along portions of the route indicating shallow soil deposits.



**Plate 3: Open watercourse and lower slope, facing north.**



**Plate 4: Upper waxing slope and small exposure, facing south.**

The portion of the Project Area located adjacent to Picton Road has been heavily disturbed through the construction of road (**Plate 1**) and the residential development. This area is traversed by two heavily modified watercourses.



**Plate 1: Area adjacent to Picton Road; previous disturbance associated with the road, facing west.**

The portion of the Project Area that runs parallel to Hornby Street is heavily disturbed by the construction of the road and residential dwellings. Along the alignment there is a very low visibility of <5% with no visible exposures.





**Plate 6: Hornsby Street, facing east.**



**Plate 7: Crest along Hornsby Street, facing east.**

### *Landform*

The Project Area is physiographically within Cumberland Lowlands that is characterised by rolling hills and river plains on shale soils. Cumberland Lowlands are situated on the margin of the Cumberland Plains and Woronora Plateau on what is the transitional zone between these two physiographical regions. Short tributaries drain east and west across the plain into the Nepean River. The underlying geology consist of Wianamatta Group shale that is Middle Triassic in age (245 to 235 million years old) that overlies Hawkesbury Sandstone. Project Area lies within Blacktown soil landscape (Hazelton and Tille 1990: 27-30). Local relief is up to 30m and slopes are very low to flat; crests are broad and rounded, and drainage depressions and valley flats are also broad. Soils are shallow to moderately deep loams and clay loams on crests, upper slopes and well-drained areas, and deep loams and clays on lower slopes and drainage depressions (Hazelton and Tille 1990: 27). Project Area lies within a range of landforms, ranging from drainage depressions and lower slopes to upper slopes and crests.

### *Site Located*

No Aboriginal objects were located within the Project Area.

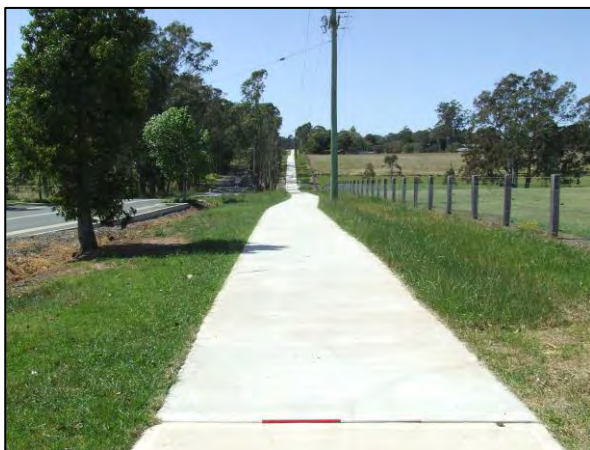
### *Disturbance*

The entire Project Area is characterised by extensive previous disturbances.

Condell Park Road reserve and the area adjacent to Picton Road have been previously significantly disturbed due to the construction of road and residential developments. In this area two drainage lines have been also been heavily modified.

The eastern end of Hornsby Street has been heavily disturbed through the construction of the road and residential dwellings. The road reserve is semi cleared with immature trees present.

Hornsby Road becomes less residential after approximately 200m but is still heavily disturbed through the construction of roads and pathways. All watercourses have been highly modified within this area (**Plate**).



**Plate 8: Hornsby Street overlooking several watercourses, facing east.**



**Plate 9: Heavily modified Stringybark Creek, facing east.**

### *Archaeological Potential*

The Project Area lies within Cumberland lowlands and Blacktown soil landscape that are known to have high archaeological sensitivity. Majority of the Aboriginal sites previously recorded within the vicinity of the Project Area are artefact scatters and shelter sites. Culturally modified trees have the potential to occur in areas that have remnant native vegetation. The Project Area does not contain sandstone overhangs and the possibility for shelter sites are nil. The area is also extensively cleared and the potential for culturally modified trees to occur is nil. Deep loamy soils that are present within the Project Area have a high potential to contain sub-surface deposits associated with campsites especially in well drained and slightly elevated areas above watercourses.

General predictive model for Cumberland Plains (JMCHM 2007a, b and c) indicated that the frequency, density and complexity of stone artefact sites varies and is dependant on the stream order of the watercourse. At the first order creeks archaeological evidence would be sparse and will comprise of isolated artefacts scattered across. Second order creeks would have more focused activity but still sparse evidence. Third order creeks will have evidence of more frequent occupation, and the major creeks and rivers will have archaeological evidence of permanent occupation and diverse activities. Ridge top location will have limited archaeological evidence. According to the topographical settings of the Project Area, the fact that all watercourses present are second order creek lines, archaeological sensitivity is assessed as low. Low density artefact scatters and isolated artefacts are likely to be the most common occurring site types within the Project Area.

Project Area has been previously extensively modified. Disturbances include construction of roads, residential dwellings and modifying watercourses. These works would have removed topsoils that would have potentially contained Aboriginal cultural material. The potential for Aboriginal archaeological sites to be present within the Project Area is assessed as low.

### *Impact Assessment*

No known Aboriginal objects or places will be impacted by the proposed works.

Potential for Aboriginal cultural material to be present within the Project Area is assessed as low due to the extensive previous disturbance.

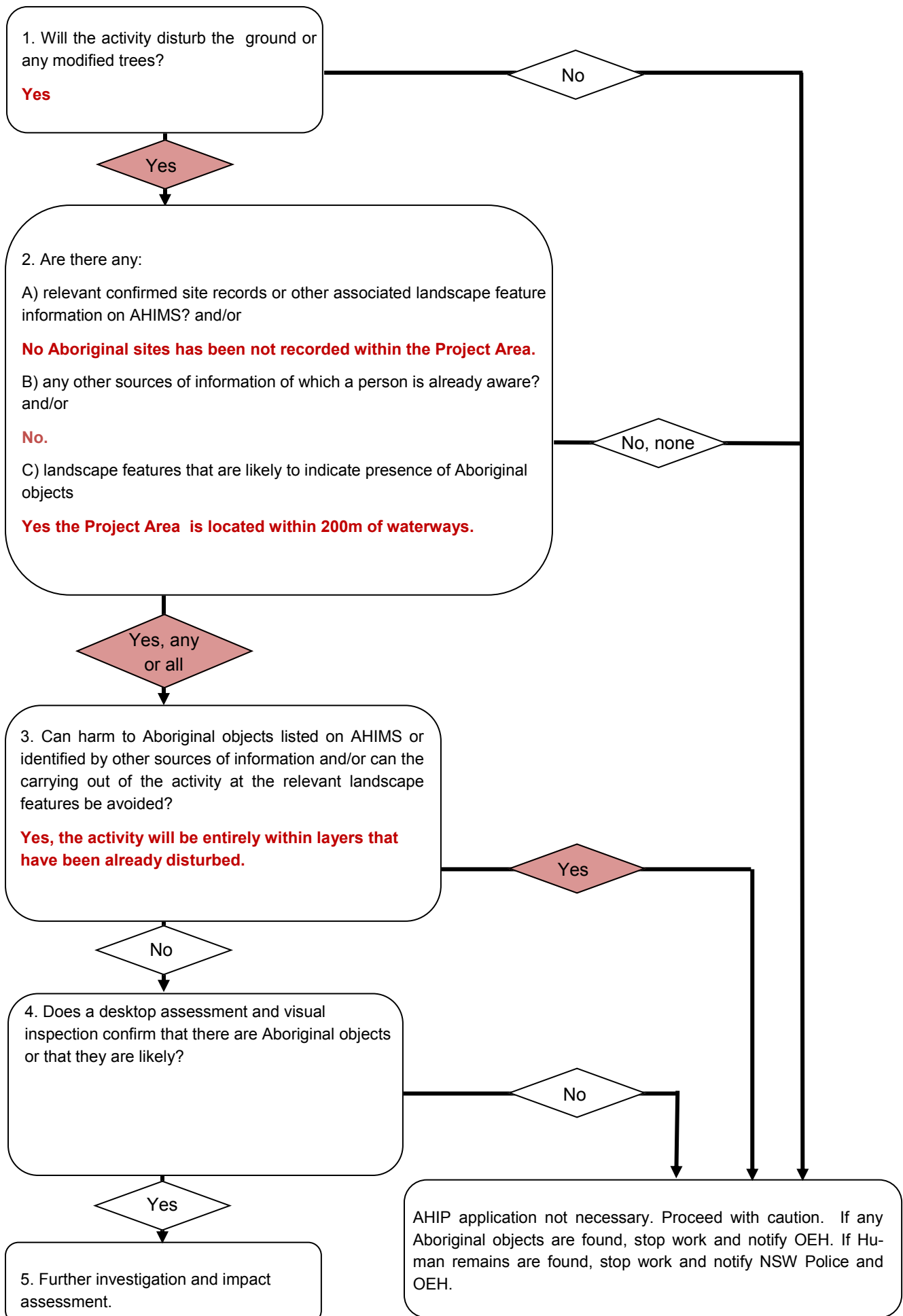
The Code provides a flowchart composed of six questions to identify the presence of, and potential harm to Aboriginal objects within the Project Area. These questions were applied to the investigation methodology.

## **Discussion**

Although the Project Area is located within a culturally sensitive area as defined by the Code, it is located in disturbed land the potential for Aboriginal objects to present is very low. No further heritage investigations are required and work should proceed with caution. Contingency plans should be put in place to cover finds of unanticipated cultural material.



Chart 1: Due Diligence Process



## Recommendations

Based on this investigation, it is recommended that:

### Recommendation 1: Proposal to proceed without further archaeological input

The work described in this report can proceed without further assessment or approval from NSW National Parks and Wildlife Act 1974 as no Aboriginal objects or places have been identified as occurring within the Project Area and the potential of locating them during the proposed works is assessed as low. This recommendation is conditional upon recommendations 2 and 3.

### Recommendation 2: Discovery of unanticipated Aboriginal cultural material

All Aboriginal places and objects are protected under the NPW Act. This protection extends to Aboriginal objects and places that have not been identified but might be unearthed during construction. The following contingency plan describes the actions that must be taken in instances where Aboriginal cultural material any such discovery at the activity area must follow these steps:

1. **Discovery:** Should unanticipated Aboriginal cultural material be identified during any works, works must cease in the vicinity of the find.
2. **Notification:** OEH must be notified of the find.
3. **Management:** In consultation with OEH, the Tharawal Local Aboriginal Land Council and a qualified archaeologist, a management strategy should be developed to manage the identified Aboriginal cultural material. This may include the requirement to apply for an Aboriginal Heritage Impact Permit.
4. **Recording:** The find will be recorded in accordance with the requirements of the national Parks and Wildlife Act 1974 and OEH guidelines.

### Recommendation 3: Discovery of Unanticipated Human Remains

The following contingency plan describes the actions that must be taken in instances where human remains or suspected human remains are discovered. Any such discovery at the activity area must follow these steps:

1. **Discovery:** If suspected human remains are discovered all activity in the vicinity of the human remains must stop to ensure minimal damage is caused to the remains, and the remains must be left in place, and protected from harm or damage.
2. **Notification:** Once suspected human skeletal remains have been found, the Coroners Office and the NSW Police must be notified immediately. Following this, the find must be reported to OEH and it is recommended that it is also reported to the Tharawal Local Aboriginal Land Council.
3. **Management:** If the human remains are of Aboriginal ancestral origin an appropriate management strategy will be developed in consultation with Aboriginal Stakeholders and OEH.
4. **Recording:** The find will be recorded in accordance with the requirements of the national Parks and Wildlife Act 1974 and OEH guidelines.

### Recommendation 4: Report to Tharawal Local Aboriginal Land Council

A copy of this report should be sent to the Tharawal Local Aboriginal Land Council for their records.

Please contact me if you require further information.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'Ana Jakovljevic'.

**Ana Jakovljevic**

Archaeologist



## References

Biosis Research. 2009. Bulli Seam Operations Aboriginal Cultural Heritage Assessment. Report for BHP Billiton Illawarra Coal.

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## Appendices

## Appendix 1: Figures



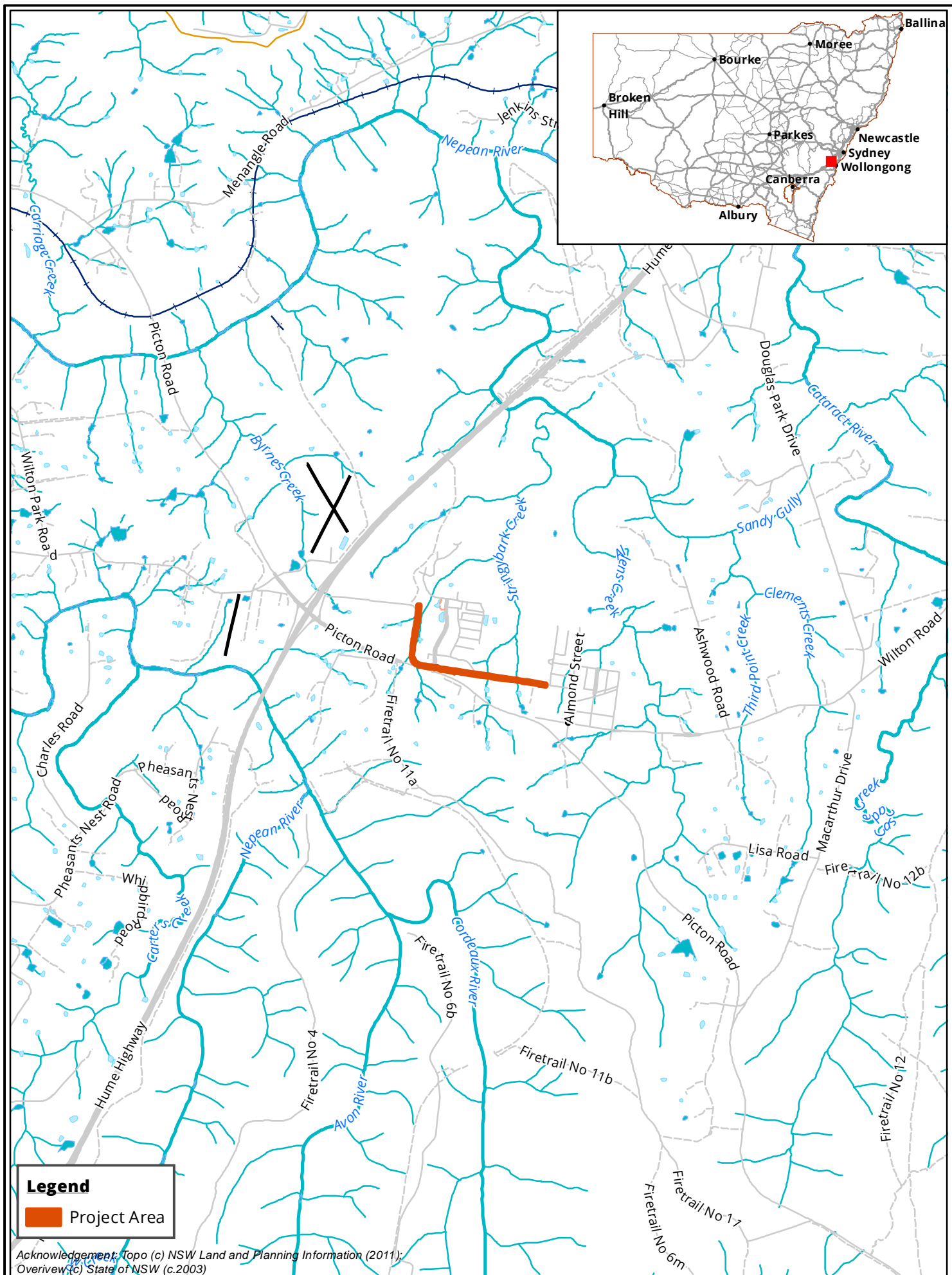


Figure 1: Location of the Project Area





#### Legend

- Alignment
- Project Area

**Figure 2: Proposed works**

0 40 80 120 160 200  
Metres

Scale: 1:4,500 @ A3  
Coordinate System: GDA 1994 MGA Zone 56



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Sydney, Wangaratta & Wollongong

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Location: P:\17000s\17036\Maping\17036\_F2\_Overview





- Legend**
- AHIMS Records
- Survey Area**
- Project Area

**Figure 3: AHIMS sites**

0 150 300 450 600 750  
Metres

Scale: 1:15,000 @ A3  
Coordinate System: GDA 1994 MGA Zone 56

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Sydney, Wangaratta & Wollongong



## Appendix 2: Aboriginal Consultation Documentation







# Wilton Rising Main: Flora and Fauna Assessment

Final REPORT

Prepared for Cardno

15 October 2013

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- Daniel Thompson
- Cassy Baxter

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- Ashleigh Pritchard for mapping

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# 1. Introduction

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## 1.1 Project background

Biosis Pty Ltd was commissioned by Cardno to undertake a flora and fauna assessment for the proposed alignment for the new Wilton Rising Main which will service the Bingara Gorge housing estate. The proposed alignment will be restricted to the road reserve to avoid the need for tree removal and minimise the risk of impact to flora and fauna. The proposed works will include excavation to a depth of approximately one metre a width of one metre, emplacement of material adjacent to the trench and associated construction movements.

This flora and fauna assessment will inform the Review of Environmental Factors (REF) being prepared by Cardno on behalf of Sydney Water. The REF will be prepared according to the requirements of Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

## 1.2 Scope of assessment

The objectives of this investigation are to:

- Identify and map vegetation communities;
- Assess the potential for the study area to support habitat for threatened flora and fauna species;
- Identify and map potential habitat for threatened flora and fauna;
- Identify the implications of state and federal biodiversity legislation and local policy and planning approvals relevant to the proposal;
- Assess potential impacts of the proposal on threatened flora and fauna species, populations and vegetation communities and their habitat;
- Recommend mitigation measures; and,
- Recommend any further assessments required.

## 1.3 Location of the study area

The study area is located in the town of Wilton, approximately 60 kilometres to the south west of the Sydney central business district (CBD) (Figure 1). The proposed alignment is restricted to the road reserve and follows Hornby Street west and crosses Pembroke Road and the entrance to Bingara Gorge and then follows part of Condell Park Road (Figure 2). The alignment crosses four intermittent streams which are upper tributaries to Stringybark Creek.

The study area is within the:

- Sydney Basin Bioregion;
- Nepean River Basin within the Hawkesbury Nepean Catchment Management Area (CMA); and,
- Wollondilly Shire Council Local Government Area (LGA).

The subject site is defined as the area of direct impact resulting from the proposed works and includes a 10 metre buffer from the centre of the proposed alignment. The study area includes the subject site as well as a further 10 metre buffer to the subject site to include the area of potential indirect impacts.



