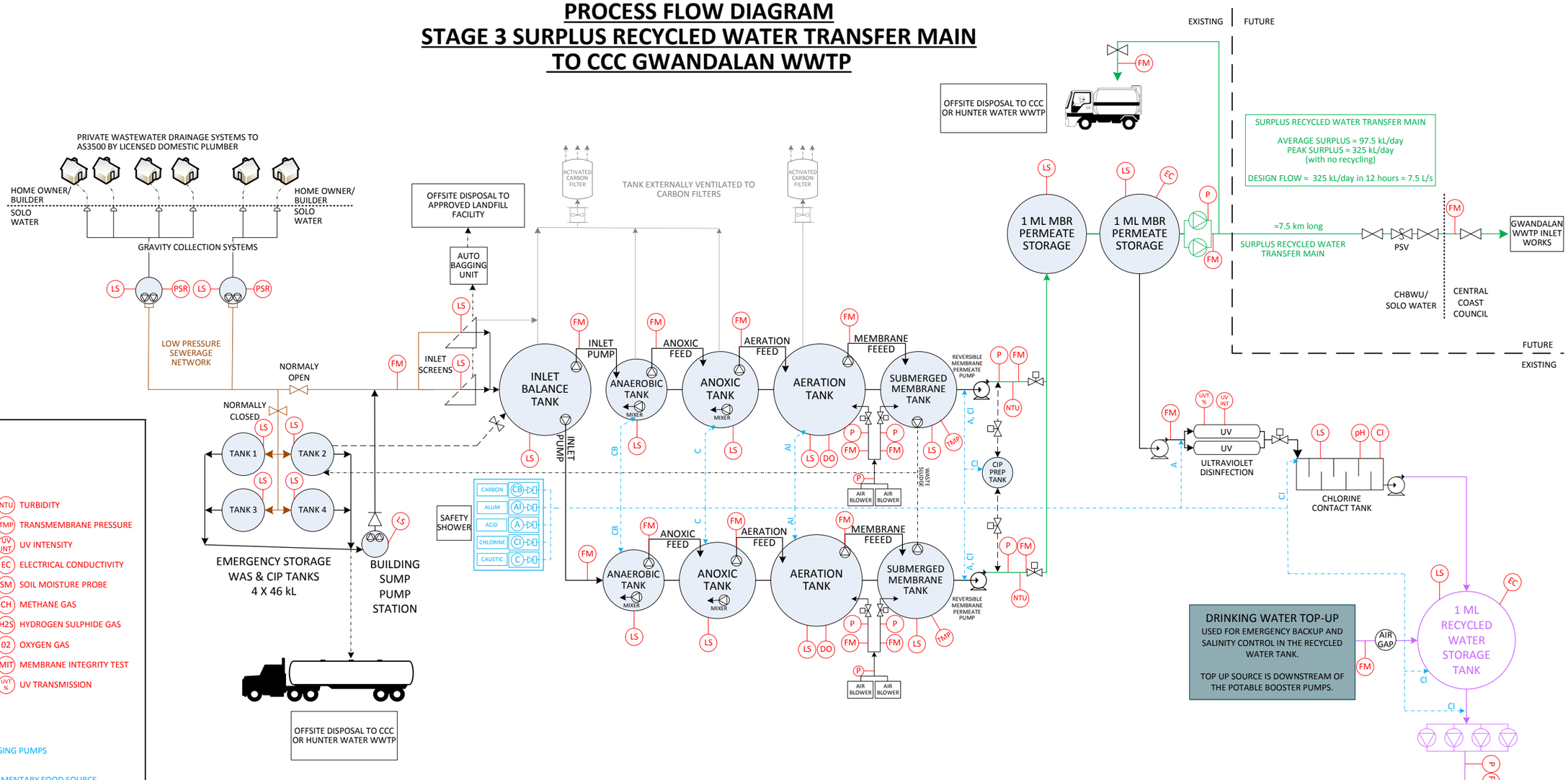
PROCESS FLOW DIAGRAM
STAGE 3 SURPLUS RECYCLED WATER TRANSFER MAIN TO CCC GWANDALAN WWTP