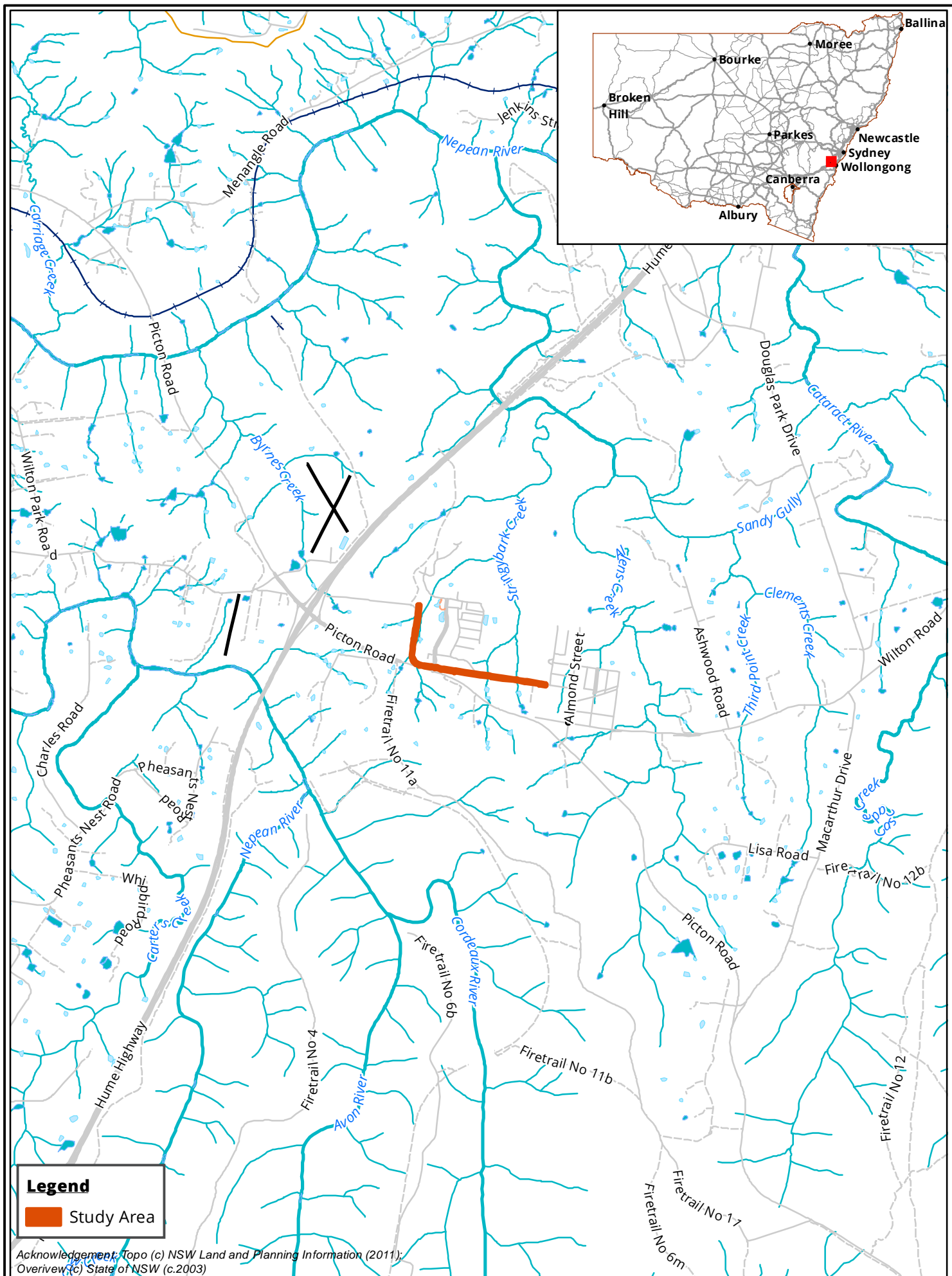
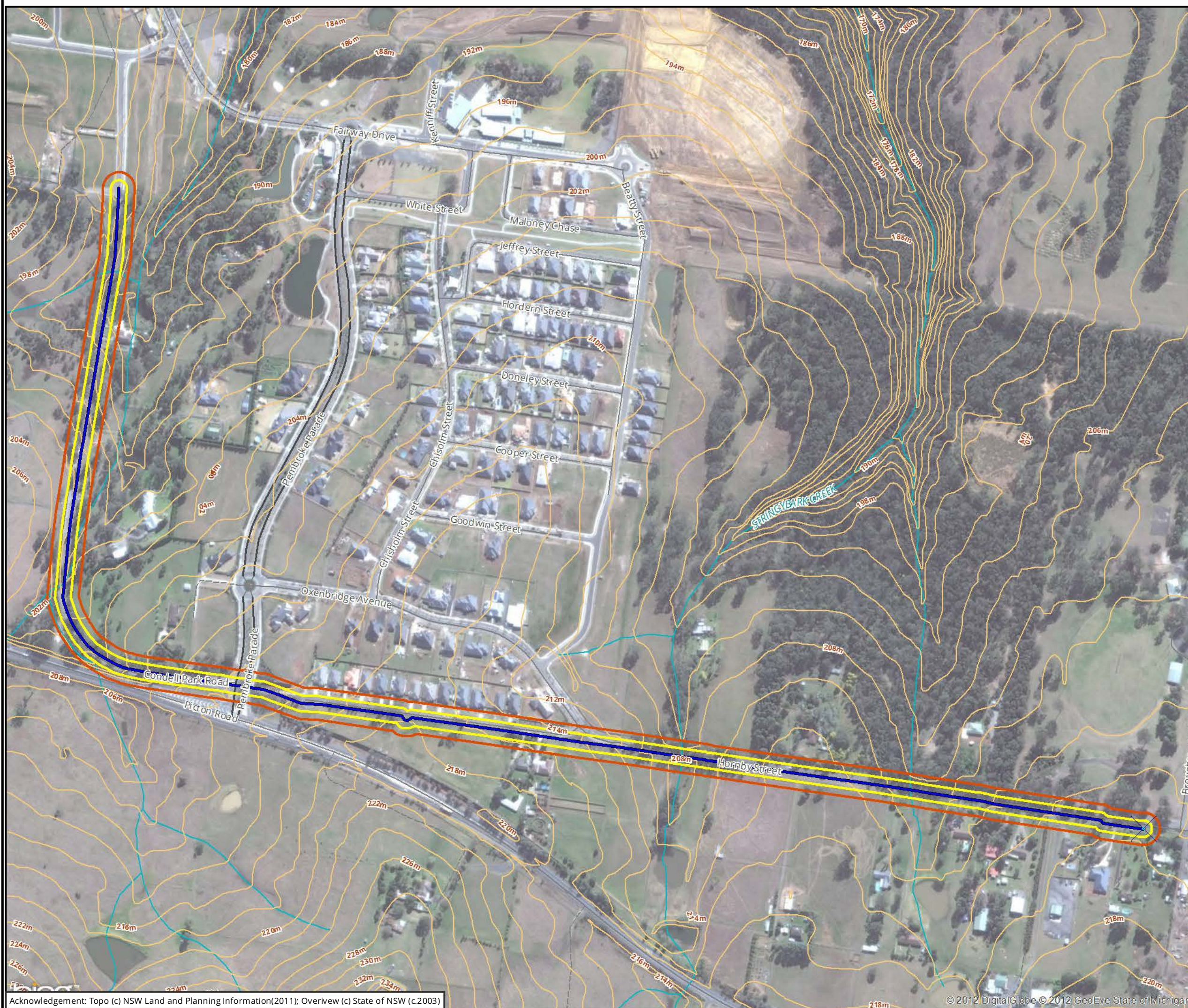


Figure 1: Location of the Study Area in a regional context





#### Legend

- Alignment
- Subject Site
- Study Area

**Figure 2: Study Area overview**

0 40 80 120 160 200  
Metres

Scale: 1:4,500 @ A3  
Coordinate System: GDA 1994 MGA Zone 56



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## 2. Methods

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### 2.1 Literature and database review

Background research conducted for this assessment has included;

- A search of the NSW Office of Environment and Heritage (OEH) Wildlife Atlas database to assess records of any threatened flora or fauna species populations or communities listed on the NSW *Threatened Species Conservation Act 1995* (TSC Act) within five kilometres of the study area (the locality);
- A search of Protected Matters Search Tool of the Australian Government Department of the Environment (DoE) for matters protected by the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) within the locality;
- Review of relevant OEH threatened species profiles and NSW Scientific Committee final determinations as well as DoE SPRAT profiles for threatened flora and fauna species and ecological communities potentially occurring within the study area; and,
- Review of the Cumberland Plain Vegetation Mapping (NPWS 2002).

### 2.2 Threatened Species likelihood of occurrence assessment

The likelihood for threatened species to occur has been determined based on the results of the field survey. This includes an assessment of the habitat observed within the study area against the known habitat requirements of threatened flora and fauna species identified as potentially occurring by the database searches and Biosis staff knowledge of the area. Any threatened species considered likely to occur within the study area have been further assessed to determine whether these species are at risk of impacts resulting from the proposal.

### 2.3 Site investigation

The field survey was undertaken on the 2 October 2013 over five hours by one ecologist. The study area for the proposed alignment was inspected and where this followed road reserves both sides of the road was traversed.

#### 2.3.1 Flora assessment

Characteristic flora species along the alignment were recorded and 400 square metre quadrats were surveyed to determine the vegetation communities present within the study area. Notes were made on general condition of native vegetation, the presence of weed species, evidence of management works, and the regeneration capacity of the vegetation.

Targeted surveys were conducted for threatened flora species identified by the background research as potentially occurring within the study area. Potential habitat for the following threatened species within the study area was traversed and searched:

- Small-flower Grevillea *Grevillea parviflora* subsp. *parviflora*;



- Bargo Geebung *Persoonia bargoensis*; and,
- Spiked Rice-flower *Pimelea spicata*.

### 2.3.2 Fauna assessment

The fauna survey included an assessment of types and quality of habitat available for fauna species taking into account such factors as the density of vegetation within structural layers, logs and leaf litter on the ground, the presence of hollow bearing trees and connecting habitat.

### 2.3.3 Permits and Licenses

The flora and fauna assessment was conducted under the terms of Biosis Scientific Licence issued by the Office of Environment and Heritage under the *National Parks and Wildlife Act* (SL100758, expiry date 31 March 2015).

## 2.4 Qualifications

Ecological surveys provide a sampling of flora and fauna at a given time and season. There are a number of reasons why not all species will be detected at a site during survey, such as species dormancy and seasonal conditions. In terms of assessing the general biodiversity values of the study area these factors do not present a significant limitation.

Database searches and associated conclusions on the likelihood of species to occur within the study area are reliant upon external data sources and information managed by third parties.

## 2.5 Legislation and policy

The implications for the project were assessed in relation to key biodiversity legislation and policy including:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- *Environmental Planning and Assessment Act 1979* (EP&A Act), including:
- *Threatened Species Conservation Act 1995* (TSC Act);
- *Noxious Weeds Act 1993* (NW Act);
- *Water Management Act 2000* (WM Act) and,
- *Fisheries Management Act 1994* (FM Act).

## 2.6 Mapping

Cardno supplied aerial photography and data showing the alignment for the proposed works. Mapping was conducted using hand-held (uncorrected) GPS units and aerial photo interpretation. The accuracy of this mapping is therefore subject to the accuracy of the GPS units (generally  $\pm 5$  metres) and dependent on the limitations of aerial photo rectification and registration.

Mapping has been produced using a Geographic Information System (GIS). Electronic GIS files which contain our flora and fauna spatial data are available to incorporate into design concept plans; however, this mapping may not be sufficiently precise for detailed design purposes.

## 3. Results

Flora species recorded during the field survey are listed in Appendix 1. The ecological features of the study area are described below and mapped in Figure 3. Threatened flora and fauna species previously recorded within the locality are shown in Figure 4 and Figure 5.

### 3.1 Vegetation & fauna habitat

The landscape surrounding the study area is characterised by agricultural and peri-urban land use with new areas of urban development as part of the Bingara Gorge housing estate. The proposed alignment is predominately within the existing road reserve. The study area includes the paved road, the disturbed road edge and small areas of native vegetation. Native vegetation includes clumped trees, generally with a degraded and weedy understorey as well as the edge of a large patch of connected bushland along Stringybark Creek. Cleared areas between patches of native vegetation are dominated by exotic grasses. The study area supports a range of ecological features including patches of native forest, scattered trees and intermittent drainage lines. Ecological features of the study area are shown in Figure 3 and are described below.

**Cumberland Plain Woodland** occurs along the Hornby Street portion of the study area (Plate 1). The dominant canopy species throughout this area is Grey Box *Eucalyptus moluccana*, with Forest Red Gum *Eucalyptus tereticornis* occurring along drainage lines and Thin-leaved Stringybark *Eucalyptus eugenioides* occurring as scattered individuals. The canopy reaches up to 25 metres and in places, is connected to the large patch of bushland associated with Stringybark Creek. Elsewhere, the canopy occurs as isolated stands or individual trees. The shrub layer is patchy, up to three metres in height and is dominated by Native Blackthorn *Bursaria spinosa* ssp. *spinosa* and Green Wattle *Acacia irrorata*. Other common shrub species are Australian Indigo *Indigofera australis*, Hickory Wattle *Acacia implexa*, and Wallaby Weed *Olearia viscidula*. Small-leaved Privet *Ligustrum sinense* dominates the shrub layer in moist areas where drainage lines cross the study area. The ground layer vegetation is dominated by weed species at bushland edges including, African Lovegrass *Eragrostis curvula*, Paspalum *Paspalum dilatatum* and Lamb's Tongues *Plantago lanceolata*. Native species occurring throughout the ground layer are Weeping Grass *Microlaena stipoides* var. *stipoides*, Kangaroo Grass *Themeda australis*, Three Awn Speargrass *Aristida vagans* and Blue Trumpet *Brunoniella australis*.

Larger stands of this community, particularly the large patch of bushland associated with Stringybark Creek to the north of the study area, may provide habitat for woodland birds, including the threatened Varied Sittella *Daphoenositta chrysoptera*, Scarlet Robin *Petroica boodang* and Diamond Firetail *Stagonopleura guttata* as well as foraging and roosting habitat for microchiropteran bats (microbats).

Although there are mature trees, no hollows were recorded within this community. The ground layer does not include significant fallen logs; however, a dense cover of grasses mixed with accumulations of woody debris at the base of trees, particularly Forest Red Gum provides a diversity of habitat for ground dwelling fauna species and the threatened Cumberland Plain Land Snail *Meridolum corneovirens*.

The community is in moderate condition where the study area adjoins bushland and poor condition in areas where trees occur as isolated clumps or individual trees. Edge effects have caused weed invasion particularly in the ground layer.



**Plate 1: Mature Grey Box within the Cumberland Plain Woodland**

A review of NPWS (2002) mapping has shown the area is mapped as Shale Sandstone Transition Forest however the current survey has found this vegetation to be representative of Shale Plains Woodland as described by NPWS. While a large proportion of the native flora species present are common to both these communities, the dominance of Grey Box indicates the vegetation is representative of Shale Plains Woodland. Shale Plains Woodland equates to the TSC Act listed Threatened Ecological Community (TEC), Cumberland Plain Woodland. Cumberland Plain Woodland that is connected to adjoining bushland complies with the criteria for the EPBC Act listed TEC Cumberland Plain Shale Woodland and Shale-Gravel Transition Forest as detailed in the EPBC Policy Statement 3.31.

**Shale Sandstone Transition Forest** occurs along the Condell Park Road portion of the study area (Plate 2). The dominant canopy species throughout this area is Forest Red Gum which is present as clumps of trees or individual trees to 25 metres. Rough-barked Apple *Angophora floribunda* occurs in an isolated stand of mature trees at the northern extent of the study area. The shrub layer is absent within this community for much of the study area, although Native Blackthorn forms a dense shrub layer along approximately 50 metres of the alignment on the north side of Condell Park Road, west from the entrance to the Bingara Gorge housing estate. Native Blackthorn is the dominant shrub species below the stand of Rough-barked Apple, forming a sparse shrub layer in this area. Tick Bush *Kunzea ambigua* and Australian Indigo are also present. One stand of Forest Red Gum on the southern side of the alignment, at the bend in Condell Park Road, is festooned with Wonga Wonga Vine *Pandorea pandorana*. The weed species, Blackberry *Rubus fruticosus*, occurs in patches throughout the community. The majority of this species appears to be treated with herbicide and is present as dead woody brambles. The ground layer is dominated by exotic grasses for the majority of the community. Common native grasses are Blady Grass *Imperata cylindrica*, Kangaroo Grass and Three Awn Speargrass. These species are concentrated in areas where native canopy trees are clumped. Common exotic ground layer species are Lambs Tongues, Paspalum and African Love Grass.





**Plate 2: Clump of Rough-barked Apple within the Shale Sandstone Transition Forest**

The habitat provided by the community within the study area is part of a patchy disconnected network with no direct connection to any significant areas of bushland. The mature canopy trees provide foraging resources and a stepping stone for a range of more mobile native fauna in a landscape of cleared pasture, road sides and urban areas. Two hollow bearing trees were recorded (Figure 3). These are both mature Forest Red Gum and include one observed hollow each measuring approximately 10 centimetres across. These hollows provide potential habitat for a range of fauna species including microbats, birds and arboreal mammals. The Blackberry brambles appear to be providing shelter for feral Rabbits *Orictolagus cuniculus* which were observed during the survey. The ground layer throughout the majority of the community within the study area provides limited habitat due to a lack of dead wood, leaf litter or other material. The grasses throughout community are maintained by mowing or are sparse near the road edges.

The community is in poor condition. Edge effects have caused weed invasion particularly in the ground layer. Where native trees are clumped the canopy and shrub layers are dominated by native species. The ground layer is dominated by weed species throughout.

A review of NPWS (2002) mapping shows the area to be mapped as Shale Sandstone Transition Forest. The current survey has found this vegetation to be representative of Shale Sandstone Transition Forest as described by NPWS. The areas dominated by Forest Red Gum are characteristic of a simplified form of Shale Sandstone Transition Forest (Low Sandstone Influence) (NPWS 2002). No sandstone outcropping is evident in these areas and the species present do not indicate a high sandstone influence. The northern extent of the study area is characteristic of Sandstone Transition Forest (High Sandstone Influence) (NPWS 2002). Sandstone boulders at the surface are evident, although sparsely distributed. The presence of Rough-barked Apple as well as Black She-Oak *Allocasuarina littoralis* and Tick Bush also indicate a sandstone influence. The Shale Sandstone Transition Forest within the study area equates to both the TSC and EPBC Act listed community.

**Exotic Closed Grassland** occurs throughout the study area between patches of native vegetation. Exotic grasses Kikuyu *Pennisetum clandestinum*, Paspalum and *Phalaris aquatica* dominate, with exotic species Lambs Tongues, Cats Ear *Hypochaeris radicata* White Clover *Trifolium repens* and Fireweed *Senecio madagascariensis* common throughout.

The community provides some foraging resources for grazing fauna including macropods as well as feral Rabbits. A lack of fallen logs, leaf mulch or other material provides very limited fauna habitat.

The Exotic closed grassland is in poor condition, the area is dominated by exotic species and very few native species are regenerating.

**Planted vegetation** occurs at the Bingara Gorge estate entrance. This includes mass plantings of common horticultural species including Chines Weeping Elm, *Ulmus parviflora*, Manchurian Pear *Pyrus calleryana* and Chinese Tallow *Sapium sebiferum*, as well as planted native species Plum Pine *Podocarpus elatus* and Lemon Scented Gum *Coymbia citriodora*. The ground layer is densely planted with native species Spiny-headed Mat Rush *Lomandra longifolia* and Blue Plax Lily *Dianella caerulea*. Regular garden maintenance is evident as the community is free of weeds and mulched throughout.

The planted vegetation provides limited potential habitat for native fauna as this area does not present the diversity of sheltering or foraging habitat of a natural area.

**Intermittent drainage lines** associated with Stringybark Creek cross the study area at four points (Plate 3 and Plate 4). These are natural swales within exotic grassland above the study area and adjoin culverts below Hornby and Condell Park Roads. All four drainage lines were dry with no pools of standing water above the study area at the time of the survey. Standing water was observed in pools below the culvert at two of the drainage lines, this is likely to be due to water pooling in scoured out sections of the drainage line directly below the culvert. The riparian vegetation is predominately exotic grasses with the native sedge *Juncus usitatus* scattered. Where one drainage line crosses Hornby Road and adjoins the patch of bushland associated with Stringybark Creek woody weeds, predominately Small-leaved Privet form a dense thicket at the edges with a canopy of Forest Red Gum.

The intermittent drainage lines provide a diversity of fauna habitat including a dense ground layer of predominately exotic grasses as well as some native sedges, standing water and/or increased soil moisture. No dead wood or built up leaf litter was observed within the drainage lines of the study area. The intermittent drainage lines provide potential habitat for a range of fauna including frogs, reptiles, birds and mammals. The culverts may provide potential roosting habitat for microbats. The culverts were inspected and no bats were recorded at the time of the survey.



**Plate 3: Intermittent drainage line above (to the south of) Hornby Road**



**Plate 4: Intermittent drainage line below (to the north of) Hornby Road**

## 3.2 Threatened species

The likelihood for threatened flora and fauna species occurring within the study area and the potential for these to be impacted by the proposal has been assessed. The full results of the database searches can be provided upon request.

### 3.2.1 Threatened flora

Threatened flora species identified by the database search as being likely to occur within the study area are listed in Table 1 below.

**Table 1: Summary of threatened flora species likely to occur in the study area**

Name	Common name	EPBC Act	TSC Act	Habitat Values within Study Area	Further Assessment Required?
<i>Persoonia bargoensis</i>	Bargo Geebung	Vulnerable	Endangered	Patches of vegetation with native shrub layer intact	No
<i>Grevillea parviflora</i> subsp. <i>parviflora</i>	Small-flower Grevillea	Vulnerable	Vulnerable	Patches of vegetation with native shrub layer intact	No
<i>Pimelea spicata</i>	Spiked Rice-flower	Endangered	Endangered	Patches of vegetation with native shrub layer intact	No

Targeted searches for the threatened flora species listed in Table 2 have been conducted as part of the field survey. These conspicuous species were not recorded within the study area and are considered unlikely to occur. No further assessment is required for threatened flora species.

### 3.2.2 Threatened fauna

Threatened flora species identified by the database search as being likely to occur within the study area are listed in Table 2 below.

**Table 2: Summary of threatened fauna species likely to occur in the study area**

Name	Common name	EPBC Act	TSC Act	Habitat Values within Study Area	Further Assessment Required?
<i>Meridolum corneovirens</i>	Cumberland Plain Land Snail		Vulnerable	Ground layer below canopy trees where clumped grasses, leaf litter and bark provide potential shelter	No
<i>Hieraetus</i>	Little Eagle		Vulnerable	Mature Canopy Trees	No



Name	Common name	EPBC Act	TSC Act	Habitat Values within Study Area	Further Assessment Required?
<i>morphnoides</i>					
<i>Petroica boodang</i>	Scarlet Robin		Vulnerable	Mature Canopy Trees	No
<i>Daphoenositta chrysoptera</i>	Varied Sittella		Vulnerable	Mature Canopy Trees	No
<i>Stagonopleura guttata</i>	Diamond Firetail		Vulnerable	Mature Canopy Trees particularly those adjoining bushland associated with Stringybark Creek	No
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Vulnerable	Vulnerable	Clumps of native canopy trees, particularly areas adjoining the patch of bushland along Stringybark Creek.	No
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle		Vulnerable	Roosting and foraging habitat Mature Canopy Trees particularly those adjoining bushland associated with Stringybark Creek	No
<i>Miniopterus schreibersii oceanensis</i>	Eastern Bent-wing-bat		Vulnerable	Potential roosting habitat in culverts and foraging habitat particularly in native vegetation adjoining bushland associated with Stringybark Creek	No
<i>Mormopterus norfolkensis</i>	Eastern Freetail Bat		Vulnerable	Foraging habitat Canopy Trees particularly those adjoining bushland associated with Stringybark Creek. Roosting habitat in Hollow bearing trees.	No
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat		Vulnerable	Foraging habitat Canopy Trees particularly those adjoining bushland associated with Stringybark Creek. Roosting habitat in Hollow bearing trees.	No

Name	Common name	EPBC Act	TSC Act	Habitat Values within Study Area	Further Assessment Required?
<b><i>Pteropus poliocephalus</i></b>	Grey-headed Flying Fox	Vulnerable	Vulnerable	Potential foraging habitat provided by mature Eucalypts	No

With the exception of the Cumberland Plain Land Snail, potential habitat for all threatened fauna species identified as being likely to occur within the study area is provided by the trees present. As the proposal will not require the removal of any trees and is unlikely to impact any trees the potential habitat for these species will not be at risk of impact. With regard to the Cumberland Plain Land Snail, potential habitat for this species has been identified within the study area and is mapped in Figure 3. As the majority of the alignment is within a paved road reserve, potential impact to this species can be avoided. Mitigation measures provided below will ensure impacts to potential habitat for Cumberland Plain Land Snail including indirect impacts resulting from construction works are avoided.

Providing mitigation measures detailed in Section 4 below are implemented, the proposed works are unlikely to have a significant impact on threatened fauna species potentially occurring within the study area. Considering key factors for the assessment of threatened species as detailed in the Section 5A EP&A Act Assessment of Significance (7 part-test), the proposed works will not:

- Adversely affect stages of the lifecycle of any threatened species;
- Result in a loss or disturbance of limiting foraging or breeding resources; or,
- Result in fragmentation of limiting habitat for any threatened species.

As such a Species Impact Statement (SIS) is not required for threatened fauna species considered likely to occur within the study area.

With regard to EPBC listed threatened fauna species likely to occur within the study area, Grey-headed Flying Fox and Large-eared Pied Bat the EPBC Significant Impact Criteria for Vulnerable species have been considered. The proposed works are unlikely to have a significant impact on these species as:

- The study area is not considered to include an important population for either species as records do not indicate a key population present and the locality is not at the limit of the range for either species;
- The study area does not provide limiting habitat for either species;
- The proposed works are not expected to reduce habitat for either species;
- The proposed works will not interfere with the recovery of either species; and,
- The proposed works are not expected to introduce disease that will cause the species to decline.

### 3.3 Threatened Ecological Communities

The study area includes two TEC's as shown in Figure 3:

- Cumberland Plain Woodland – listed as Critically Endangered under the TSC and EPBC Act (listed as Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest under the EPBC Act).
- Shale Sandstone Transition Forest – listed as Endangered under the TSC and EPBC Act.

While the proposal does not require the removal of native trees or native vegetation from TEC's listed above, Assessments of Significance as detailed in Section 5A of the EP&A Act have been conducted for these communities given that some understory may be removed which have been included in Appendix 2.

The Assessments of Significance have concluded, providing mitigation measures detailed in Section 4 are implemented, the proposed works are unlikely to have a significant impact on TEC's Cumberland Plain Woodland or Shale Sandstone Transition Forest. As such a SIS is not required for these TEC's.

With regard to Cumberland Plain Woodland and Shale Sandstone Transition Forest being listed under the EPBC Act, the Significant Impact Criteria for Endangered and Critically Endangered Ecological Communities has been considered. The proposed works will not have a significant impact on these communities as:

- The proposed works will not reduce the extent or increase fragmentation of the native vegetation within the study area;
- The proposed works will not modify the landscape or cause any disturbance to natural processes such as hydrology, that is expected to result in a significant change to the native vegetation within the study area;
- The proposed works will not introduce fertilisers, herbicide, or other chemicals or pollutants to the landscape that may be detrimental to the native vegetation within the study area; and,
- The proposal will not interfere with the recovery of either community.

### 3.4 Intermittent Drainage Lines

The proposed alignment crosses four intermittent drainage lines as described in Section 3.1 and shown in Plate 3 and Plate 4. The locations of these drainage lines are shown in Figure 2. These drainage lines are first or second order drainage lines associated with Stringybark Creek. The proposal will require trenching within these drainage lines. Once the trench is filled and the area is rehabilitated the profile of the drainage line will remain unchanged. As the REF for the proposed works will be submitted on behalf of Sydney Water the proposal work will not require a Controlled Activity Approval under the WM Act as public authorities are exempt from requiring this approval. Mitigation measures are provided in Section 4.1 to ensure the drainage lines are stabilised and that the proposed works will not cause siltation downstream of the study area.

Consultation has been conducted with Department of Fisheries. The drainage lines within the study area are not mapped as Key Fish Habitat, therefore no further consultation is required with the DPI Fisheries.



### 3.5 Noxious Weeds

The study area includes two noxious weeds listed under the NW Act for Wollondilly Shire LGA (Figure 3);

- Bridal Creeper *Asparagus asparagoides* – Class 4; The legal requirement for this species according to the NSW Department of Primary industries is, *The plant must not be sold propagated or knowingly distributed.*
- Blackberry *Rubus fruticosus* – Class 4; The legal requirement for this species according to the NSW Department of Primary industries is, *The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its reproduction and the plant must not be sold propagated or knowingly distributed.*

The management of noxious weeds is the responsibility of the land owner. In this case this responsibility is that of Wingecarribee Shire Council; however, care must be taken to ensure the proposed works do not further spread these or other weed species.

Where Bridal Creeper occurs within the subject site this will need to be controlled prior to trenching in order to prevent the spread of this weed. Bridal Creeper has a woody crown as well as fruits that if left in the soil or dispersed within the study area or offsite are likely to proliferate. Inadvertently burying the plants below soil when rehabilitating the area following the installation of the sewer main is likely to make this weed more difficult to manage in future. Bridal Creeper generally occurs within the study area as small plants, often amongst native vegetation. The most appropriate control method for Bridal Creeper in this situation is manual removal of the crowns and disposing of the crown and fruits at an appropriate waste facility. Bridal Creeper can also be spot sprayed using diluted Glyphosate during the active growing season in spring and summer however this method may take several applications over a period of weeks to be completely effective.

Information on the management of Bridal Creeper is available at the following website:

<http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles/bridal-creeper>

Blackberry within the subject site occurs as small infestations and appears to have been buried and is recovering following the construction of a new footpath along the south side of Hornby Street. The most appropriate control method for Blackberry within the study area is to cut back stems to remove the bulk of the plant which should then be taken offsite. New succulent shoots will grow rapidly and should be sprayed with diluted Glyphosate or can be treated with concentrated Glyphosate using the scrape and paint method. This is best done during the warmer months as new shoots will be more susceptible to the poison.

Information on the management of Blackberry is available at the following website:

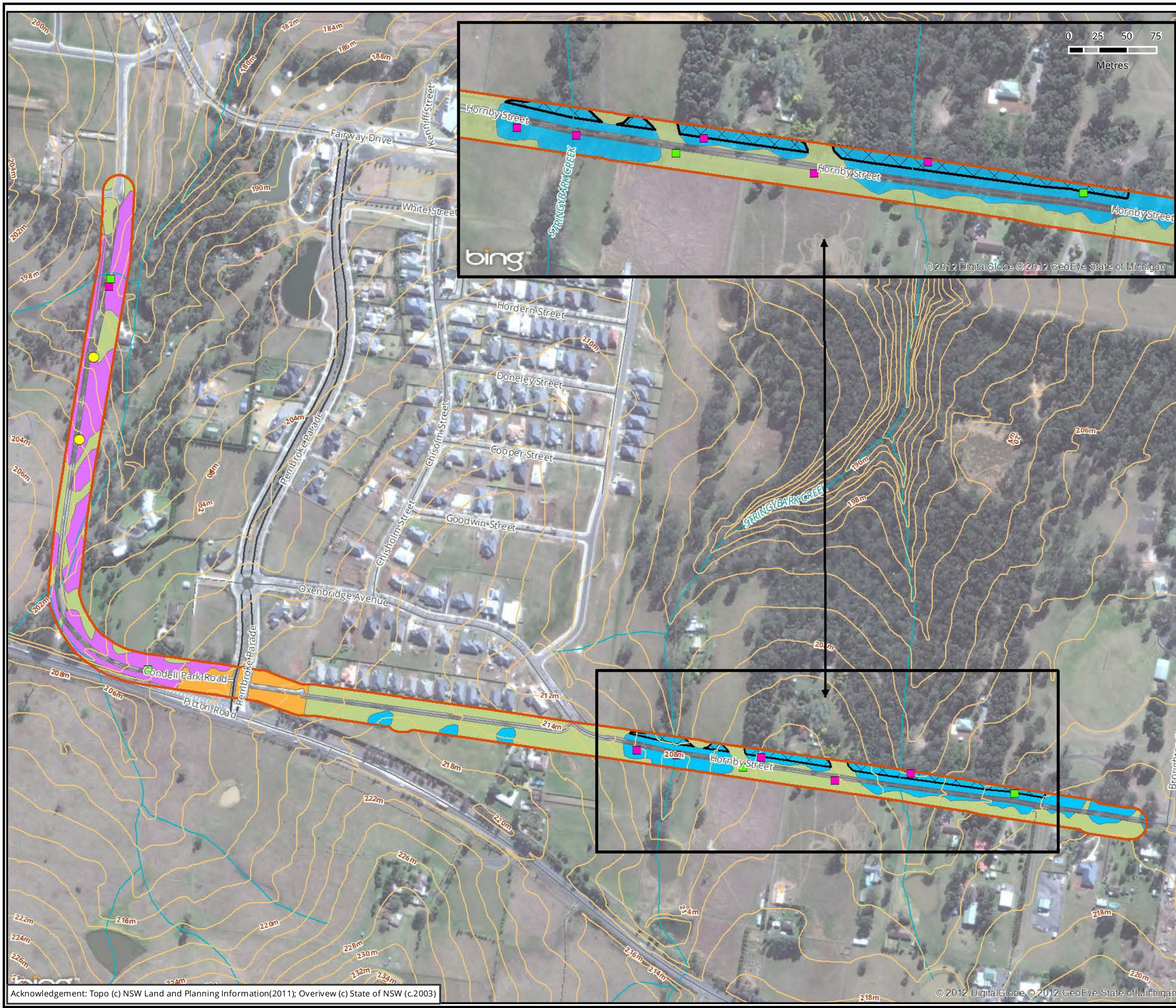
<http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/profiles/blackberry>

These herbicide recommendations are made subject to the product being registered for that purpose under relevant legislation. It is the user's responsibility to check that registration or an off-label permit covers the proposed use.

Further information regarding herbicides is available at the Australian Pesticides and Veterinary Medicines Authority (APVMA) website [www.apvma.gov.au](http://www.apvma.gov.au).

The use of herbicides for weed control within the study area is only to be conducted by a suitably qualified bush regeneration contractor.





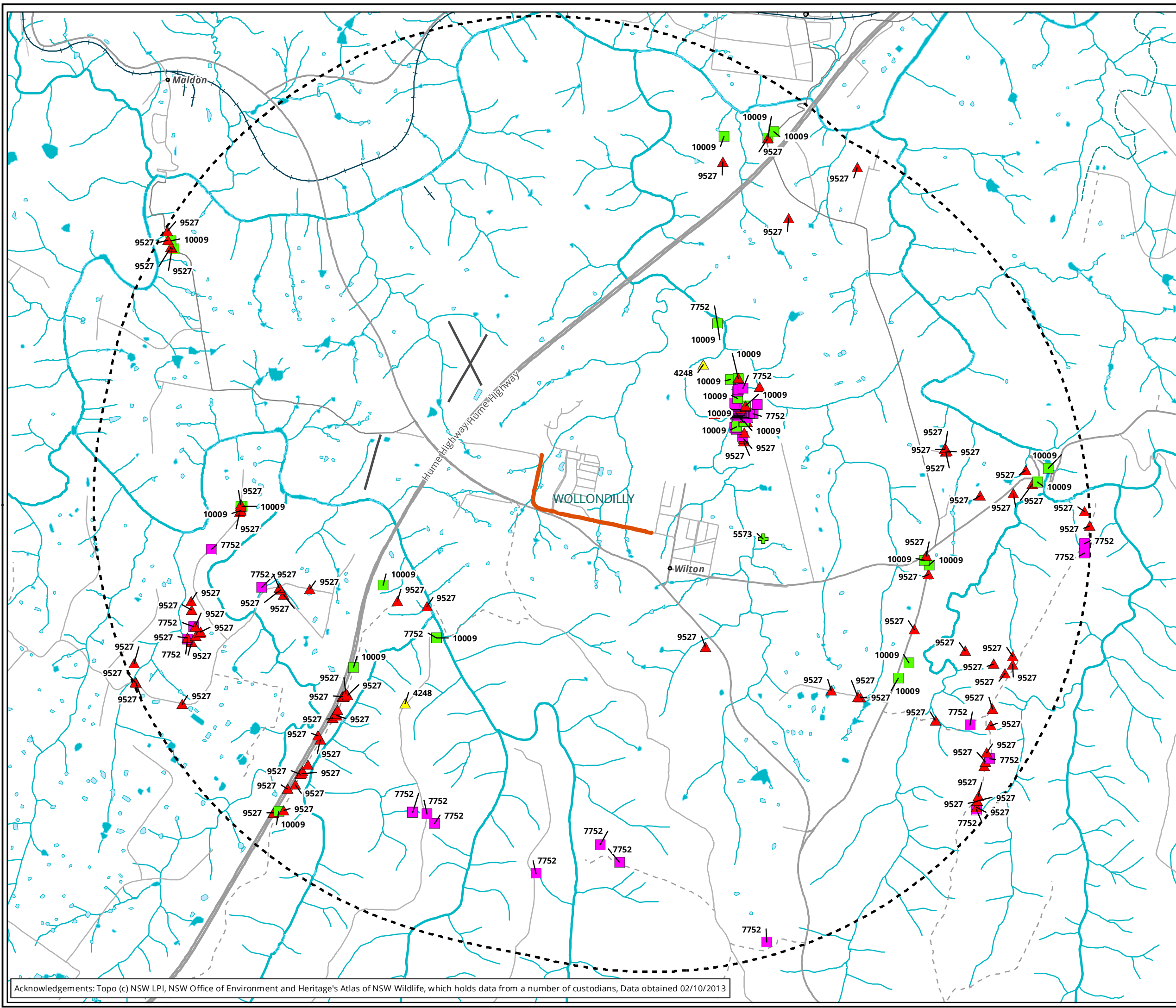
- Legend**
- Vegetation Communities**
- Cumberland Plain Woodland
  - Exotic Closed Grassland
  - Planted/Exotic
  - Shale Sandstone Transition Forest
- Significant fauna habitat**
- Hollow bearing trees
  - Cumberland Plain Land Snail potential habitat
- Noxious Weeds**
- Blackberry
  - Bridal Creeper
- Survey Area**
- Study Area

**Figure 3: Vegetation, significant fauna habitat and noxious weeds of the study area**

0 40 80 120 160 200  
Metres  
Scale: 1:4,500 @ A3  
Coordinate System: GDA 1994 MGA Zone 56

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**Legend**

**Threatened Flora**

- 10009; *Grevillea parviflora* subsp. *parviflora*
- 4248; *Melaleuca deanei*
- 5458; *Persoonia hirsuta*\*
- 5573; *Pomaderris brunnea*
- 7752; *Epacris purpurascens* var. *purpurascens*
- 9527; *Persoonia bargoensis*
- 9615; *Pterostylis saxicola*\*

**Survey Area**

- Study Area
- Search area

\* Record is listed as sensitive under OEH's Sensitive Species Data Policy and cannot be shown at this scale

**Figure 4: TSC Act threatened flora records within 5km of the Study Area**

0 400 800 1,200 1,600 2,000  
Metres

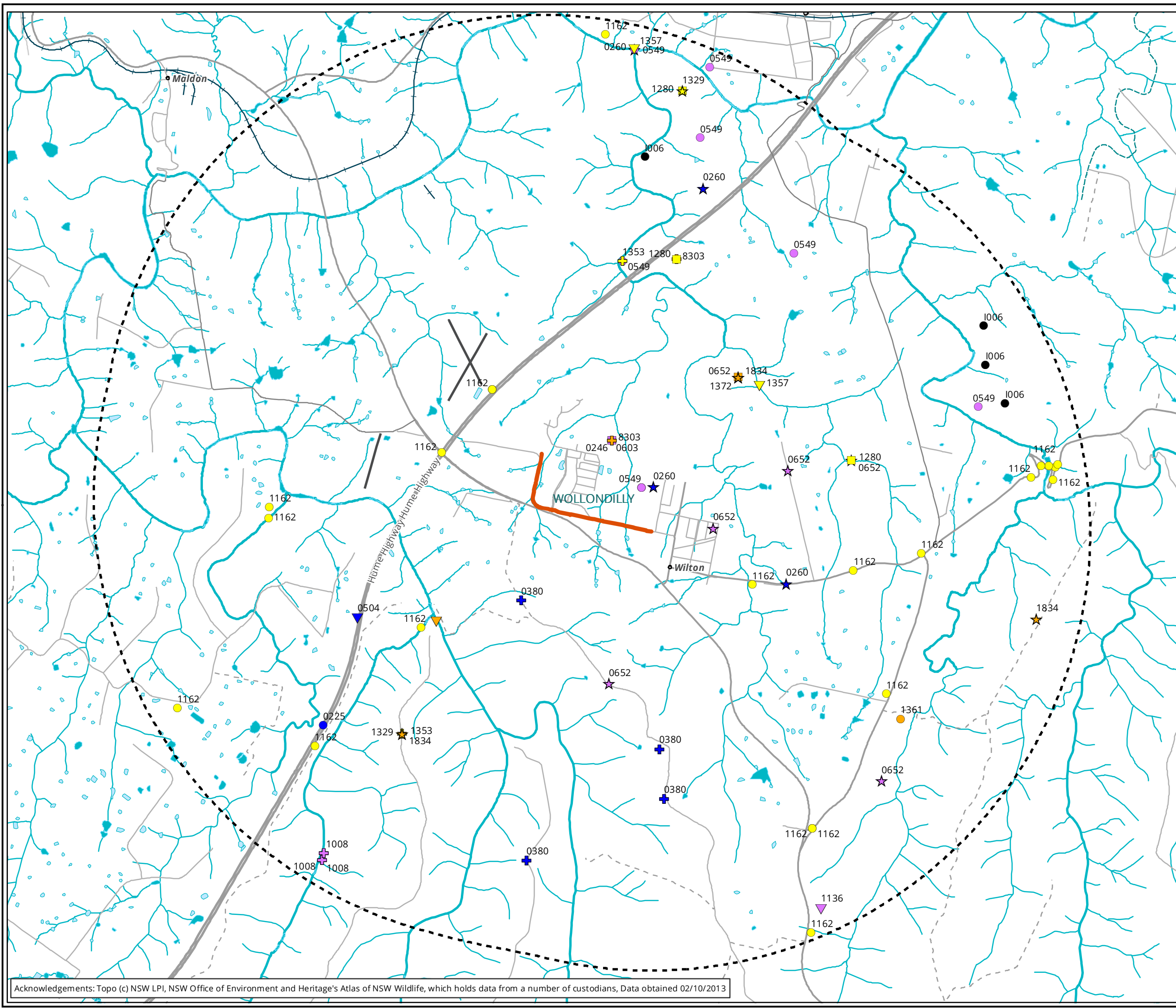
Scale: 1:40,000 @ A3  
Coordinate System: GDA 1994 MGA Zone 55



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Matter:  
Date: 04 October 2013,  
Checked by: BC, Drawn by: ANP, Last edited by: apritchard  
Location: P:\17000s\17029\Map\17029\_F4\_ThrFlora





**Legend**

**Threatened Fauna**

- 0225, Little Eagle
- 0246, Barking Owl
- 0248, Powerful Owl\*
- ★ 0260, Little Lorikeet
- 0265, Glossy Black-Cockatoo\*
- 0302, Turquoise Parrot\*
- 0309, Swift Parrot\*
- ⊕ 0380, Scarlet Robin
- ▼ 0504, Speckled Warbler
- 0549, Varied Sittella
- 0603, Regent Honeyeater
- ★ 0652, Diamond Firetail
- ⊕ 1008, Spotted-tailed Quoll
- ▼ 1136, Yellow-bellied Glider
- 1162, Koala
- 1280, Grey-headed Flying-fox
- ★ 1329, Eastern Freetail-bat
- ⊕ 1353, Large-eared Pied Bat
- ▼ 1357, Southern Myotis
- 1361, Greater Broad-nosed Bat
- 1372, Eastern False Pipistrelle
- ★ 1834, Eastern Bentwing-bat
- ⊕ 8303, Black-chinned Honeyeater (eastern subspecies)
- ▼ Macquarie perch
- 1006, Cumberland Plain Land Snail

**Survey Area**

- Study Area
- Search area

*\* Record is listed as sensitive under OEH's Sensitive Species Data Policy and cannot be shown at this scale*

**Figure 5: TSC Act threatened fauna records within 5km of the Study Area**

0 400 800 1,200 1,600 2,000  
Metres  
Scale: 1:40,000 @ A3  
Coordinate System: GDA 1994 MGA Zone 55

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## 4. Recommendations and Conclusion

### 4.1 Mitigation measures

The following measures are required to minimise impacts to retained native vegetation and fauna habitat. These measures should be included within the Environmental Management Plan (EMP) for the construction works.