LEGEND

PROCESS MONITORING

- FM FLOW METER
- P PRESSURE
- PSR PUMP STARTS AND RUN HOURS
- LS WATER LEVEL
- DO DISSOLVED OXYGEN
- SS MIXED LIQUOR SUSPENDED SOLIDS
- pH pH
- Cl FREE CHLORINE RESIDUAL
- WS WEATHER STATION
- NTU TURBIDITY
- TMP TRANSMEMBRANE PRESSURE
- UV INT UV INTENSITY
- EC ELECTRICAL CONDUCTIVITY
- SM SOIL MOISTURE PROBE
- CH METHANE GAS
- H2S HYDROGEN SULPHIDE GAS
- 02 OXYGEN GAS
- MIT MEMBRANE INTEGRITY TEST
- UVT % UV TRANSMISSION

PROCESS CHEMICALS

- BUNDED CHEMICAL STORAGE AREA
- BUNDED CHEMICAL CONTAINERS AND DOSING PUMPS
- CHEMICAL DELIVERY LINES
- CB ACETIC ACID (CARBON) DOSING AS SUPPLEMENTARY FOOD SOURCE
- Al POLYALUMINIUM CHLORIDE DOSING FOR PHOSPHORUS REMOVAL
- Cl SODIUM HYPOCHLORITE FOR CHLORINATION
- A ACID FOR pH CORRECTION AND MEMBRANE CLEANING
- C SODIUM HYDROXIDE (CAUSTIC) FOR pH CORRECTION & MEMBRANE CLEANING

PROCESS EQUIPMENT

- INLET SCREEN
- MEMBRANE BIOREACTOR PROCESS TANKS
- SUBMERSIBLE PUMP
- DRY-MOUNTED PUMP
- MIXING PUMP
- MOTORISED VALVE
- HOUSEHOLD SEWERAGE CONNECTION POINT
- MANUAL VALVE
- VARIABLE SPEED DRIVE PUMP SET

ULTRAVIOLET DISINFECTION SYSTEM
SELF CLEANING SYSTEM WITH UV INTENSITY MONITORING
UV TRANSMISSION OF 60%
USEPA ACCREDITED UV DISINFECTION SYSTEM

CHLORINE CONTACT TANK
CONTACT TANK TO BE DESIGNED TO USEPA GUIDELINES TO ACHIEVE CT VALUES FOR THE REQUIRED LOG REMOVAL TARGETS

CLIENT: ROSE PROPERTY GROUP PTY LTD	PROJECT: BEACHES RESIDENTIAL SUBDIVISION MONTEFIORE STREET, CATHERINE HILL BAY	PHASE: STAGE 3 SURPLUS RECYCLED WATER TRANSFER MAIN	NETWORK OPERATOR: CATHERINE HILL BAY WATER UTILITY PTY LTD	DRAWING TITLE: PROCESS FLOW DIAGRAM STAGE 3 SURPLUS RECYCLED WATER TRANSFER MAIN	DRAWING NUMBER: 56-RW-PFD-ST3-1C DATE: 12/4/2019

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Engineering

Working Beyond Expectations

Design Report

Surplus Recycled Water Transfer Scheme to Gwandalan STP

Property:
Recycled Water Treatment Plant Site
46 Rockpool Road, Catherine Hill Bay Water

Applicant:
Coastal Hamlets Pty Limited

Date:
September 2019

Document Control Sheet

Issue No.	Amendment	Date	Prepared By	Checked By
A	Draft	15th July 2019	RJ	CB
B	Final	19th September 2019	RJ	CB

Executive Summary

ADW Johnson Pty. Limited (ADW Johnson) has been commissioned by Coastal Hamlets Pty Ltd to design and obtain approvals for the construction of a surplus recycled water transfer scheme pipeline from the Catherine Hill Bay (CHB) Recycled Water Treatment Plant (RWTP), operated by Catherine Hill Bay Water Utility Pty Ltd (CHBWU), to Gwandalan Sewage Treatment Plant (STP), operated by Central Coast Council. The engagement covers the provision of civil engineering, survey and planning services for the construction of a surplus recycled water transfer main.