**Table 3: Recommended mitigation measures**

Activity	Mitigation measure
<b>Prior to construction works.</b>	<p>Locate the alignment outside of mapped areas of native vegetation (Figure 3) where possible. This could be achieved by positioning the alignment within the cleared road verge on the opposite side of the road to areas of native vegetation and where native trees or native vegetation occurs on both sides of the road, positioning the alignment down the middle of the road reserve. This would require positioning the alignment along the southern side of the road for the majority of the Hornby Road portion of the study area and positioning the alignment down the centre of Condell Park Road.</p> <p>Clearly define the boundaries of TEC's and potential habitat for Cumberland Plain Land Snail on construction plans and in the field using brightly coloured para-webbing (or similar) prior to the commencement of works. These areas should be identified as "no go zones" to ensure indirect impacts relating to the construction phase of the project are avoided.</p> <p>A five metre buffer either side of intermittent streams is required to be clearly delineated onsite using brightly coloured tape or para-webbing to identify these areas as riparian buffers.</p> <p>Designate areas away from "no go zones" and riparian buffers for storage of soil/fill, other materials, machinery and vehicular access.</p> <p>Install sediment control within intermittent streams and down stream of trenching or any other soil disturbance prior to the commencement of works.</p>
<b>During construction works.</b>	<p>"No go zones" are clearly defined and no access is allowed to these areas. No storing of materials, equipment, fuel or soil is allowed in these areas.</p> <p>Riparian buffer areas are clearly defined and no storing of fuels, equipment or soils is allowed in the riparian buffer.</p> <p>Install sediment control around any areas of soil disturbance resulting from the works and any stockpiles of soil. Maintain sediment controls throughout the construction works.</p> <p>Noxious weeds within the subject site must be treated using appropriate control measures detailed in Section 3.4.</p>

Activity	Mitigation measure
	Any trimming of tree roots required must be undertaken by a qualified arborist.
<b>Remediation works</b>	<p>Cover any bare soil following the filling of the trench with mulch or turf in areas of exotic closed grasslands to ensure soil is stabilised.</p> <p>Implement maintenance and weed control programs to ensure weeds are controlled within remediated areas.</p>
<b>Communication</b>	All contractors conducting vegetation removal and maintenance must be made aware through site inductions, tool box talks and the EMP of the biodiversity values of the study area, particularly the presence of the TEC's Cumberland Plain Woodland and Shale Sandstone Transition Forest and the potential habitat for Cumberland Plain Land Snail.

The principal means to reduce impacts on biodiversity values within the study area will be to ensure trees and areas of native vegetation are identified and managed as "no go zones".

## 4.2 Conclusion

A flora and fauna assessment has been conducted for the study area for the proposed Sewer main at Bingara Gorge housing estate, Wilton. Eleven threatened fauna species are considered likely to occur within the study area, while TEC's Cumberland Plain Woodland and Shale Sandstone Transition Forest occur. Providing the mitigation measures recommended are implemented, impacts to threatened species and TEC's will be avoided. The proposal has been considered against the factors outlined in Section 5A of the EP&A Act. This assessment concludes the proposal is unlikely to have a significant impact on threatened fauna species considered likely to occur or TEC's within the study area. As such a SIS is not required.

The EPBC Significant Impact Criteria for Vulnerable species as well as Critically Endangered and Endangered ecological communities have also been considered in regard to the potential impact of the proposal. This assessment concluded the proposal does not meet any of the EPBC Act Significant Impact Criteria and as such a referral of the proposal to Department of the Environment is not required.

The proposal will require works within four intermittent drainage lines associated with Stringybark Creek. As the REF is being prepared on behalf of a public authority a Controlled Activities Approval under the WM Act is not required. As the study area does not include Key Fish Habitat no consultation with the DPI Fisheries will be required.



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## Appendices

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# Appendix 1: Flora species inventory

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Notes to tables:

<b>EPBC Act:</b>	<b>TSC Act:</b>
CR - Critically Endangered	C1 – critically endangered
EN - Endangered	E1 – endangered (Part 1, Schedule 1)
VU - Vulnerable	E2 – endangered (Part 2, Schedule 1)
	E4 – presumed extinct (Part 4, Schedule 1)
	V1 – vulnerable (Part 1, Schedule 2)
# - Native species outside natural range	
** - noxious weed species declared under the Noxious Weeds Act 1993	



## A1.1 Flora species recorded from the study area

**Table 4: Flora species recorded from the study area.**

Status	Scientific name	Common name	CPW Q1	CPW Q2	SSTF Q1	SSTF Q2	Observed outside quadrats
<b>Indigenous species</b>							
	<i>Acacia decurrens</i>	Black Wattle				2	
	<i>Acacia fimbriata</i>	Fringed Wattle					*
	<i>Acacia implexa</i>	Hickory Wattle	1			1	
	<i>Acacia irrorata</i>	Green Wattle	3	5	3		
	<i>Acacia suaveolens</i>	Sweet Wattle					*
	<i>Allocasuarina littoralis</i>	Black She-Oak				1	
	<i>Allocasuarina torulosa</i>	Forest Oak					*
	<i>Angophora floribunda</i>	Rough-barked Apple				5	
	<i>Aristida vagans</i>	Threeawn Speargrass		2		2	*
	<i>Brachychiton acerifolius</i>	Illawarra Flame Tree		1			
	<i>Breynia oblongifolia</i>	Coffee Bush					*
	<i>Brunoniella australis</i>	Blue Trumpet	2		2		
	<i>Bursaria spinosa</i>	Native Blackthorn	3	4	5	3	
	<i>Calotis cuneifolia</i>	Purple Burr-Daisy					*
	<i>Cassinia arcuata</i>	Sifton Bush					*
	<i>Cassytha glabella</i>		3	3			
	<i>Cheilanthes sieberi</i>	Rock Fern					*
	<i>Dianella longifolia</i>	Blueberry Lily	2		2		
	<i>Dichondra repens</i>	Kidney Weed			3		*
	<i>Entolasia marginata</i>	Bordered Panic				2	
	<i>Eucalyptus eugenioides</i>	Thin-leaved Stringybark					*
	<i>Eucalyptus moluccana</i>	Grey Box	6			1	
	<i>Eucalyptus tereticornis</i>	Forest Red Gum		5	5		
	<i>Euchiton involucratus</i>	Star Cudweed		1			
	<i>Exocarpos cupressiformis</i>	Cherry Ballart					*
	<i>Gahnia aspera</i>	Rough Saw-sedge					*
	<i>Geranium homeanum</i>			1	1		

Status	Scientific name	Common name	CPW Q1	CPW Q2	SSTF Q1	SSTF Q2	Observed outside quadrats
	<i>Goodenia hederacea</i> subsp. <i>hederaceae</i>	Ivy Goodenia				1	
	<i>Glycine tabacina</i>		2		2		
	<i>Hakea salicifolia</i>	Willow-leaved Hakea					*
	<i>Hakea sericea</i>	Needlebush					*
	<i>Hardenbergia violacea</i>	False Sarsaparilla	3		3	3	
	<i>Imperata cylindrica</i>	Blady Grass			2	3	*
	<i>Indigofera australis</i>	Australian Indigo	3			1	
	<i>Juncus usitatus</i>						*
	<i>Kunzea ambigua</i>	Tick Bush				1	*
	<i>Lepidosperma laterale</i>	Variable Sword-sedge					*
	<i>Leucopogon juniperinus</i>	Prickly Beard-heath		1			
	<i>Melaleuca styphelioides</i>	Prickly-leaved Tea Tree					*
	<i>Microlaena stipoides</i>	Weeping Grass	5	3	4		
	<i>Olearia viscidula</i>	Wallaby Weed	3		1		*
	<i>Ozothamnus diosmifolius</i>	White Dogwood	2				
	<i>Pandorea pandorana</i>	Wonga Wonga Vine			1		
	<i>Persicaria hydropiper</i>	Water Pepper				1	
	<i>Pittosporum revolutum</i>	Rough Fruit Pittosporum					*
	<i>Pittosporum undulatum</i>	Sweet Pittosporum					*
	<i>Solanum pungetium</i>	Eastern Nightshade	1				
	<i>Themeda australis</i>	Kangaroo Grass	2	1	3	2	
	<b>Exotic species</b>						
	<i>Araujia sericifera</i>	Moth Vine	3	2	2	2	
	<i>Asparagus aethiopicus</i>	Asparagus Fern	1				
**	<i>Asparagus asparagoides</i>	Bridal Creeper	3	3	1	2	
	<i>Asparagus officinalis</i>	Asparagus					*
	<i>Avena fatua</i>	Wild Oats	2			3	
	<i>Bidens pilosa</i>	Cobbler's Pegs	3				

Status	Scientific name	Common name	CPW Q1	CPW Q2	SSTF Q1	SSTF Q2	Observed outside quadrats
	<i>Briza maxima</i>	Quaking Grass		3	2		
	<i>Bromus catharticus</i>	Praire Grass				1	
	<i>Chloris gayana</i>	Rhodes Grass			5		*
	<i>Cyperus eragrostis</i>	Umbrella Sedge				1	
	<i>Ehrharta erecta</i>	Panic Veldtgrass	1	3		3	
	<i>Eragrostis curvula</i>	African Lovegrass	3	3	1	3	*
	<i>Hypochaeris radicata</i>	Catsear				1	
	<i>Jasminum polyanthum</i>	White Jasmine		1			
	<i>Lactuca serriola</i>	Prickly Lettuce	1				
	<i>Ligustrum lucidum</i>	Large-leaved Privet	1				
	<i>Ligustrum sinense</i>	Small-leaved Privet					*
	<i>Lolium perenne</i>	Perennial Ryegrass				1	
	<i>Onopordum acanthium</i>				1	2	*
	<i>Paspalum dilatatum</i>	Paspalum	1		2		
	<i>Pennisetum clandestinum</i>	Kikuyu Grass					*
	<i>Phalaris aquatica</i>	Phalaris		3	2		
	<i>Plantago lanceolata</i>	Lamb's Tongues	3	3	3	3	
**	<i>Rubus fruticosus sp. agg.</i>	Blackberry complex				1	
	<i>Senecio madagascariensis</i>	Fireweed		2	1	2	
	<i>Sida rhombifolia</i>	Paddy's Lucerne		3	2	2	
	<i>Solanum pseudocapsicum</i>	Madeira Winter Cherry					*
	<i>Trifolium repens</i>	White Clover				2	



## Appendix 2: Assessments of Significance (7-part test)

The following section provides for Assessments of Significance according to the seven factors outlined in Section 5A of the EP&A Act for Threatened Ecological Communities Cumberland Plain Woodland and Shale Sandstone Transition Forest.

### Cumberland Plain Woodland

Cumberland Plain Woodland is listed as Critically Endangered under the TSC Act and occurs along the Hornby Road portion of the study area. Cumberland Plain Woodland occurs on soils derived from Wianamatta Shale throughout the driest part of the Sydney Basin (OEH 2013). The structure of Cumberland Plain Woodland in relatively undisturbed sites, is that of a typical, grassy woodland with a sparse canopy layer, sparse or absent shrub layer and abundant grasses and forbs in the ground layer (NSW Scientific Committee 2009). The dominant canopy trees of Cumberland Plain Woodland are Grey Box *Eucalyptus moluccana* and Forest Red Gum *Eucalyptus tereticornis*. Other common canopy species are Narrow-leaved Ironbark *Eucalyptus. crebra*, Spotted Gum *Corymbia maculata* and Thin-leaved Stringybark *Eucalyptus eugenioides*, occurring less frequently. The shrub layer is typically dominated by Blackthorn *Bursaria spinosa*. Abundant grasses such as Kangaroo Grass *Themeda australis* and Weeping Meadow Grass *Microlaena stipoides* var. *stipoides* are also characteristic of the community (OEH 2013).

Approximately 9% of the original extent of Cumberland Plain Woodland remains (OEH 2013); much of this exists as small fragmented remnants. The TSC Act listed community may also occur as a derived native grassland where the community has been cleared and characteristic ground layer species remain (NSW Scientific Committee 2009).

The proposal is a new rising main to service the Bingara Gorge estate at Wilton. The proposed alignment is within a road reserve with native vegetation including patches of Cumberland Plain Woodland occurring at the road edge. The proposed works will include excavation of a trench within the road reserve to a depth of approximately one metre a width of one metre, emplacement of material adjacent to the trench and associated construction movements.

- (a) *in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.*

Not applicable.

- (b) *in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction*

Not applicable.

(c) *in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

- (i) *is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*
- (ii) *is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,*

The proposed works are not expected to reduce the extent of Cumberland Plain Woodland within the study area provided recommended mitigation measures are implemented. This assessment takes a conservative approach and a 10 metre buffer to the proposed alignment has been assessed as the area of direct impact (subject site). Based on the area of the community mapped during the current survey occurring within the subject site, the proposal may require the removal or disturbance of up to 0.64 hectares of Cumberland Plain woodland. Using the NPWS (2002) Cumberland Plain Mapping as a reference, there is approximately 90.62 hectares of native vegetation within a five kilometre buffer of the study area (the locality) that equates to the TSC Act listed Cumberland Plain Woodland community. Based on these figures the proposal will remove 0.7% of the Cumberland Plain Woodland within the locality. This extent of vegetation removal is unlikely to significantly affect the local occurrence of Cumberland Plain Woodland.

The proposal is not expected to modify the species composition of the Cumberland Plain Woodland within the study area as recommended mitigation measures will avoid areas of the community. There is some risk however of root damage caused by the proposed trench. Recommended mitigation measures are to locate the alignment outside of the mapped community. Provided this is implemented the proposal is not expected to substantially modify the composition of the ecological community.

*(d) in relation to the habitat of a threatened species, population or ecological community:*

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and*
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and*
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,*

The alignment has been designed within a paved road reserve to minimise impacts to flora and fauna. The works are expected to be restricted to the road reserve and cleared areas adjoining the road reserve. Recommended mitigation measures to avoid indirect impacts to Cumberland Plain Woodland through no go zones are expected to minimise impacts to the community. Given the current modified nature of the habitat provided by the study area and mitigation measures recommended to protect habitat for the community the extent of the habitat for Cumberland plain woodland to be modified is expected to be minimal.

The native vegetation within and surrounding the study is highly fragmented by roads, and clearing for rural and urban land use. The proposed alignment runs along a cleared road reserve and is not expected to require any native vegetation removal. As such the proposal is not expected to increase fragmentation of Cumberland Plain Woodland in or adjacent to the study area.

*(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*

Not applicable. No critical habitat has been determined under the TSC Act for Cumberland Plain Woodland.

*(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

The *Cumberland Plain Recovery Plan* prepared by The Department of Environment, Climate Change and Water (DECCW 2011) lists objectives including building a protected area network, and improving and implementing best practice management for threatened biodiversity as well as developing an greater awareness of the threatened biodiversity of the community. The recovery plan is focussed primarily on conserving priority areas, these being larger better condition patches of the community as a key approach to recovering Cumberland Plain Woodland. The Cumberland Plain Woodland within the study area is not a priority area based on the fragmented and degraded condition of the vegetation.

*(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

The listed Key Threatening Process (KTP), *invasion of native plant communities by exotic perennial grasses* is currently in operation within the study area.

The proposal is not expected to increase the impact of this KTP.

### **Conclusion**

Based on the minimal extent of Cumberland Plain Woodland and habitat for the community that may be impacted by the proposed works and mitigation measures expected to minimise indirect impacts to the community the proposal is unlikely have a significant impact on the local occurrence of the community . As such a Species Impact Statement (SIS) is not required.



## Shale Sandstone Transition Forest

Shale Sandstone Transition Forest is listed as Endangered under the TSC Act and occurs along the Condell Park Road portion of the study area. Shale Sandstone Transition Forest Occurs at the edges of the Cumberland Plain, where shale derived clay soils intergrade with sandstone derived sandy soils or where shale caps overlay sandstone. The species composition and structure of this community varies depending on the soil influences. Characteristic canopy species include Forest Red Gum *Eucalyptus tereticornis*, Grey Gum *Eucalyptus punctata*, stringybarks *Eucalyptus globoidea*, and *Eucalyptus eugenioides* and ironbarks *Eucalyptus fibrosa* and *Eucalyptus crebra*. Areas of low sandstone influence (more clay-loam soil texture) have an understorey that is closer to Shale Sandstone Transition Forest (OEH 2013). The Shale Sandstone Transition Forest within the study area grades from a high sandstone influence form of the community in the northern extent of the study area to low sandstone influence further downslope towards areas mapped in the current survey as Shale Sandstone Transition Forest. This change is evident from the native flora species present as well as a small amount of sandstone outcropping that occurs in the northern portion of the study area.

Approximately 22.6% of the original extent of Shale Sandstone Transition Forest remains, much of this exists as small linear fragmented remnants (NSW Scientific Committee 1998).

The proposal is a new rising main to service the Bingara Gorge estate at Wilton. The proposed alignment is within a road reserve with native vegetation including patches of Shale Sandstone Transition Forest occurring at the road edge. The proposed works will include excavation of a trench within the road reserve to a depth of approximately one metre a width of one metre, emplacement of material adjacent to the trench and associated construction movements.

- (a) *in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.*

Not applicable.

- (b) *in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction*

Not applicable.

- (c) *in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:*

- (i) *is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*
- (ii) *is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,*

The proposed works are not expected to reduce the extent of Shale Sandstone Transition Forest within the study area provided recommended mitigation measures are implemented. However this assessment takes a conservative approach and a 10 metre buffer to the proposed alignment has been assessed as the area of direct impact (subject site). Based on the area of the community mapped during the current survey occurring within the subject site the proposal may require the removal or disturbance of up to 0.81 hectares of Shale Sandstone Transition Forest. Using the NPWS (2002) Cumberland Plain Mapping as a reference, there is approximately 2,761.40 hectares of native vegetation within a five kilometre buffer of the study area (the locality) that equates to the TSC Act listed Shale Sandstone Transition Forest community. Based on these figures the proposal will remove 0.029% of the Shale Sandstone Transition Forest within the locality. This

extent of vegetation removal is unlikely to significantly affect on the local occurrence of Shale Sandstone Transition Forest.

The proposal is not expected to modify the species composition of the Shale Sandstone Transition Forest within the study area as recommended mitigation measures will avoid areas of the community. There is some risk however of root damage caused by the proposed trench. Recommended mitigation measures are to locate the alignment outside of the mapped community. Provided this is implemented the proposal is not expected to substantially modify the composition of the ecological community.

*(d) in relation to the habitat of a threatened species, population or ecological community:*

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and*
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and*
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,*

The alignment has been designed within a paved road reserve to minimise impacts to flora and fauna. The works are expected to be restricted to the road reserve and cleared areas adjoining the road reserve. Recommended mitigation measures to avoid indirect impacts to Shale Sandstone Transition Forest through no go zones are expected to minimise impacts to the community. Given the current modified nature of the habitat provided by the study area and mitigation measures recommended to protect habitat for the community the extent of the habitat for Shale Sandstone Transition Forest to be modified is expected to be minimal.

The native vegetation within and surrounding the study is highly fragmented by roads, and clearing for rural and urban land use. The proposed alignment runs along a cleared road reserve and is not expected to require any native vegetation removal. As such the proposal is not expected to increase fragmentation of Shale Sandstone Transition Forest in or adjacent to the study area.

*(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),*

Not applicable. No critical habitat has been determined under the TSC Act for Shale Sandstone Transition Forest.

*(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,*

The *Cumberland Plain Recovery Plan* prepared by The Department of Environment, Climate Change and Water (DECCW 2011) includes the vegetation occurring on the Cumberland Plain within the scope and includes Shale Sandstone Transition Forest. The plan lists objectives including building a protected area network, and improving and implementing best practice management for threatened biodiversity as well as developing an greater awareness of the threatened biodiversity of the community. The recovery plan is focussed primarily on conserving priority areas, these being larger better condition patches of bushland as a key approach to recovering native vegetation of the Cumberland Plain. The Shale Sandstone Transition Forest within the study area is not high priority based on the fragmented and degraded condition of the vegetation.

The Office of Environment and Heritage has identified 26 priority actions to help recover the Shale/Sandstone Transition Forest in New South Wales (OEH 2013). These are not directly relevant to the proposal as the action listed are strategic level actions for OEH to implement and include liaising with Commonwealth and State Agencies as well as private land owners, directing funding to conservation of the community, promoting awareness of the community as well as implementing and furthering best practice methods.

*(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.*

The listed Key Threatening Process (KTP) Invasion of native plant communities by exotic perennial grasses is currently in operation within the study area. The proposal is not expected to increase the impact of this KTP.

### **Conclusion**

Based on the minimal extent of Shale Sandstone Transition Forest and habitat for the community that may be impacted by the proposed works and mitigation measures expected to minimise indirect impacts to the community the proposal is unlikely have a significant impact on the local occurrence of the community . As such a Species Impact Statement (SIS) is not required.





# DETAIL DESIGN REPORT

## WILTON PRESSURE SEWER TRANSFER MAIN

Prepared For : Solo Water

September 2013



## Document Information

Prepared for Solo Water  
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## 1. INTRODUCTION

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### 1.1 Background

The Wilton Village pressure sewerage system is proposed to be designed and constructed to transport wastewater from individual properties in Wilton. The asset that makes up Wilton village pressure sewerage system is owned by Sydney Water and comprise of reticulation pipes with each Lot installed with lateral pipework, boundary kit, tank, pump, and telemetry enabled control panel. Wilton Village pressure sewerage system customers are customers of Sydney Water.

Design of the Wilton Village pressure sewerage system is being undertaken by Sydney Water Corporation with detailed consideration of the downstream system performance as detailed in *Boundary Conditions for Wilton Connection to Bingara Gorge*, version D, issued 16 June 2013.

The Wilton Village pressure sewerage system terminates at the connection point at the corner of Hornby Street and Broughton Streets.

The Bingara Gorge residential development is located adjacent to Wilton Village. Sewerage services for Bingara Gorge are being provided by a Private Water Utility model using an MBR sewage treatment facility.

The transfer main from the Wilton Village connection point (Corner of Hornby and Broughton Streets) is being be designed and constructed by (or on behalf of) Lend Lease Communities (Wilton) Pty Limited.

### 1.2 Overview

Sewage from Wilton village to the Bingara RWTP, is to discharge at the Connection Point (corner of Hornby and Broughton Streets) via a dedicated polyethylene 125mm PE100 PN16 main, connecting to the existing 125Ø sewage rising main, for treatment at the Bingara RWTP facility.

Sydney Water Corporation has requested a transfer main high point control (RL 228) to maintain a flooded pressure sewerage system serving Wilton Village.

### 1.3 Objective

There are many components and stakeholders involved with the planning and implementation of the Wilton Pressure Sewer Transfer Main, in particular APA Group, the operators of the Moomba Gas Main and Ethane Gas Main crossing the proposed sewage transfer main.

The objective of this Report is to combine elements of the Wilton transfer main in one document, and highlight the importance of ensuring that the correct procedures and approvals are obtained in advance of undertaking construction of the gas main easement crossing.

## 2. SCOPE OF WORKS

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### 2.1 Pressure System Solutions P/L Scope of Works

- a. Gather associated information and data such as line survey (by others) and Sydney Water Corporation requirements;
- b. Develop concept design to include using the existing temporary 125 mm SRM;
- c. Develop detail design including plans and long sections for horizontal and vertical control;
- d. Select, locate, detail and specify ancillary items such as the pinch valve, air valves, isolation valves and flushing points;
- e. Develop and document solution for hydrostatic control of the Wilton village upstream pressure sewerage system;
- f. Construction specification and schedule of works.

#### 2.1.1 Exclusions

- a. Detailed investigations, site specific design and approvals for the crossing of the Moomba to Wilton Gas Main Easement (including the Moomba to Wilton Natural Gas Pipeline (864mm) and the Moomba – Sydney Ethane Pipeline (219mm)
- b. Develop odour management solution and dosing system design - Not required, as advised by Solo Water 13/09/2013;
- c. Monitored pressure transducer – Not required, as advised by Solo Water 13/09/2013;
- d. Flow meter, included in Solo Water's works at RWTP;
- e. Test point with isolation valves either side, included in Sydney Water's scope of works.

#### 2.1.2 Pressure System Solutions P/L Deliverables

- a. Plans and long sections;
- b. Construction details;
- c. Technical specification;
- d. Schedule of works.

### 2.2 Work by Others

- a. **Sydney Water** – up to the Wilton Connection Point at the corner of Broughton Street and Hornby Street, including test point, scour point and isolation valves;
- b. **Solo Water** – from the proposed isolation valve at the corner of Condell Park Road and the entry road to the RWTP to discharge location at the RWTP including all valves and ancillary items;
- c. **External designer and contractor** – the sewage rising main from existing SPS discharging to the Veolia STP.



### 3. PARAMETERS

---

#### 3.1 Base Information

1. Dial Before You Dig Services Search, request number 6403391, sent 03/06/2013
  - AAPT PowerTel, received 03/06/2013
  - APA Group High Pressure Gas, received 04/06/2013
  - Endeavour Energy, received 04/06/2013
  - Jemena, received 04/06/2013
  - Nextgen, received 03/06/2013
  - Optus, received 03/06/2013
  - RMS, received 04/06/2013
  - Sydney Water, received 04/06/2013
  - Telstra, 13/06/2013
2. Detail Survey for Proposed Sewer Main, Hornby Street & Condell Park Road, Wilton, **ACAD-I581\_D01E.dwg**, received from Surveying Insites, 12/09/2013.
3. Finished surface levels for Condell Park Road, **NA82013043-D-3D-FACE\_V2010.dwg**, received from Cardno, 13/09/2013
4. Gas pipeline location files, **APA NSW Pipelines.zip**, received from APA, 11/09/2013
5. Report on Pavement Investigations (including test pit logs), **43677B - BINGARA GORGE - Report 1 - 18 Jan 07 – Pavement Thickness Report – Stage 2 Pavements (2).pdf**, received from Cardno, 17/09/2013.

#### 3.2 Deviations from Boundary Condition Report

1. The temporary sewage rising main from the existing SPS to the Veolia STP is a 125Ø sewage rising main not 110Ø sewage rising main (advised by Lend Lease);
2. Sydney Water Corporation requested a transfer main high point control of RL227m to maintain a flooded Wilton Village pressure sewerage system. On the 27 August 2013, PS Solutions was advised that this control level had increased to RL228m.
3. Solo Water advised PS Solutions that a pressure transducer was no longer required;
4. Sydney Water is supplying and installing a test point, scour point and isolation valves prior to the Wilton Connection Point;

### 3.3 Hydraulic Parameters

Table 2 below details the hydraulic parameters used in sizing the pressure sewer options.

Hydraulic Parameters	Value
Peak flow at Wilton Connection Point	7.3l/s
Connection Point level ( <b>corner of Hornby and Broughton Streets</b> )	
Surface RL	215.55
Pipe Invert RL	214.47
Transfer main control level	RL 228m
Discharge location level at RWTP	RL 207m
Friction Loss	Colebrook-White formula; k factor of 0.15
Scour Velocity	0.6 m/s
Max. Design Velocity	1.20 m/s
Pipe Type	SDR 11, black with cream stripe, polyethylene PE100 PN16
HGL at Wilton Connection Point	243.5m

**Table 3-1: HYDRAULIC PARAMETERS**

### 3.4 Assumptions

1. The temporary 125mm rising main from the SPS to the STP has been adequately designed and installed, with PN16 rated material, electro fusion fitting jointing methods and that the minimum depth from cover of the pipe will be maintained.
2. The construction staging of the development will allow for direct discharge of the Wilton PSS into the RWTP, in isolation of the existing SPS, Bingara PSS and the gravity system.
3. The changeover of the existing 125Ø SRM from the Veolia STP, to the redundancy tank (temporary location) and the transition to the final discharge location at the inlet header of the MBR WWTP, will not detrimentally affect the hydraulics of the Wilton pressure sewerage transfer main, and that these pipework reconfigurations will not result levels not greater than RL207m.

## 4. WILTON PRESSURE SEWER TRANSFER MAIN DETAILS

### 4.1 Overview



**Figure 1: Wilton to Bingara RWTP Pressure Sewer Transfer Main**

### 4.2 Wilton (Sydney Water) Connection Point

The Wilton Connection Point is located at the corner of Broughton Street and Hornby Road (E 287610.876: N 6209176.451) with at pipe invert level RL214.47m .

### 4.3 Pinch Valve

The purpose of the pinch valve is to generate a control level within the transfer main which will maintain a flooded state for the Wilton Pressure Sewerage System. Sydney Water specified the control level to be RL 228m.

The pinch valve contains a rubber sleeve which is connected to two air tanks. Actuation of the valve, the pinching action is accomplished by air or hydraulic pressure placed on the sleeve. Adding air pressure within the annular space between the body and the sleeve can open, throttle, or close the valve.

The pinch valve is located near the Wilton Connection Point at RL 214.47m, therefore the pinch valve will be required to retain sewage up to 13.53m pressure to maintain the SWC specified hydraulic control level.



#### **4.4 Retention Time**

The total length of the transfer main from the connection point to the RWTP, including the existing SRM, is approximately 3km.

The average retention time in the transfer main, is the average time taken for the sewage to reach the Wilton Connection Point from the furthest unit in the system, then to flow approximately 3km to the discharge point at the RWTP.

Typically, odour release in a PSS is not an exact science. However the general principle is as follows:

- < 4 hours retention time is usually not an issue;
- 4-12 hours may need to consider a contingency odour strategy;
- >12 hours odour will be an issue.

Sydney Water Corporation was requested to provide forecast sewage age data discharging from the Wilton pressure sewerage system prior to connecting to the transfer main. This information was a Boundary Condition requirement and is still pending.

##### **4.4.1 Odour Management**

The Bingara Gorge sewage treatment facility site will incorporate a chemical dosing system. Air valves will incorporate a gas phase odour scrubber.

#### **4.5 Air Valves**

The Wilton pressure sewer transfer main (from Wilton Connection Point to the limit of works, including the existing SRM) has five air valves, four below ground and one above ground.

The above ground air valve is a critical air valve in the system, it is at the high point of the transfer main in a residential area, and is likely to allow air to enter and exit the system. Therefore to reduce the likelihood of odour complaints an above ground air valve solution is recommended at this location.

One air valve is proposed to be retrospectively installed at the high point of the existing SRM on Condell Park Road. The purpose of this air valve is to improve hydraulic performance, which will decrease the hydraulic grade line of the transfer main. If this air valve is not installed then the hydraulic grade line at the connection point will exceed 243.5m.

#### **4.6 Flushing Points and Isolation Valves**

Flushing points and isolation valve pairings are positioned along the transfer main. These are strategically located on the line to ensure efficient flushing and scouring of the main, in particular for the low points where sediment deposit is likely.

A flushing point and isolation valve is proposed to be installed at the corner of Condell Park Road and the new entry road to the RWTP, near the electrical substation.

#### **4.7 Gas Pipeline Easement**

A Gas pipeline easement crosses the Wilton transfer main alignment on Condell Park Road. This easement contains two high pressure gas pipelines, the Moomba to Wilton Natural Gas Pipeline (864mm) and the Moomba to Sydney Ethane Pipeline (219.1mm).

The services survey that PS Solutions received from Lend Lease's consultant, Insites, did not confirm accurate gas main alignments or depths. PS Solutions requested survey accurate details of the Moomba Gas Main, from Insites and Solo Water, however was advised that potholing during the design would not be undertaken.

Due to the high risk nature of this crossing, PS Solutions Pty Ltd recommends that potholing be undertaken prior to the construction, and that the detail design achieves approval from APA prior to commencing any Construction works. It is understood that APA will only be able to provide an 'in principle' design approval once potholing and an accurate location of APA Group assets has been completed.

Again, due to the high risk nature of this crossing, PS Solutions Pty Ltd recommends that Lend Lease engage a Trenchless Technology Specialist to undertake works prior to the construction tender, these works to include physical sites works, gain design approval from APA, and provide specialist documentation specific for these works (e.g. risk assessments, construction methodology and contingency planning).

PS Solutions commenced preliminary discussions with APA Group regarding the Moomba gas main in which it was advised that the minimum depth of cover of the gas main could be between 1200mm and 2000m. Design specifications and 'in-principle' design approval requirements are yet to be supplied by APA Group.

#### **4.8 Connection to Existing Sewage Rising Main**

The Wilton pressure sewerage transfer main will connect into the existing 125Ø sewage rising main (which is temporarily transporting sewage from the SPS to the Veolia STP) at the Condell Park Road and Berrima Road intersection. This temporary service will need to be capped when Wilton Village comes online, and replaced by the permanent sewage rising main from the SPS to the RWTP (refer to Bingara Gorge Masterplan Design Report for Construction Staging).

#### **4.9 Existing 125Ø SRM (design and constructed by others)**

It should be noted that the existing 125Ø sewage rising main was designed and installed as a temporary main, without knowledge of the finished surface levels. Cardno supplied the finished ground levels for the Highlands region, which indicated that in some locations the minimum depth from cover of the main will not be maintained, potentially compromising the integrity of the pipe.

Pressure System Solutions Pty Ltd are proposing the installation of an air valve, at the high point, and a scour point and isolation valve at the low point (limit of works) on the existing 125Ø sewage rising main, however any other works in relation to this main are outside the scope of works, as it is assumed that the main will be fit for purpose.

##### **4.9.1 Entry Road to RWTP (outside scope of works)**

According to the WAE drawings of the existing 125Ø main in comparison to the surveyed ground levels along the road, there are a number of locations where the minimum depth from cover is not being achieved.

It should be noted that the WAE documentation show a section of main, near the substation is exposed above ground level. Upon visual site inspection the main could not be seen. Roadwork excavation (boxing-out) has occurred on the site after the main was installed and the WAE data suggests the integrity of the main may have been compromised during the road regrading. This will require confirmation on site by the construction contractor.

#### **4.10 Bingara Gorge RWTP (outside scope of works)**

The temporary 125Ø mm sewage rising main is currently pumping sewage from the existing sewage pumping station, along Condell Park Road, up the new entry road to the RWTP and discharging at the Veolia STP.

Construction staging will need to consider halting pumped flow from the SPS, and transferring pumped SPS flows from the temporary SRM to the permanent SRM.

A flow meter will be installed to measure wastewater flows from Wilton Village (Sydney Water) into the Bingara Gorge sewage treatment facility.

There are a number of coordination and changeover activities required at the RWTP, which are outside of PS Solutions scope of work. Therefore Solo Water has specified the discharge location to be at the redundancy tank at RL 207m.



## **APPENDIX A – BOUNDARY CONDITION REPORT**

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# BOUNDARY CONDITIONS FOR WILTON CONNECTION TO BINGARA GORGE

SITE: Wilton - Bingara Gorge NSW



**PRESSURE SYSTEM SOLUTIONS PTY LTD**



## Document Information

Project Name Bingara Gorge  
File Reference Bingara Gorge-Wilton Boundary Conditions  
Job Reference Solo Water  
Date 16th April 2013

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## 1. INTRODUCTION

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The objective of this document is to provide a performance overview of the sewage transfer main from Wilton village connection point to the Bingara Gorge sewerage treatment facility.

The Bingara Gorge residential development is located adjacent to Wilton Village. Sewerage services for Bingara Gorge are being provided by a Private Water Utility model using an MBR sewage treatment facility.

Numerous transfer main options were reviewed with the selected option encompassing sewage from Wilton village discharging via a dedicated polyethylene 125mm PE100 PN16 main to the Bingara waste water treatment facility. Sydney Water Corporation has requested a transfer main high point control (RL 227) to maintain a flooded pressure sewer system serving Wilton Village.

The transfer main from the Wilton Village connection point (Corner of Hornby and Broughton Streets) will be designed and constructed by (or on behalf of) Lend Lease Communities (Wilton) Pty Limited.

The Wilton Village pressure sewer system is proposed to be designed and constructed to take wastewater from individual properties in Wilton. The asset that makes up Wilton village pressure sewer system is owned by Sydney Water and comprise of reticulation pipes with each Lot installed with lateral pipework, boundary kit, tank, pump, and full telemetry control panel.

The Wilton Village pressure sewer system terminates at the connection point with the transfer main (corner of Hornby and Broughton Streets).

A flow meter will be installed to measure wastewater flows to the Bingara Gorge sewage treatment facility.

Wilton Village pressure sewer system customers are customers of Sydney Water.

Design of the Wilton Village pressure sewer system is being undertaken by Sydney Water Corporation with detailed consideration of the downstream system performance as detailed in this document.



## **2. BACKGROUND**

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### **Wilton Village Service Area**

The Wilton Village service area is defined by Sydney Water Corporation Technical Memorandum Ref 17-02-01-15-01-001 dated 12.02.2013.

### **Bingara Gorge Servicing Strategy**

The majority of Bingara Gorge is being serviced by a pressure sewer system however some early release stage lots are being serviced using a gravity sewerage system.

The selected Pressure sewer units for the Bingara Gorge system are EOne Extreme duplex units. Multiple residential lots will discharge via a shallow gravity sewer to a duplex pressure sewer unit. Sewage will then be conveyed via a pressure sewer grinder pump and collection network to the sewage treatment facility.

### **Wilton Village Servicing Strategy**

The Wilton Village servicing strategy is defined in Section 3 of the Sydney Water Corporation Technical Memorandum Ref 17-02-01-15-01-001 dated 12.02.2013.

### **Design Criteria / Parameters / Assumption**

The Wilton Village design criteria is defined in Section 4 and 5 of the Sydney Water Corporation Technical Memorandum Ref 17-02-01-15-01-001 dated 12.02.2013.

### **Sewage Loadings**

The Wilton Village design criteria are defined in Section 4 and 5 of the Sydney Water Corporation Technical Memorandum Ref 17-02-01-15-01-001 dated 12.02.2013.





### **3. REGULATORY REQUIREMENTS**

---

Solo Water will obtain a Network Operator's Licence under WICA, to include the services referred to in this document. Sydney Water has the retail rights to the customers in Wilton Village and Solo Water will operate and maintain the network under Sydney Water's operator's licence.



#### 4. WILTON PRESSURE SEWER SYSTEM SEWAGE

##### a) Quality

The Wilton Village wastewater quality envelope is as set out in the Wilton Village Wastewater Services Agreement extract below:

<i>Type</i>	<i>Units</i>	<i>value (50%ile)</i>
<i>Oil &amp; Grease</i>	<i>mg/L</i>	<i>&lt;50</i>
<i>Ammonia NH3-N</i>	<i>mg/L</i>	<i>&lt;70</i>
<i>BOD5</i>	<i>mg/L</i>	<i>&lt;350</i>
<i>COD</i>	<i>mg/L</i>	<i>&lt;750</i>
<i>SS</i>	<i>mg/L</i>	<i>&lt;500</i>
<i>TKN</i>	<i>mg/L</i>	<i>&lt;90</i>
<i>TP</i>	<i>mg/L</i>	<i>&lt;18</i>
<i>TDS</i>	<i>mg/L</i>	<i>&lt;1000</i>
<i>pH</i>		<i>5-8</i>

(Source: Wilton Village Wastewater Services Agreement, Schedule 5)

##### b) Wilton Sewage Quantity and Flow Rates

The Wilton village wastewater quantity is as set out in the Wilton Village Wastewater Services Agreement extract below:

The Wilton Village Pressure sewer system will be designed and constructed to accept only wastewater from Wilton Village Customers, in accordance with the PSS Home Owner's Manual (Exhibit 2).