The RWTP as part of *The Beaches* subdivision at CHB will generate excess recycled water. Under the current approvals, disposal is via onsite irrigation. Since approval, an arrangement to discharge to Central Coast Council's Gwandalan STP via private transfer main and pumping station has been secured, removing the need for onsite irrigation.

The proposed surplus recycled water transfer main (SRWTM) route includes construction within NSW National Parks and Wildlife Services (NPWS) land, a crossing of the Roads and Maritime Services (RMS) road on the Pacific Highway and construction along Kanangra Drive and Summerland Road, Gwandalan. The proposed pipeline section along Kanangra Drive and Summerland Road requires a Development Application (DA) under Part 4 of the Environmental Planning & Assessment Act 1979 (EP&A Act) with Central Coast Council as the Determining Authority. The part within NPWS land, including the RMS crossing, requires a Review of Environmental Factors (REF) under Part 5 of the EP&A Act. CHBWU will also seek overall approval of decommissioning the existing reverse osmosis (RO) ponds and transfer main connecting the existing sewer service from Montefiore Street to the transfer main within NPWS land under Part 5 of the EP&A Act from the Independent Pricing and Regulatory Tribunal (IPART).

The design of the surplus recycled water transfer pipeline has been completed as two separate components to facilitate the split approval process.

Following an iterative design process, it was deemed a single solution was the only practicable solution available following correspondence and requirements posed by the various controlling authorities including Solo Water, RMS and Central Coast Council.

The proposed design of the pumping station and surplus recycled water transfer pipeline includes the following components:

- Re-use of the existing irrigation water pump station with inclusion of standby 'hot spare';
- Re-use of the existing suction and discharge lines;
- Supply and installation of DN140 PE100 DN16 pipe from chainage 0.0 m to 4,677 m;
- DN100 Bermad 700 Series Model 730 Pressure Sustaining/Relief Valve at chainage 4,677 m;
- Supply and installation of DN125 PE PN16 pipe from chainage 4,677 m to 7,959 m; and
- Connection to the Gwandalan Sewage Treatment Plant inlet works chamber.

The proposed design provides a solution able to meet hydraulic requirements while minimising capital and operational costs and meeting all Authority requirements specified as part of the project.

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1.0 Introduction

ADW Johnson Pty. Limited (ADW Johnson) has been commissioned by Coastal Hamlets Pty Ltd to design and obtain approvals for the construction of a surplus recycled water transfer scheme pipeline from the Catherine Hill Bay (CHB) Recycled Water Treatment Plant (RWTP), operated by Solo Water Pty Ltd (Solo Water), to Gwandalan Sewage Treatment Plant (STP), operated by Central Coast Council. ADW Johnson are to provide civil engineering, survey and planning services for the preparation of design plans and a Development Application (DA) for the section along Kanangra Drive to obtain development consent from Central Coast Council for the construction of a surplus recycled water transfer main.

The proposed surplus recycled water transfer main (SRWTM) route includes construction within NSW National Parks and Wildlife Services (NPWS) land, a crossing of the Roads and Maritime Services (RMS) road on the Pacific Highway and construction along Kanangra Drive and Summerland Road, Gwandalan. The proposed pipeline section along Kanangra Drive and Summerland Road requires a Development Application (DA) under Part 4 of the Environmental Planning & Assessment Act 1979 (EP&A Act) with Central Coast Council as the Determining Authority. The part within NPWS land, including the RMS crossing, requires a Review of Environmental Factors (REF) under Part 5 of the EP&A Act. CHBWU will also seek overall approval of decommissioning the existing reverse osmosis (RO) ponds and transfer main connecting the existing sewer service from Montefiore Street to the transfer main within NPWS land under Part 5 of the EP&A Act from the Independent Pricing and Regulatory Tribunal (IPART).

The design of the surplus recycled water transfer pipeline has been completed as two separate components to facilitate the split approval process.

The SRWTM has been further split into three distinct physical segments:

- Segment 1: CHB RWTP to Pacific Highway;
- Segment 2: Pacific Highway to Kanangra Drive; and
- Segment 3: Kanangra Drive to Gwandalan STP.