It is assumed that each Lot produces an average daily flow of 495 litres calculated on the following basis:

Flow rate per Lot - 150 litres per day/person x 3.0 = 450 litres per day/Lot + 10% for inflow infill = 495 litres per day/Lot (calculated over a quarterly period corresponding to payment quarter)

And



The Wilton Village design flow rates are defined in Section 5.2 of the Sydney Water Corporation Technical Memorandum Ref 17-02-01-15-01-001 dated 12.02.2013 (Attachment C).

And

Wilton Estimated peak flow (see Attachment D) as follows:-

**Estimated ultimate flow rates**

$$ADWF = 283.9 \text{ ET} \times 0.45 \text{ kL/ET/day} = 127.8 \text{ kL/day}$$

*PDWF from modelling...*

<b>Percentile (th %ile)</b>	<b>Q (L/s)</b>
100	10.8
99	7.3
95	5.3
90	4.5
50	1.5





## **5. WILTON PRESSURE SEWER SYSTEM CONNECTION LOCATION AND TRANSFER MAIN PARAMETERS**

---

### **Connection Location**

Numerous transfer main options were reviewed with the selected option encompassing sewage from Wilton village discharging via a dedicated polyethylene 125mm and 110mm PE100 PN16 main to the Bingara waste water treatment facility. The transfer main incorporates isolation valves, air valves monitored pressure transducer and flow meter.

The Wilton Village connection point (Corner of Hornby and Broughton Streets) to the transfer main is shown on Wilton connection design drawing in Attachment A. The downstream transfer main will be designed and constructed by (or on behalf of) Lend Lease Communities (Wilton) Pty Limited.

Sydney Water Corporation is supplying an isolation valve and upstream flow meter (type to be confirmed with Solo Water).

### **Transfer Main Level Control**

Sydney Water Corporation has requested a transfer main high point control (RL 227) to maintain a flooded pressure sewer system serving Wilton Village. This will be accommodated by using a barometric loop or pinch valve set to maintain an upstream pressure sufficient to maintain a flooded condition. The control device location is shown in Attachment A HGL Figures 1 to 10 inclusive.

### **Wilton Village PSS Connection Point Transfer Main HGL**

The Wilton village sewage transfer main has been hydraulically assessed using the sewage flow range shown above.

Pressure System Solutions P/L generally use a K Factor of 0.15 in the design of pressure sewer system however from Sydney Water Corporations Wilton Technical Memorandum Section 4.1, a more conservative Factor of 0.75 has been adopted for the Wilton pressure sewer system design.

To facilitate Sydney Water Corporation's detailed design of the Wilton village pressure sewer system an hydraulic analysis assessment has been undertaken of the transfer main using the briefed range of sewage flow rates and the different k Factors. Table 1 below is a summary of the hydraulic assessment outputs.



Probability Percentile (%)	Q (L/s)	HGL @ Connection Point K=0.15	HGL @ Connection Point K=0.75
100	10.8	289.3	333.7
99	7.3	243.5	263.2
95	5.3	232.6	235.1
90	4.5	231.1	232.8
50	1.5	227.5	227.7

**Table 1: HGL Summary Table****Maximum Sewage Discharge Flows** (e.g. after electricity interruption)

The Bingara Gorge sewage treatment facility will accept sewage flows as indicated in Table 1 i.e. maximum of 10.8 l/s and up to the maximum daily volume (495 litres per day/Lot x 300 lots). Sydney Water Corporation is required to limit the peak flow to the transfer main connection to a maximum of 10.8 l/s at any time.

**Inflow and Infiltration**

It is not normal practice to accommodate an inflow and infiltration allowance in the design of a pressure sewer system. No allowance has been made for rain, ground or surface water discharged into the Wilton village transfer system or at the Bingara Gorge sewage treatment facility. Positive means must be employed by Sydney Water Corporation to eliminate and prevent reoccurrences of I & I entering the system.

Solo water will use the transfer main flow meter to monitor peak flows and volumes discharging to the sewage treatment facility.

**After Electricity Interruption**

After prolonged electricity interruption the Bingara sewage treatment facility will accept flows from Wilton village at a maximum rate as stated above. Sydney Water Corporation is required to design the Wilton village pressure sewer system using a pressure sewer unit with emergency storage volume to limit the opportunity for an overflow occurrence such as EOne 2010ip with 600 litres above pump on level.

The Bingara Gorge pressure sewer scheme is utilising a monitoring and control system to assist in managing high flows by peak flow shaving and eliminating pressure sewer unit overflows by monitoring wastewater levels in each tank and firstly pumping down high water level units upon the resumption of electricity supply to the network.



## 6. SOLO WATER ASSUMPTIONS

---

### a) Bingara Monitoring and Control System

The Bingara Gorge pressure sewer system will be monitored and controlled using a centralised SCADA system. The objective of this solution is to provide remote monitoring and control of the system at the basic level and higher level function that assist performance and longevity of the pressure sewer pumps & integrate the system with the treatment facility.

The Bingara Gorge system uses design parameters to provide system performance consistent with traditional pressure sewer systems. The control system is designed to monitor pressure sewer system day to day performance and override controls when planned or emergency maintenance is being conducted at the STP. The monitoring and control system will also be designed to manage other system operational events including limiting high flow occurrences after electricity outages.

The Wilton pressure sewer system design is required to be designed using traditional design parameters. The Wilton pressure sewer system design report and hydraulic model is required to be provided for review and comment prior to construction.

#### **Benefits of Monitoring and Control**

- Interface pressure sewer system flows with treatment facility
- Manage flows in PPM situations.
- Assists meeting connection requirements
- Removes the need for property owner intervention in alarm situations
- Provides a form of continuous asset monitoring to assist maintenance scheduling and reduce the occurrence of total failure events
- Network hydraulic benefits for flushing and controlling peak flows
- Pump down high water level pressure sewer units after electricity interruption to limit potential of sewage overflows
- Global pressure sewer system control
- Ability to undertake network shut downs in pipe burst situations
- Communication with external sensors (eg flow meters, pressure transducers)
- Manage odour control system
- Monitor and alarm any I & I issues with any particular pump unit

#### **Aspects To Be Monitored**

General aspects that would require monitoring and viewing would include:

- network flow



Boundary conditions for Wilton  
Connection

- levels in each wet well including alarms
- hours run (in a 24hr period & total)
- number of starts (in the last hour & total)
- pump running (ie duty or stand-by)
- number of maximum run times in a 24 hr period
- number of current / overload trips
- mains power failure
- what site(s) are operating
- pump model at each site
- fault type

**b) Odour Management**

The Bingara Gorge sewage treatment facility site will incorporate a chemical dosing system. Sydney Water Corporation is requested to advise forecast sewage age data during the forecast connection profile.





## 5. DESIGN AND WORK AS EXECUTED DOCUMENTATION

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Prior to handover of the system Sydney Water Corporation is required to issue for approval the following documentation:-

- Wilton village design documentation including the hydraulic model, design report in Word format and drawings in Auto Cad electronic format.
- WAE CAD files updated with the following:-
  - Surveyed installed pipe locations
  - MGA 94 co-ordinate system
  - Bore log data
  - Co-ordinates on all assets
- Data base of customer connections
- Testing and commissioning sheets for each pressure sewer unit including pump serial numbers.
- ITP's etc.
- Operations and maintenance manuals including emergency procedures



## ATTACHMENTS

---

### A - Wilton Connection Location Plan





**OPTION B3**  
SYSTEM PERFORMANCE (5% PROBABILITY)  
- CONNECT TO EXISTING SPS VIA CLUB HOUSE/GOLF CART BRIDGE CROSSING

	WESTERN RIDGE (ZONE 158)		EASTERN RIDGE (ZONE 1)	
	FLOW (L/s)	TDH (m/H)	FLOW (L/s)	TDH (m/H)
EC080 MONO	23.33	55.85	14.23	47.33
EONE	22.44	50.52	13.48	46.73

	WESTERN RIDGE (ZONE 158)		EASTERN RIDGE (ZONE 1)		WILTON	
	FLOW (L/s)	TDH (m/H)	FLOW (L/s)	TDH (m/H)	FLOW (L/s)	TDH (m/H)
EC080 MONO	23.33	55.85	19.74	50.47	7.97	28.23
EONE	22.44	50.52	19.27	49.46	7.26	27.26

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B	SECOND ISSUE	SW	16/06/13
A	FIRST ISSUE	SW	18/03/13

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DRAWN	KG	DATE	18/03/13
CHECKED	RRS	DATE	18/03/13
APPROVED	SW	DATE	18/03/13

0 20 40 60 80 100m  
SCALE 1:2500 AT A0

CLIENT: **Solo Water**

PROJECT: **BINGARA GORGE**

TITLE: **PRESSURE SEWER CONCEPT LAYOUT PLAN OPTION B3**

DRG No. **SK103**

REV **C**

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## **B - Connection Location HGL Range**

- a. **Figure 1 - HGL Longsection 10.8 L/s,  $k=0.15$**
- b. **Figure 2 - HGL Longsection 7.3 L/s,  $k=0.15$**
- c. **Figure 3 - HGL Longsection 5.3 L/s,  $k=0.15$**
- d. **Figure 4 - HGL Longsection 4.5 L/s,  $k=0.15$**
- e. **Figure 5 - HGL Longsection 1.5 L/s,  $k=0.15$**
- f. **Figure 6 - HGL Longsection 10.8 L/s,  $k=0.75$**
- g. **Figure 7 - HGL Longsection 7.3 L/s,  $k=0.75$**
- h. **Figure 8 - HGL Longsection 5.3 L/s,  $k=0.75$**
- i. **Figure 9 - HGL Longsection 4.5 L/s,  $k=0.75$**
- j. **Figure 10 - HGL Longsection 1.5 L/s,  $k=0.75$**



### Wilton Village PSS Connection Point Transfer Main HGL

Probability Percentile (%)	Q (L/s)	HGL @ Connection Point K=0.15	HGL @ Connection Point K=0.75
100	10.8	289.3	333.7
99	7.3	243.5	263.2
95	5.3	232.6	235.1
90	4.5	231.1	232.8
50	1.5	227.5	227.7

**Table 1: HGL Summary Table**

Figure 1 - HGL Longsection 10.8 L/s, k=0.15

Figure 2 - HGL Longsection 7.3 L/s, k=0.15

Figure 3 - HGL Longsection 5.3 L/s, k=0.15

Figure 4 - HGL Longsection 4.5 L/s, k=0.15

Figure 5 - HGL Longsection 1.5 L/s, k=0.15

Figure 6 - HGL Longsection 10.8 L/s, k=0.75

Figure 7 - HGL Longsection 7.3 L/s, k=0.75

Figure 8 - HGL Longsection 5.3 L/s, k=0.75

Figure 9 - HGL Longsection 4.5 L/s, k=0.75

Figure 10 - HGL Longsection 1.5 L/s, k=0.75

**Parameters:** 1- 450 L/ET/Day sewage discharge

2- 100% Probability percentile = 10.8 L/s

3-  $k=0.15$

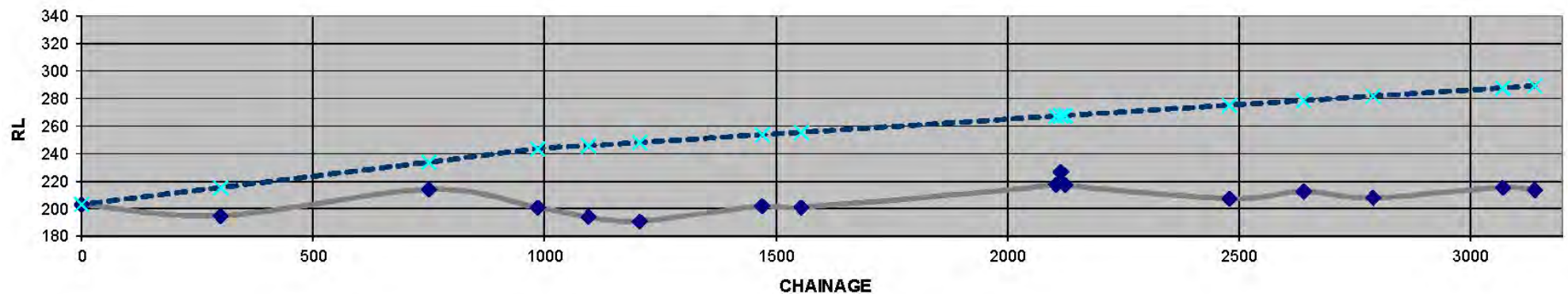
4- Pipe material = Polyethylene 125 $\Phi$  & 110 $\Phi$  PN16 PE100

5- Transfer main control level = RL 227m (AHD) @ approx Chainage 2115 metres

6- Air valves as shown on Wilton Connection Plan

7- Ground RL at connection point = RL 213.5m

**Outputs:** HGL at intersection of Hornby Street & Broughton Street = 289.3m



**Figure 1**

**Parameters:** 1- 450 L/ET/Day sewage discharge

2- 99% Probability percentile = 7.3 L/s

3-  $k=0.15$

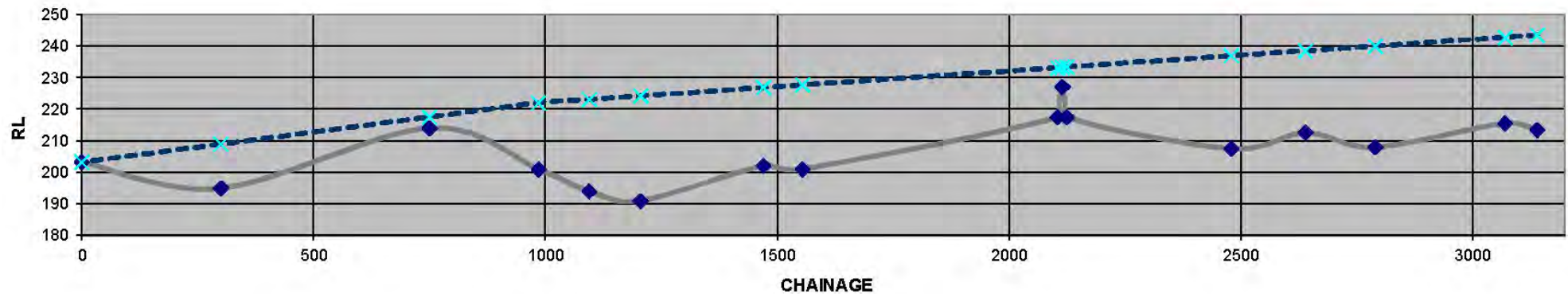
4- Pipe material = Polyethylene 125 $\Phi$  & 110 $\Phi$  PN16 PE100

5- Transfer main control level = RL 227m (AHD) @ approx Chainage 2115 metres

6- Air valves as shown on Wilton Connection Plan

7- Ground RL at connection point = RL 213.5m

**Outputs:** HGL at intersection of Hornby Street & Broughton Street = 243.5m



**Figure 2**

**Parameters:** 1- 450 L/ET/Day sewage discharge

2- 95% Probability percentile = 5.3 L/s

3-  $k=0.15$

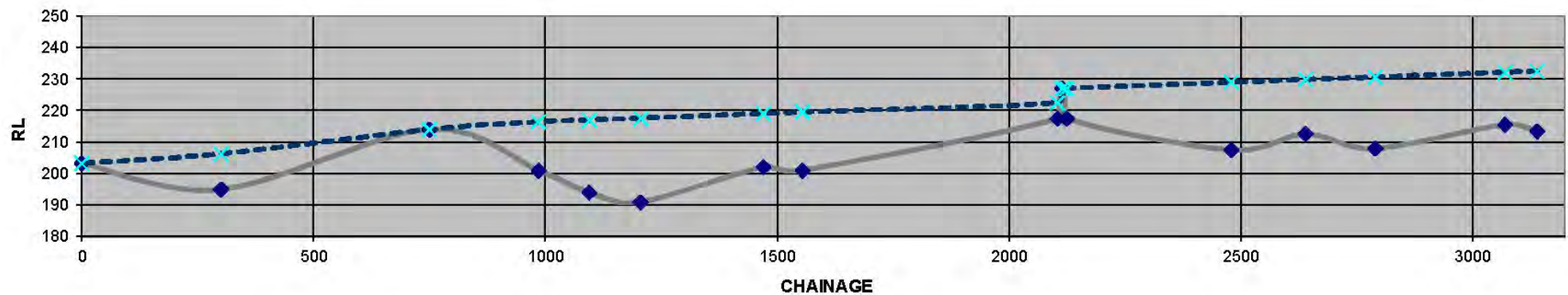
4- Pipe material = Polyethylene 125 $\Phi$  & 110 $\Phi$  PN16 PE100

5- Transfer main control level = RL 227m (AHD) @ approx Chainage 2115 metres

6- Air valves as shown on Wilton Connection Plan

7- Ground RL at connection point = RL 213.5m

**Outputs:** HGL at intersection of Hornby Street & Broughton Street = 232.6m



**Figure 3**



**Parameters:** 1- 450 L/ET/Day sewage discharge

2- 90% Probability percentile = 4.5 L/s

3-  $k=0.15$

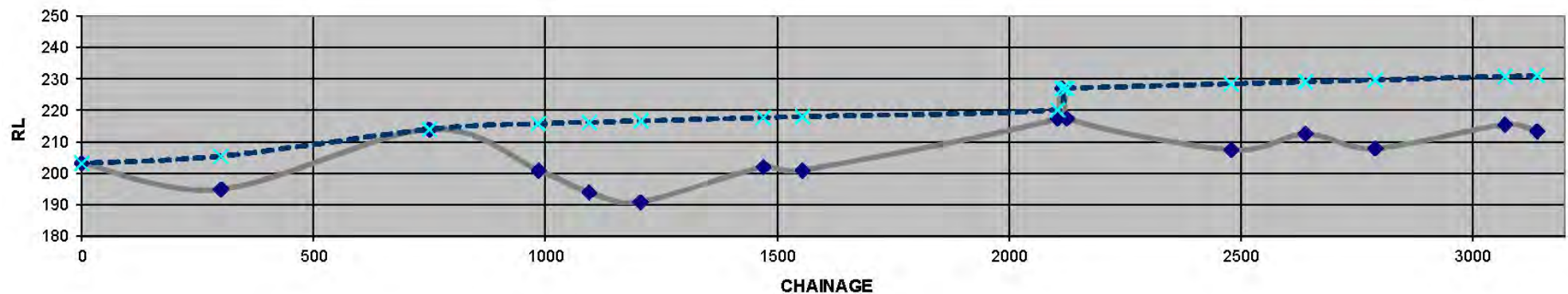
4- Pipe material = Polyethylene 125 $\Phi$  & 110 $\Phi$  PN16 PE100

5- Transfer main control level = RL 227m (AHD) @ approx Chainage 2115 metres

6- Air valves as shown on Wilton Connection Plan

7- Ground RL at connection point = RL 213.5m

**Outputs:** HGL at intersection of Hornby Street & Broughton Street = 231.1m



**Figure 4**

**Parameters:** 1- 450 L/ET/Day sewage discharge

2- 50% Probability percentile = 1.5 L/s

3-  $k=0.15$

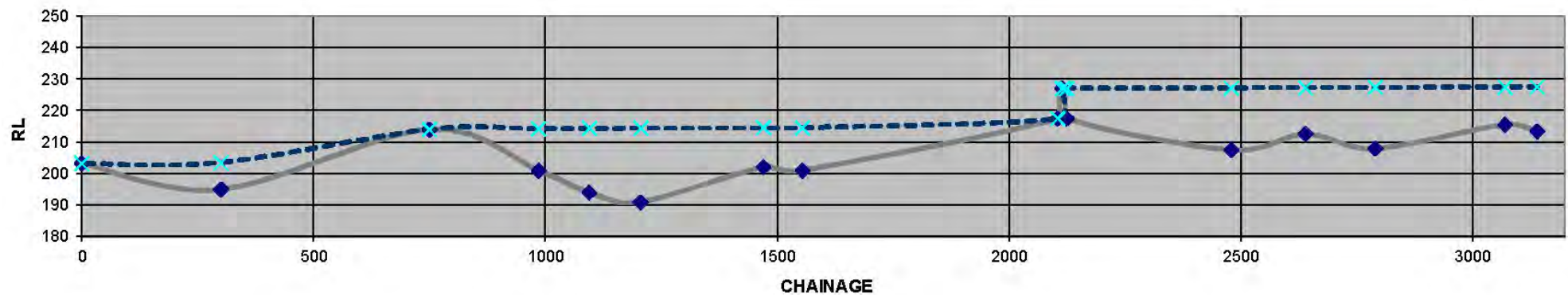
4- Pipe material = Polyethylene 125 $\Phi$  & 110 $\Phi$  PN16 PE100