This report will discuss all three segments for the purposes of the design of the SRWTM.

2.0 Site Description

The proposed SRWTM alignment runs from the CHB RWTP located off Montefiore Street, Catherine Hill Bay to Gwandalan STP located off Summerland Road, Gwandalan.

An existing bulk potable water main (BPWM) approximately 6.5 km in length delivers drinking water from Central Coast Council's area of operations at Kanangra Drive Reservoir via a new transfer pumping station to the development site known as *The Beaches - Catherine Hill Bay*. The BPWM is DN200 polyethylene (PE) for the majority of the alignment with a section of DN150 stainless steel pipe approximately 120 m in length for an above ground crossing of the Pacific Highway through an existing services culvert. The proposed SRWTM is to generally follow the alignment of the existing BPWM.

The site location showing the existing CHB RWTP, Gwandalan STP, Gwandalan Water Supply Reservoir and BPWM alignment is shown in **Figure 1**.

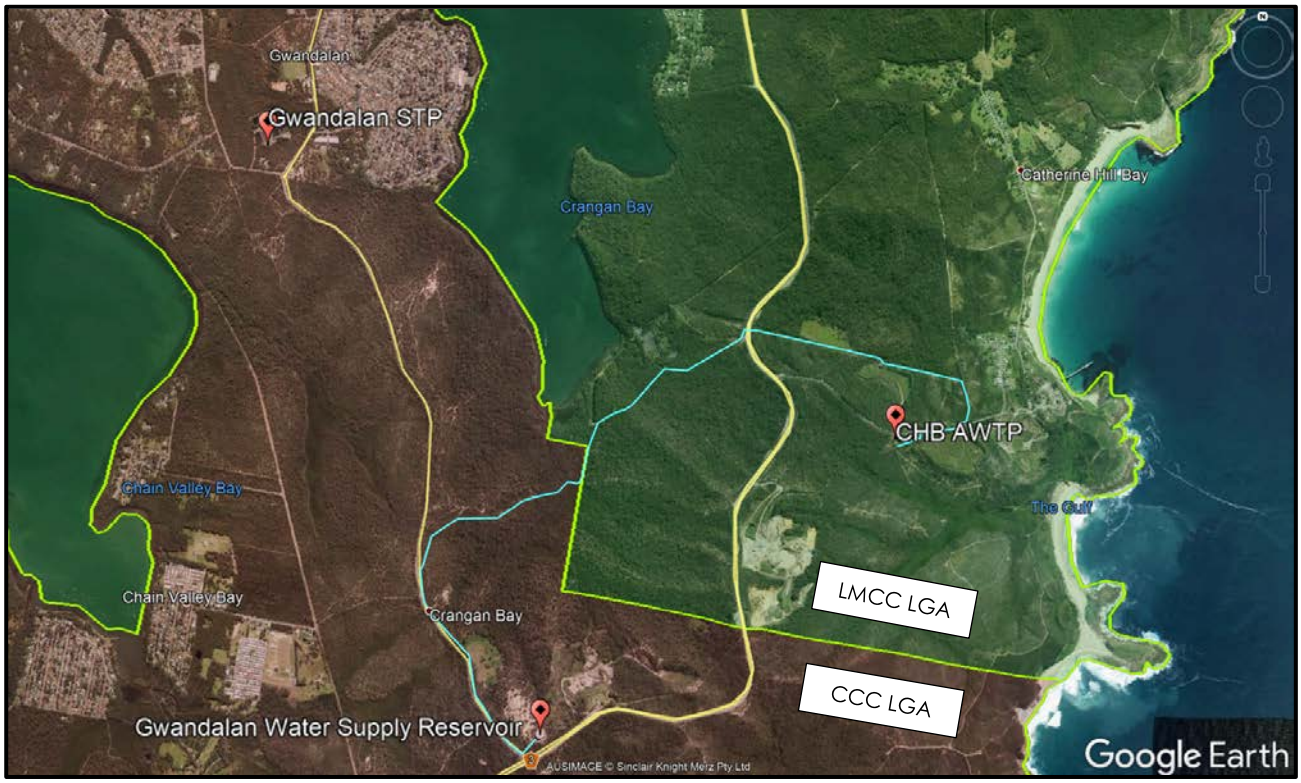

Figure 1 – Site Location.