5- Transfer main control level = RL 227m (AHD) @ approx Chainage 2115 metres

6- Air valves as shown on Wilton Connection Plan

7- Ground RL at connection point = RL 213.5m

**Outputs:** HGL at intersection of Hornby Street & Broughton Street = 227.5m



**Figure 5**

**Parameters:** 1- 450 L/ET/Day sewage discharge

2- 100% Probability percentile = 10.8 L/s

3-  $k=0.75$

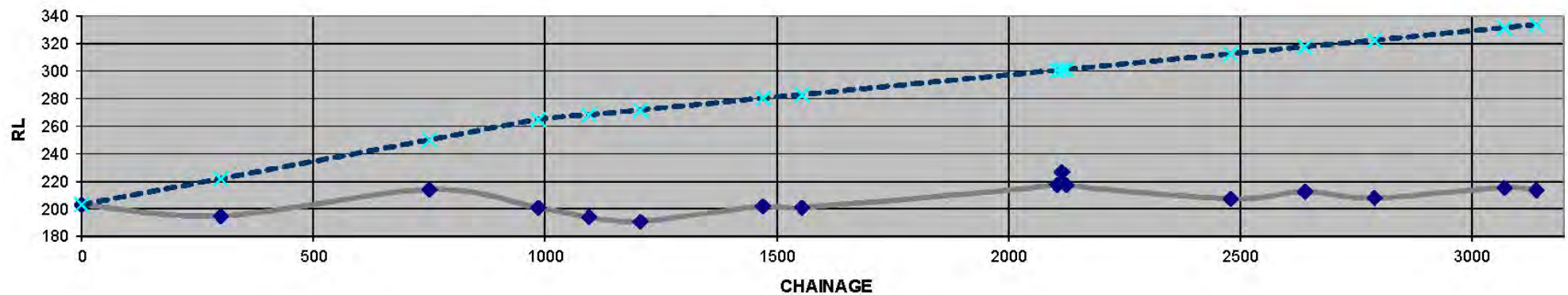
4- Pipe material = Polyethylene 125 $\Phi$  & 110 $\Phi$  PN16 PE100

5- Transfer main control level = RL 227m (AHD) @ approx Chainage 2115 metres

6- Air valves as shown on Wilton Connection Plan

7- Ground RL at connection point = RL 213.5m

**Outputs:** HGL at intersection of Hornby Street & Broughton Street = 333.7m



**Figure 6**

**Parameters:** 1- 450 L/ET/Day sewage discharge

2- 99% Probability percentile = 7.3 L/s

3-  $k=0.75$

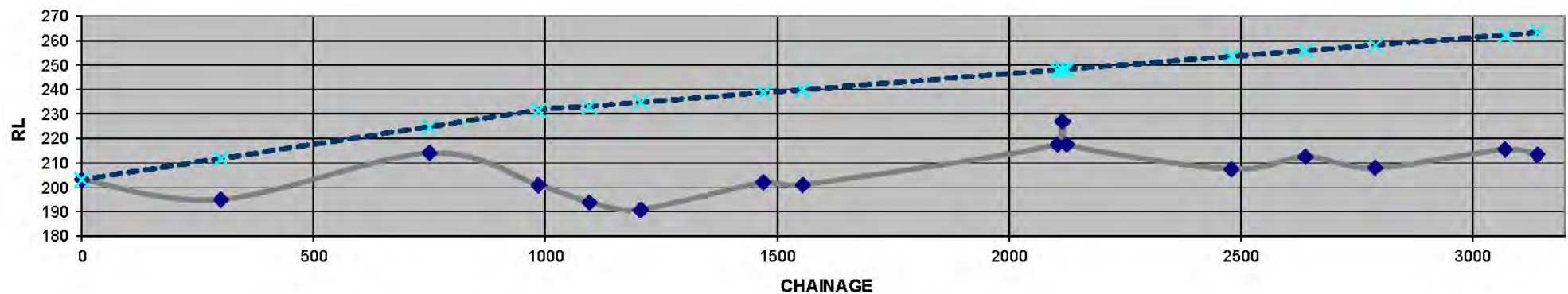
4- Pipe material = Polyethylene 125 $\Phi$  & 110 $\Phi$  PN16 PE100

5- Transfer main control level = RL 227m (AHD) @ approx Chainage 2115 metres

6- Air valves as shown on Wilton Connection Plan

7- Ground RL at connection point = RL 213.5m

**Outputs:** HGL at intersection of Hornby Street & Broughton Street = 263.2m



**Figure 7**



**Parameters:** 1- 450 L/ET/Day sewage discharge

2- 95% Probability percentile = 5.3 L/s

3-  $k=0.75$

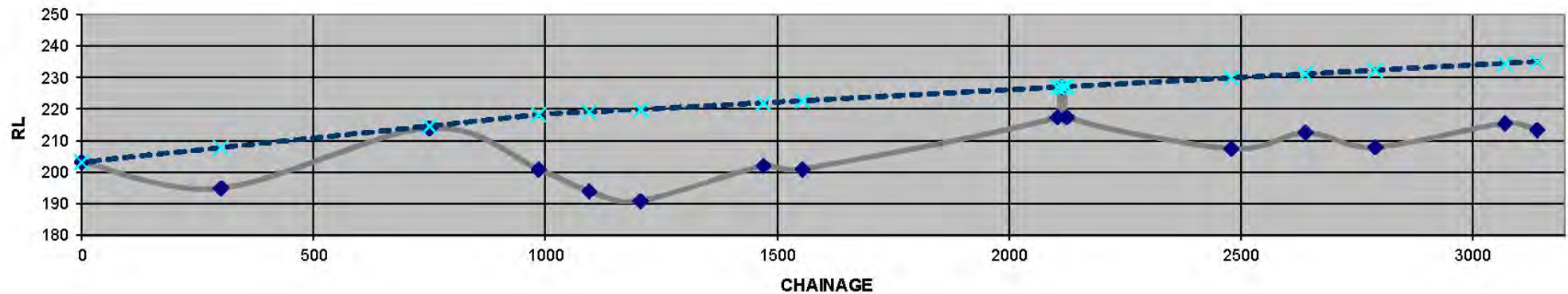
4- Pipe material = Polyethylene 125 $\Phi$  & 110 $\Phi$  PN16 PE100

5- Transfer main control level = RL 227m (AHD) @ approx Chainage 2115 metres

6- Air valves as shown on Wilton Connection Plan

7- Ground RL at connection point = RL 213.5m

**Outputs:** HGL at intersection of Hornby Street & Broughton Street = 235.1m



**Figure 8**

**Parameters:** 1- 450 L/ET/Day sewage discharge

2- 90% Probability percentile = 4.5 L/s

3-  $k=0.75$

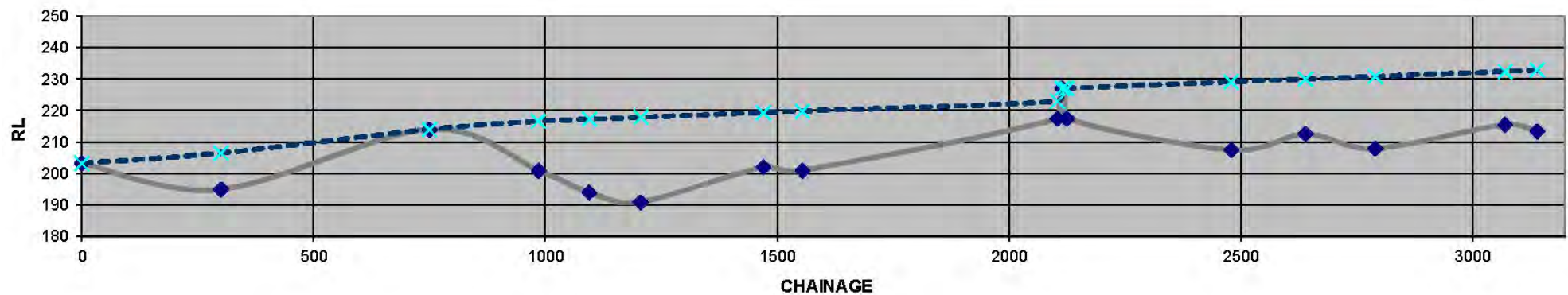
4- Pipe material = Polyethylene 125 $\Phi$  & 110 $\Phi$  PN16 PE100

5- Transfer main control level = RL 227m (AHD) @ approx Chainage 2115 metres

6- Air valves as shown on Wilton Connection Plan

7- Ground RL at connection point = RL 213.5m

**Outputs:** HGL at intersection of Hornby Street & Broughton Street = 232.8m



**Figure 9**

**Parameters:** 1- 450 L/ET/Day sewage discharge

2- 50% Probability percentile = 1.5 L/s

3-  $k=0.75$

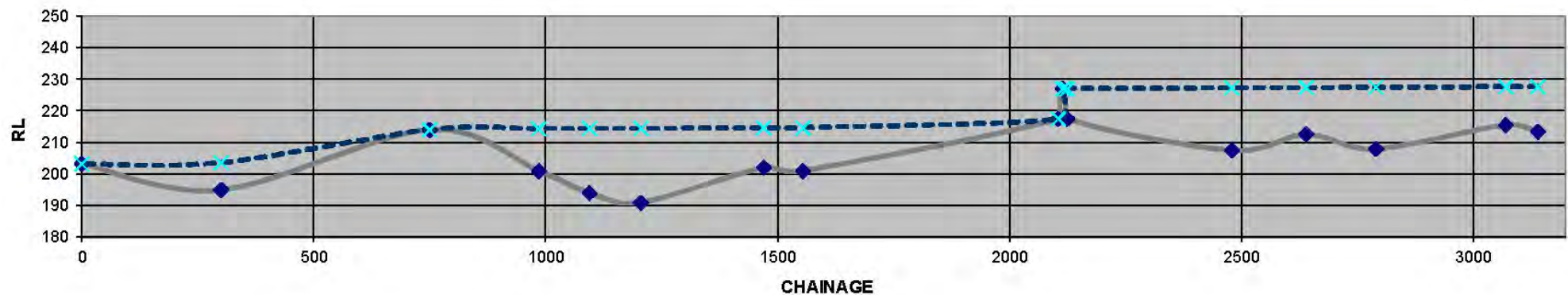
4- Pipe material = Polyethylene 125 $\Phi$  & 110 $\Phi$  PN16 PE100

5- Transfer main control level = RL 227m (AHD) @ approx Chainage 2115 metres

6- Air valves as shown on Wilton Connection Plan

7- Ground RL at connection point = RL 213.5m

**Outputs:** HGL at intersection of Hornby Street & Broughton Street = 227.7m



**Figure 10**

**C - Wilton Village Technical Memorandum Ref 17-02-01-15-01-001**



# TECHNICAL MEMORANDUM

## PRIORITY SEWERAGE PROGRAM TEAM

Brian Road, Appin NSW 2560, Locked Bag 5501, Appin NSW 2560 Australia

<b>Attention</b>	Cowan PSP Alliance Team & Sydney Water Project Officer (Les Zbrog)	<b>Our Ref.</b>	17-02-01-15-01-001
<b>Copy to</b>	Sydney Water Project Officer to distribute to Sydney Water stakeholders	<b>Date</b>	12.02.2013
<b>Subject</b>	Wilton Sewerage Scheme – Basis of Design		
<b>Author</b>	Madelene Abd El-Malek		
<b>Checked by</b>	Victor Chin		

## 1 Introduction

The Wilton Sewerage Scheme is to be delivered as part of the Priority Sewerage Programme (PSP) Stage 3.

Wilton is located within the Wollondilly Shire Council approximately 85 km southwest of the Sydney CBD.

Sydney Water issued a Request for Proposal<sup>1</sup> (RFP) to the PSP Alliance (Alliance) to develop a Target Out-turn Cost design and cost estimate for this scheme.

The purpose of this memo is to present the design basis for the Target Out-turn Cost phase consistent with the RFP, including the properties to be serviced, design criteria, and assumptions.

## 2 Servicing area

The servicing area for Wilton identified in the RFP covers approximately 40 hectares and includes 255 No. properties as shown in Figure 1.

Subsequent to the issue of the RFP, an additional property was added to the servicing area by Sydney Water. It is understood that the Wilton Wastewater Servicing Options Report when issued by Sydney Water. This property is at the northern end of Broughton St on the western side. It is shown in Figure 2 and increases the number of serviced properties to 256 No. in total.

The apparent natural surface levels range from 226 mAHD at the intersection of Argyle St and Almond St to 204 m AHD at the point of connection to the receiving sewer.

<sup>1</sup> Request For Proposal (Sydney Water reference: RFP 006 of 2012, issued 8 October 2012) and subsequent correspondence to clarify scope (refer GEN#0001 on ProjectCentre – PSPDTPD)

# TECHNICAL MEMORANDUM

## PRIORITY SEWERAGE PROGRAM TEAM

Brian Road, Appin NSW 2560, Locked Bag 5501, Appin NSW 2560 Australia

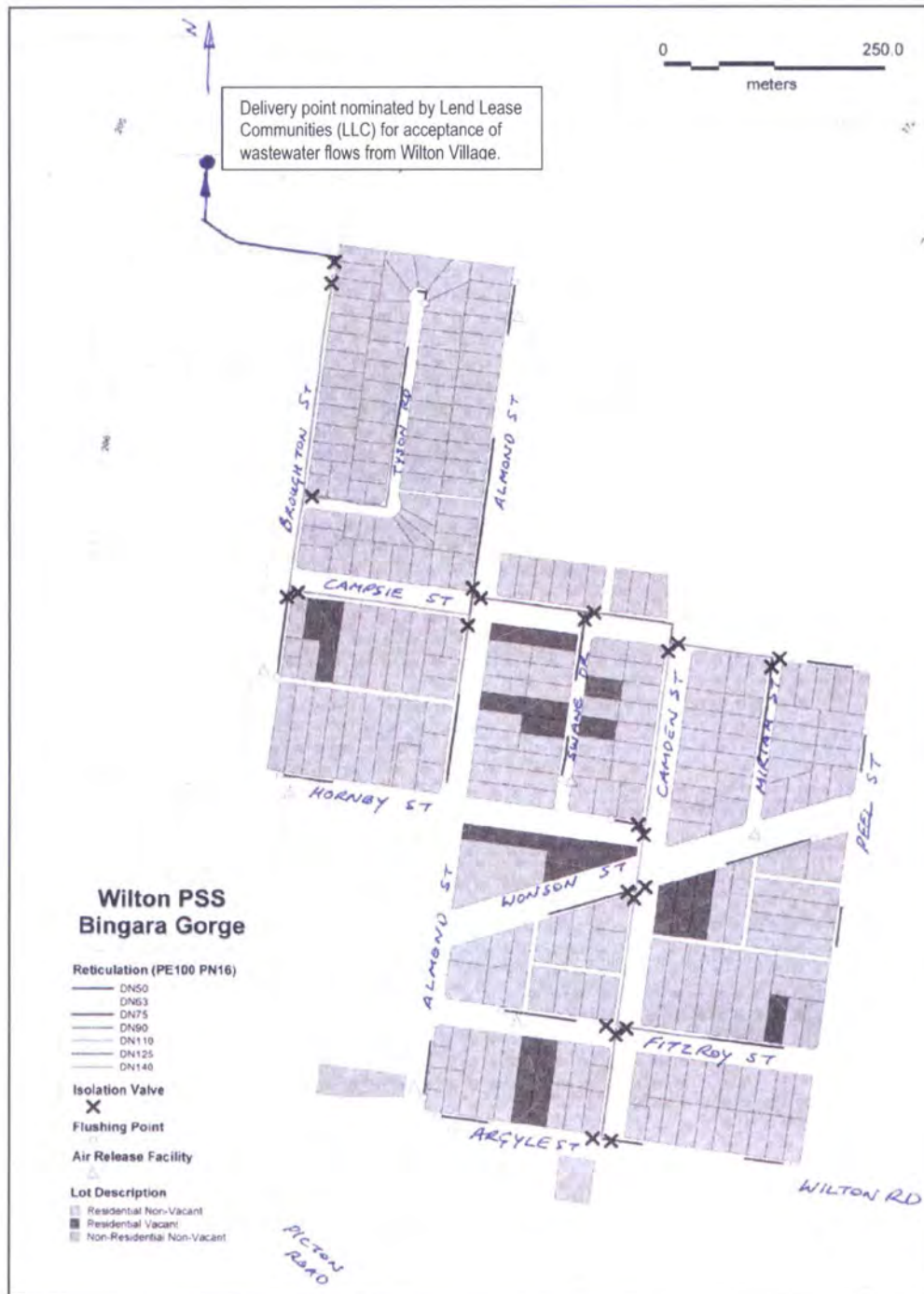
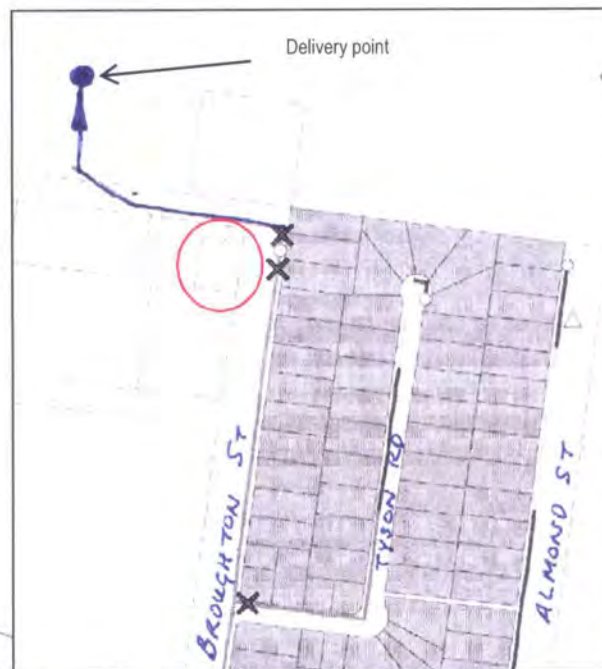


Figure 1 Wilton servicing area

# TECHNICAL MEMORANDUM

## PRIORITY SEWERAGE PROGRAM TEAM

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**Figure 2 Additional property for servicing - subsequent to RFP issue**

A land zone map is included in Appendix A.

The number of lots in the service area is shown in Table 1, categorised according to zoning and occupancy status.

**Table 1 Lots within service area**

Residential Occupied (Zone R2 & R3)	Residential Vacant (Zone R2 & R3)	Non-Residential Occupied (Other)	Non-Residential Vacant (Other)	Total Existing Lots
232	16	7	1	256

Lots that are outside of the service area but have a reticulation main adjacent to their property, are considered consequential lots and may apply for a connection to the system through a Water Services Coordinator once the system is available for connection. Service will only be considered if there is a demonstrable capacity within the system for the additional flows.



## PRIORITY SEWERAGE PROGRAM TEAM

Brian Road, Appin NSW 2560, Locked Bag 5501, Appin NSW 2560 Australia

### 3 Servicing strategy

The identified servicing strategy is a Pressure Sewer System (PSS) within the township. The design shall incorporate PSS infrastructure on each property consisting of a collection tank, a grinder pump, and associated equipment. Each pump will macerate the sewage and pump it into on-property pressurised pipework. The pressurised pipe will then connect into a network of small diameter reticulation mains, conveying flows to the delivery point nominated by LLC.

Lend Lease Communities (LLC) has advised Sydney Water that the delivery point will be approximately 250 m to the northwest of the northern end of Broughton Street. This is in a property (Property Number: 5395726) privately owned by LLC.

At this location, the reticulation infrastructure to be delivered by the Alliance will connect to a proposed pressurised sewer transfer main via a delivery point to be designed and constructed by LLC through its contractor. Both the transfer main and the delivery point will be designed and constructed by LLC. The Alliance understands that this proposed pressure main will discharge to an existing sewage pumping station (SPS) in the Bingara Gorge estate to the west of the Wilton township.

All proposed infrastructure (including that to be provided by the Alliance within the township) will be operated by a sole utilities operator to be determined by LLC.

Consistent with the Sydney Water's servicing policies<sup>2</sup>, the following properties included in the service area will receive subsidised equipment:

- All residential lots (regardless of ET)
- Non-residential lots that discharge less than or equal to 1 ET of non-tradewaste sewage

All other lots within the service area shall be provided with a boundary kit and a property lateral pipe for connection to the scheme. Costs for other on-property infrastructure shall be borne by the lot owner.

Flows from all lots will be included in the design.

Sydney Water has nominated the use of Mono collection tanks and Mono G80 pumps.