2.1 APPLICABLE LOCAL GOVERNMENT AREAS

The pipe alignment and site footprints are located within both Lake Macquarie City Council (LMCC) Local Government Area (LGA) and Central Coast Council (CCC) LGA, as shown in **Figure 1**. The engagement focusses on approvals within CCC LGA, as the components of the scheme and associated approvals required within LMCC LGA are considered to be constructed and approved already.

2.2 NETWORK OPERATOR

Under Section 10 of the Water Industry Competition Act (WICA) 2006 NSW, a network operator's licence has been granted to Catherine Hill Bay Water Utility Pty Ltd (CHBWU) authorising the licensee and any authorised persons to construct, maintain and operate the water industry infrastructure specified in the licence. Solo Water is an authorised person under the WICA licence.

Activities authorised under the WICA licence include non-potable water, drinking water and sewerage services. This engagement is primarily focused with the provision of non-potable water services.

The CHBWU network operator's license is to be updated to include the SRWTM.

3.0 Pipe Alignment

The proposed SRWTM alignment runs from the CHB RWTP located off Montefiore Street, Catherine Hill Bay to Gwandalan STP located off Summerland Road, Gwandalan. The pipe alignment was selected from the preferred options taking into consideration the following:

- Constructability;
- Existing services;
- Make use of currently installed underground pipeline;
- Consultation with authorities and affected stakeholders;
- Impacts on the public;
- Environmental and planning considerations;
- Restoration requirements;
- Geotechnical and sub-surface conditions;
- Design constraints;
- Methodology for connecting to existing infrastructure;
- Cost consideration; and
- Work, health and safety.

The pipe alignment and alternative routes are discussed below in further details as three distinct sections.

3.1 SEGMENT 1 – CHB RWTP TO PACIFIC HIGHWAY CROSSING

Segment 1 provided two route options from the CHB RWTP to the Pacific Highway. The two sub-segments are discussed in further detail below. Both proposed route options include connection to the existing DN125 PE irrigation water main that currently transfers surplus irrigation (permeate) water from the CHB RWTP to *The Beaches Water Sound* stage release on Lot 1116 DP 1219395. It is proposed to connect to the existing DN125 PE irrigation water main at the roundabout intersection of Montefiore Street and Sunnyspot Boulevard. All suction and discharge pipework to the Irrigation Water Pump Station (IWPS) is proposed to be re-used. For the purposes of hydraulic design following confirmation with Solo Water, the following pipeline section and details proposed for re-use includes:

- Suction pipework – DN200 PE100 PN16 13m long from 1 ML MBR Permeate Tank 1 to the IWPS;
- Discharge pipework section 1 – DN125 PE100 PN16 – 82m long from the IWPS to boundary of the CHB RWTP (NOTE: this section of pipe is shown as DN200 PE100 PN16 on the As Constructed Catherine Hill Bay Waste Water Treatment Plant Civil Engineering Design Drawings SW-56-WWTP-WAE-1030 but is confirmed to be DN125 by Solo Water); and
- Discharge pipework section 2 – DN125 PE100 PN16 approx. 430m long from the boundary of the CHB RWTP to the proposed connection point at the intersection of Montefiore Street and Sunnyspot Boulevard.

3.1.1 Segment 1 Route Option A – BPWM Alignment

Segment 1 route option A is approximately 1.8 km in length and follows the alignment of the existing BPWM which traverses the following lots:

- CHB RWTP – Lot 1120 DP 1219395;
- Crossing of Montefiore Street (Lake Macquarie City Council);
- Along Montefiore Street road reserve (Lake Macquarie City Council);
- Lot 105 DP 1129872;
- Lot 204 DP 1164883; and
- Crossing of Pacific Highway (RMS).

The Segment 1 route option A alignment follows the existing BPWM alignment throughout greenfield areas, adjacent *The Beaches Water Sound* stage release on Lot 1116 DP 1219395. The key design constraints exist near the crossing of the Pacific Highway on the embankment with maximum grade of approximately 40% alongside the existing BPWM DN150 stainless steel pipe section.