<sup>2</sup> *Priority Sewerage Program – Pressure Sewerage Systems, PSP Pressure Sewerage Systems Policy\_02, 20 August 2012, and Policy for Servicing Commercial, Industrial and Publicly-owned Properties by Pressure Sewerage, PSP PSS CIP Policy\_02, 20 August 2012*

## PRIORITY SEWERAGE PROGRAM TEAM

Brian Road, Appin NSW 2560, Locked Bag 5501, Appin NSW 2560 Australia

## 4 Design criteria

### 4.1 Reticulation infrastructure

The design of the reticulation system shall incorporate the use of the Mono Eco 1-80 pressure sewer system. This includes the use of the following components:

- Mono G80 pump
- Mono EMS-180 collection tank (900 L)
- Mono EMS-180B collection tank (2200L, as required)
- Telemetry-capability for each control panel to facilitate centralised control by utilities operator<sup>3</sup>

The design of the reticulation system will comply with 'WSA 07-2007-1.1 - Pressure Sewerage Code of Australia' and the 'Pressure Sewerage System Installation Specification'<sup>4</sup> as developed by the Priority Sewerage Program.

Key criteria from these documents are included below.

- Pipe velocities shall exceed 0.60 m/s at least once per day for the purposes of self-cleansing and slime/grease control
- Where pressure and velocity criteria cannot be both satisfied, preference will be given to the pressure criterion over the velocity criterion
- Air-release points with odour control will be located throughout the network at the critical locations to facilitate the operation of the system, however these shall be minimised to mitigate the impact of odour within the townships
- Vent shafts shall be utilised to facilitate the dispersion of odour where required
- Pipework shall be PE100 PN16 (minimum).
- Pressure reticulation lines shall be equal or greater than DN50.

<sup>3</sup> Mono has advised (Tender 15-TC067 Wilton Telemetry Clarification, R. Pacholek, 23 January 2013) that the standard control panels are telemetry-ready and suitable for a range of telemetry providers. As the specific telemetry provider is yet to be determined by LLC, the Alliance shall supply telemetry-ready control panels.

<sup>4</sup> PSP document reference: 00-09-02-01-01 [7].



## PRIORITY SEWERAGE PROGRAM TEAM

Brian Road, Appin NSW 2560, Locked Bag 5501, Appin NSW 2560 Australia

- The hydraulic roughness value,  $ks_2$ , for PE pressure reticulation sewers shall be 0.75 mm.

## 5 Design assumptions

### 5.1 Property and Township information

- Lot data (boundary, address, property number, size, land use, etc.) shall be sourced from Sydney Water's MapInfo database<sup>5</sup>
- Contour data will be sourced from Sydney Water's MapInfo database<sup>6</sup> for the design of the reticulation system. Topographical survey data shall be sourced for the design of the transfer main.
- Aerial photographs will be sourced from Sydney Water's MapInfo database<sup>7</sup>.

### 5.2 Connections and flow rates

- The existing discharge rate shall be assumed to be 150 L/EP<sup>8</sup>/day.
- The EP:ET ratio shall be assumed to be 3. This results in a discharge rate of 450 L/ET/day.
- Each apparent single-dwelling residential lot will be regarded as 1 ET. The assumed ET for other residential lots will be estimated and agreed with the Sydney Water Project Officer.
- Non-residential ETs will be estimated based on knowledge of land use and winter water consumption where available. Where data is not available, each non-residential lot will be regarded as 2 ET.
- Peak flow rates from individual lots will be limited to 2 L/s.
- The diurnal patterns applied to the average flow rates from residential and non-residential lots will be as per previous PSP schemes. These include a peak residential multiplier of 3.329 at 8:00 am and a peak non-residential multiplier of 2.126 at 12:00 pm. These patterns are included in Appendix B.

<sup>5</sup> "Lot\_coverage" MapInfo table, located in "\\ads.swc\data\hb\data2\psp alliance\E. Program & Schemes Records\17 Wilton\16 GIS Data\01 SW layers 101025"

<sup>6</sup> Contour data located in "\\ads.swc\data\hb\data2\psp alliance\E. Program & Schemes Records\17 Wilton\16 GIS Data\01 SW layers 101025"

<sup>7</sup> Located in "\\ads.swc\data\hb\data2\psp alliance\E. Program & Schemes Records\17 Wilton\16 GIS Data\04 Aerial photos"

<sup>8</sup> Equivalent Population



## PRIORITY SEWERAGE PROGRAM TEAM

Brian Road, Appin NSW 2560, Locked Bag 5501, Appin NSW 2560 Australia

- The ultimate connection scenario shall be addressed in the design. This shall include all lots within the service area and 10% additional ETs to account for growth in the town. This growth will be represented by a general 5% increase to estimated current discharge rates and 13 No. specific additional connections, equivalent to the remaining 5% growth in residential ETs. Therefore the ultimate connection scenario will be designed to account for 282 Lots (i.e. 256 plus an additional 10% growth).

### 5.3 Reticulation infrastructure

The design of the reticulation system shall be undertaken using both a steady-state approach and an unsteady<sup>9</sup> model using the H2OMap software.

The design shall assume the following equipment based on lot type (refer to Table 2).

**Table 2 Equipment According to Lot Type**

Lot type	Equipment
Residential	<p>1 ET connections...</p> <ul style="list-style-type: none"> <li>1 ET connections: 1 x Mono EMS-180 collection tank, 1 Mono G80 pump</li> </ul> <p>Other connections...</p> <ul style="list-style-type: none"> <li>Duplex connections: 1 x Mono EMS-180B collection tank, 1 Mono G80 pumps</li> </ul>
Non-residential (1ET)	<ul style="list-style-type: none"> <li>1 ET connections: 1 x Mono EMS-180 collection tank, 1 Mono G80 pump</li> </ul>
Non-residential (>1ET)	<ul style="list-style-type: none"> <li>2 ET connections: 1 x Mono EMS-180B collection tank, 2 Mono G80 pump</li> <li>&gt; 2 ET connection: 1 x 2m-deep collection tank with volume equal to 24hrs of average flow, and a maximum of 2 Mono G80 pumps</li> </ul>

Performance curves for the pumps are included in Appendix C.

### 5.4 Receiving system

The receiving system downstream of the delivery point will comprise of a transfer main which will be designed and constructed by LLC and pump station which is already in place however it may require some upgrades to account for the increased flows from Wilton. Hence the design of the Wilton reticulation system shall assume the following:

<sup>9</sup> Unsteady modelling accounts for diurnal variations and dynamic interactions within the system.

# TECHNICAL MEMORANDUM

## PRIORITY SEWERAGE PROGRAM TEAM

Brian Road, Appin NSW 2560, Locked Bag 5501, Appin NSW 2560 Australia

- The receiving system has sufficient capacity for Wilton PSS flows
- The discharge point within the receiving system at the Bingara Gorge SPS shall be at RL227 mAHD, such that positive static pressure can be maintained on the Wilton pressure sewer system (RL 226 mAHD at the highest point – intersection of Argyle St and Almond St)
- The transfer main shall be 1.1 km in length between the Wilton PSS delivery point and the Bingara Gorge SPS, this allows the PSP design team to assume head losses along this pipe in the order of 1m/100m for the total length of the main, i.e. 11m.
- In lieu of a diurnal pattern of upstream flows and transfer main pipe details, the transfer main conveying flows from the Wilton PSS delivery point to the Bingara Gorge SPS shall have a constant hydraulic grade line slope of 1 m / 100 m, excluding Wilton PSS flows.
- The transfer main shall have appropriate air management to not impose any additional head on the Wilton PSS

The design of the Wilton PSS shall not include the design of any aspects downstream of the delivery point. As such, the Alliance shall assume that the Wilton PSS shall pump against a constant head at RL238 mAHD (1 m static head from Bingara Gorge SPS discharge + 11 m friction head from transfer main) at the delivery point.

The implications for these assumptions are that any reporting on the performance of the Wilton PSS will be an estimate only.

A significant further implication is that LLC shall be required to design and construct downstream infrastructure consistent with these assumptions. Given that the natural surface level at the Bingara Gorge SPS is approximately RL 188 mAHD, a pressure (barometric) loop of approximately 40 m is an unrealistic option.

# TECHNICAL MEMORANDUM



## PRIORITY SEWERAGE PROGRAM TEAM

Brian Road, Appin NSW 2560, Locked Bag 5501, Appin NSW 2560 Australia

## 6 Appendices

### Appendix A

Local Environmental Plan 2011 – Land Zoning Map

DRAFT

17-02-01-15-01-001 [B] WI - Basis of Design

Sydney Water

ABN 49 776 225 038

MWH

ABN 17 007 820 322

UGL

ABN 96 096 365 972

John Holland Pty Ltd

ABN 11 004 282 268

Manidis Roberts

ABN 42 003 550 972



# TECHNICAL MEMORANDUM

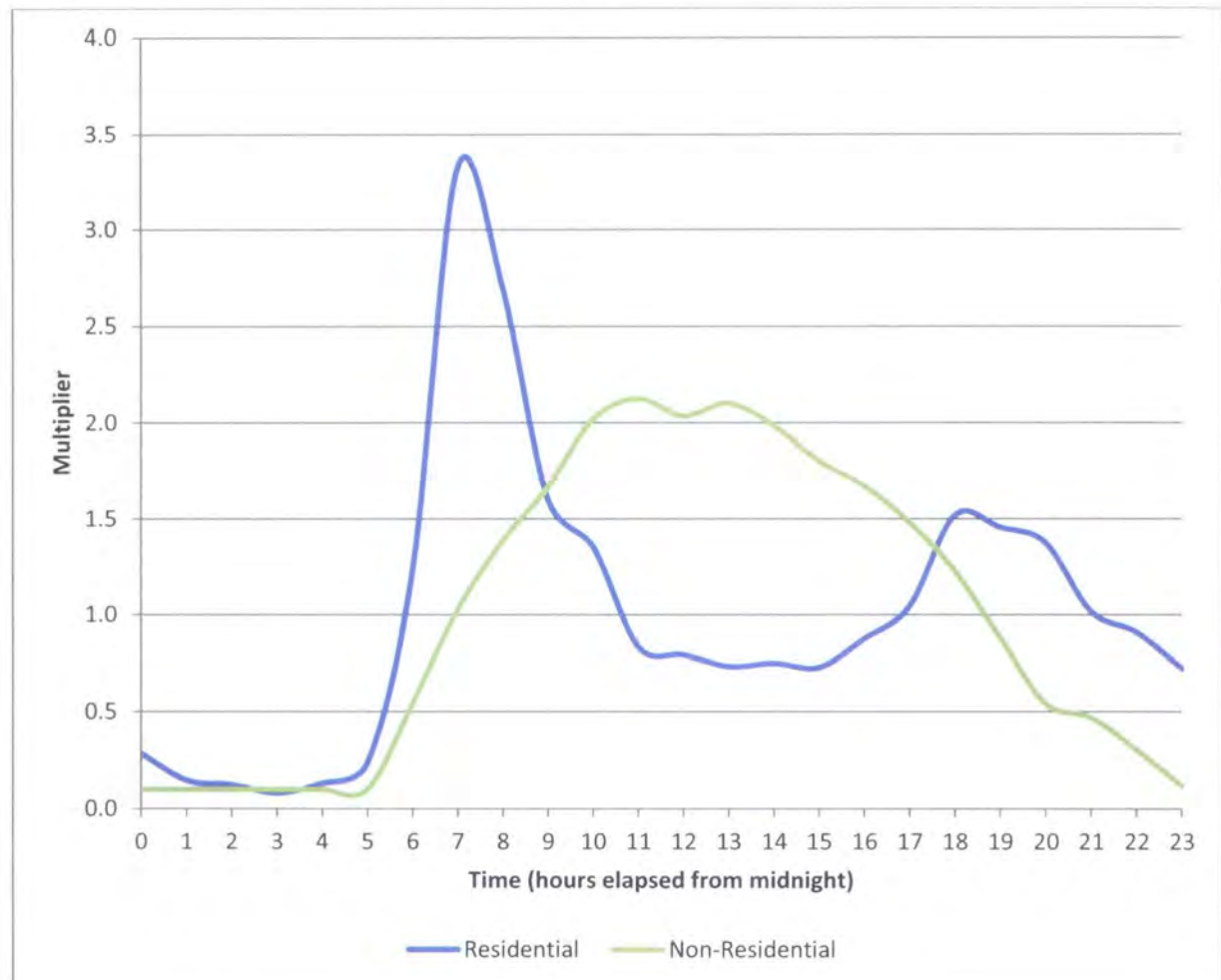


## PRIORITY SEWERAGE PROGRAM TEAM

Brian Road, Appin NSW 2560, Locked Bag 5501, Appin NSW 2560 Australia

### Appendix B

Diurnal pattern for residential and non-residential lots



17-02-01-15-01-001 [B] WI - Basis of Design

Sydney Water

ABN 49 776 225 038

MWH

ABN 17 007 620 322

UGL

ABN 96 096 365 972

John Holland Pty Ltd

ABN 11 004 282 268

Manidis Roberts

ABN 42 003 550 972

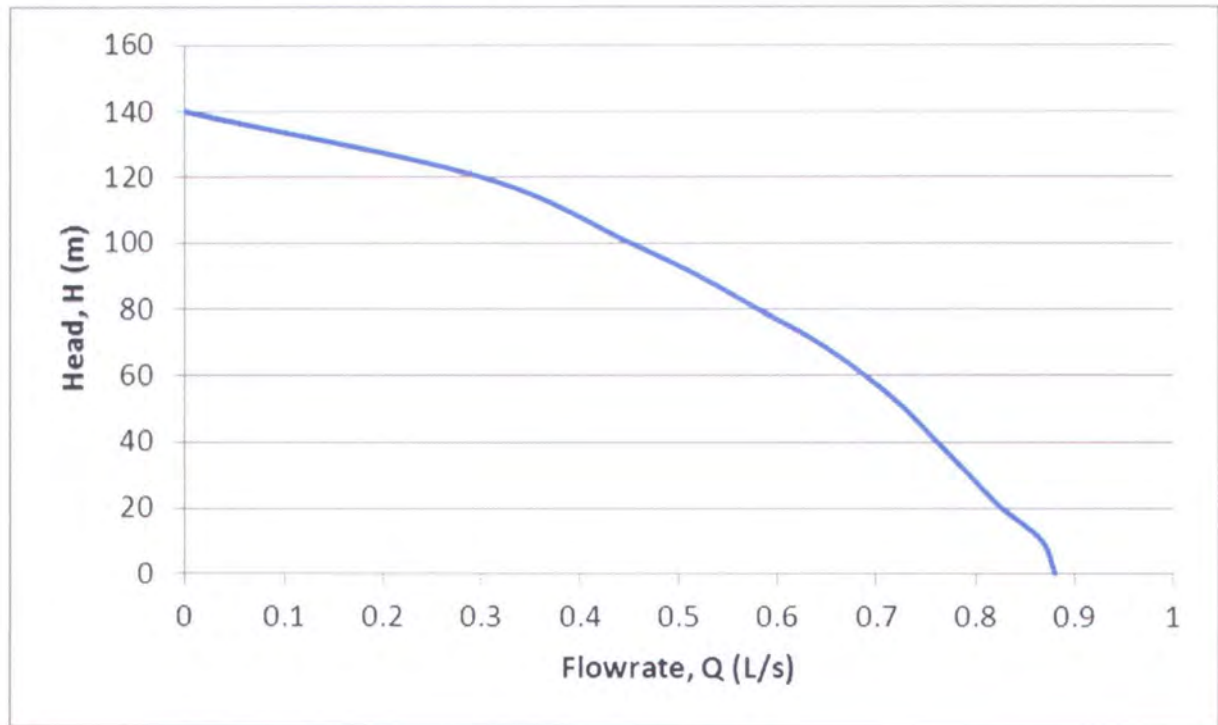
# TECHNICAL MEMORANDUM

## PRIORITY SEWERAGE PROGRAM TEAM

Brian Road, Appin NSW 2560, Locked Bag 5501, Appin NSW 2560 Australia

### Appendix C

Pump performance curve – Mono G80 pump



17-02-01-15-01-001 [B] WI - Basis of Design

Sydney Water

ABN 49 776 225 038

MWH

ABN 17 007 820 322

UGL

ABN 96 096 365 972

John Holland Pty Ltd

ABN 11 004 282 268

Manidis Roberts

ABN 42 003 550 972



**D - Wilton Estimated Peak Flow (Email From Les Zbrog To Jamie Howieson Dated 25/03/13)**

**From:** ZBROG, LES [<mailto:Les.Zbrog@sydneywater.com.au>]  
**Sent:** Monday, 25 March 2013 7:09 PM  
**To:** Howieson, Jamie  
**Cc:** 'wayne@solowater.com.au' ([wayne@solowater.com.au](mailto:wayne@solowater.com.au)); [steve.wallace@pssolutions.net.au](mailto:steve.wallace@pssolutions.net.au); BUTLER, IAN; RUMI, ENRICO; MANGALAM, RAJU; MARRONE, BERT; CHIN, VICTOR  
**Subject:** Estimated Peak Flow - Wilton Village Pressure Sewer System

Hi Jamie,

Please find below our estimate of the peak flow rate for WVPSS.

**DISCHARGE ASSUMPTIONS**

- 150 L/EP/day
- 3 EP/ET
- 450 L/ET/day

**CONNECTION INPUTS**

Type	ET	No.	Base ET	Growth multiplier	Ultimate ET
Residential	1.0	252	252.0	1.05	264.6
Focussed residential growth (5% of residential base ET)	1.0	13	13.0	1	13.0
Non-residential: Camden St (P/N 5367209)	1.0	1	1.0	1	1.0
Non-residential: Lot 1, Broughton St	2.0	1	2.0	1	2.0
Non-residential: 1105 Argyle St	2.0	1	2.0	1	2.0
Non-residential: 1107 Argyle St	1.4	1	1.4	1	1.4
<b>Total ET</b>					<b>283.9</b>





## ESTIMATED ULTIMATE FLOW RATES

ADWF = 283.9 ET x 0.45 kL/ET/day = 127.8 kL/day

PDWF from modelling...

Percentile (th %ile)	Q (L/s)
100	10.8
99	7.3
95	5.3
90	4.5
50	1.5

Note that the peak multipliers cited in the Basis of Design document refer to discharge patterns applied at the property nodes in our model – we do not apply them at a scheme-wide level.

The 10.8 L/s value that was mentioned in our recent meeting is the instantaneous peak flow from the hydrograph – modelling results registered this value as a 'blip' during a morning peak when a number of pump operations would have coincided for a brief period (in this case, one modelling time-step).

For a dependable PDWF, it would be more realistic to use the **95<sup>th</sup> %ile Q = 5.3 L/s**.

We typically do not make an additional allowance for infiltration/inflow along the sanitary drain. As part of the connection process on PSP schemes, customers are required to ensure sanitary drain plumbing meets Australian Standards. Prior to connection, an inspection is undertaken to ensure pipework integrity. Defects have to be rectified as a pre-requisite to connecting to the scheme.

Les Zbrog | Project Delivery Officer  
 Priority Sewerage Program  
 Infrastructure Delivery | Sydney Water  
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**D - Wilton Estimated Peak Flow Email From Les Zbrog To Jamie Howieson  
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**To:** Howieson, Jamie  
**Cc:** 'wayne@solowater.com.au' ([wayne@solowater.com.au](mailto:wayne@solowater.com.au)); [steve.wallace@pssolutions.net.au](mailto:steve.wallace@pssolutions.net.au); BUTLER, IAN; RUMI, ENRICO; MANGALAM, RAJU; MARRONE, BERT; CHIN, VICTOR  
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<b>Total ET</b>					<b>283.9</b>



## ESTIMATED ULTIMATE FLOW RATES

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Les Zbrog | Project Delivery Officer  
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## **APPENDIX B – PRESSURE SEWER TRANSFER MAIN DRAWINGS**

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### **LIST OF DRAWINGS**

- 130830-RM000 – Pressure Sewer Transfer Main Cover Sheet
- 130830-RM001 – Pressure Sewer Transfer Main Layout Plan & Longitudinal  
Section Sheet 1 of 5
- 130830-RM002 – Pressure Sewer Transfer Main Layout Plan & Longitudinal  
Section Sheet 2 of 5
- 130830-RM003 – Pressure Sewer Transfer Main Layout Plan & Longitudinal  
Section Sheet 3 of 5
- 130830-RM004 – Pressure Sewer Transfer Main Layout Plan & Longitudinal  
Section Sheet 4 of 5
- 130830-RM005 – Pressure Sewer Transfer Main Layout Plan & Longitudinal  
Section Sheet 5 of 5
- 130830-RM006 – Pressure Sewer Transfer Main High Pressure Gas  
Easement Crossing Details
- 130830-RM101 – Pressure Sewer Transfer Main Pinch Valve Detail
- 130830-RM102 – Miscellaneous Details
- 130830-RM103 – Air Valve Details Sheet 1 of 2
- 130830-RM104 – Air Valve Details Sheet 2 of 2