The preferred method of crossing the Pacific Highway is via trenchless methods adhering to Roads & Maritime Services (RMS) requirements including provision within a DN375 grout-filled encasing pipe beneath the road pavement. Space and access constraints existing at entry/exit pit sites requires for the trenchless method of construction.

An alternative method considered as part of the design included laying the pipe in the existing services culvert which currently houses the DN150 stainless steel BPWM. It was found that the existing services culvert has limited capacity to additionally house the SRWTM without removing and reinstating the BPWM. The existing steep embankment on either side of the Pacific Highway crossing introduces constructability issues regarding plant access and operation in order to utilise the services culvert. After consultation with the civil contractor that installed the BPWM in the service culvert previously, it was deemed this alternative for laying dual pipes in the existing services culvert as more expensive and hence not preferred.

Given that the alignment is primarily within NPWS lands and follows the same alignment as the BPWM, an easement will be established to cover both the BPWM and the SRWTM throughout this segment.

3.1.2 Segment 1 Route Option B – Montefiore Street Alignment

Segment 1 route option B is approximately 1.4 km in length and includes following the Montefiore Street road reserve alignment towards the traffic light intersection at the Pacific Highway and traverses the following lots:

- CHB RWTP – Lot 1120 DP 1219395;
- Crossing of Montefiore Street (Lake Macquarie City Council);
- Along Montefiore Street road reserve (Lake Macquarie City Council);
- Along Pacific Highway road reserve (RMS); and
- Crossing of Pacific Highway (RMS).

The Segment 1 route option B alignment follows the road reserve along Montefiore Street and the Pacific Highway. Preliminary services enquiries show minimal to no existing services being located on the northern side of the Montefiore Street road reserve, being the favourable alignment option over the southern side.

This route option requires the installation of the SRWTM within the RMS road reserve parallel to the Pacific Highway before crossing beneath in the same vicinity where the existing BPWM crosses. Crossing at this location ensures both mains are covered by a common easement and it is the most logical location to cross under the Pacific Highway.

This section alignment includes an embankment with multiple stormwater culvert crossings and an existing optic fibre service line.

As per Segment 1 route option A, the preferred method of crossing the Pacific Highway is via trenchless methods requiring a specialist trenchless subcontractor to install with analogous constraints.

In consultation with the construction contractor who laid the BPWM, it was deemed that the option Segment 1 route option B was not preferred due to location of existing services constraints, presence of rock, extensive landscaping re-instatement cost, and general constructability issues.

Segment 1 route option A is therefore the preferred alignment for Segment 1.

3.2 SEGMENT 2 – PACIFIC HIGHWAY CROSSING TO KANANGRA DRIVE

Segment 2 is approximately 2.85 km in length and includes following the alignment of the existing BPWM which traverses the following lots:

- Lot 204 DP 1164883;
- Lot 12 DP 1180296;
- Crosses existing Crown Land road reserve; and
- Lot 12 DP 1180296.

Segment 2 alignment requires following the existing BPWM through NPWS lands. It is considered for purposes of the planning approval and design process that no alternative alignment options are considered. It is understood that an easement will be established to cover both the BPWM and the SRWTM throughout this segment.

3.3 SEGMENT 3 – KANANGRA DRIVE TO GWANDALAN STP

Segment 3 is approximately 3.3 km in length and follows Kanangra Drive road reserve to Gwandalan STP via the round-a-bout intersection of Kanangra Drive and Summerland Road, Gwandalan. The alignment of Segment 3 includes:

- Along Kanangra Drive road reserve (Central Coast Council);
- Crossing Kanangra Drive (Central Coast Council);
- Along Summerland Road road reserve (Central Cost Council); and
- Gwandalan STP – Lot 52 DP 785458.

Segment 3 alignment follows the northern road edge line along Kanangra Drive. Minimal space is available between the existing road edge line and tree line. There is potential to move to the other side of Kanangra, although competing underground services exist including a critical asbestos cement (AC) watermain and overhead power transmission lines.

The proposed SRWTM alignment is shown in **Figure 2**.

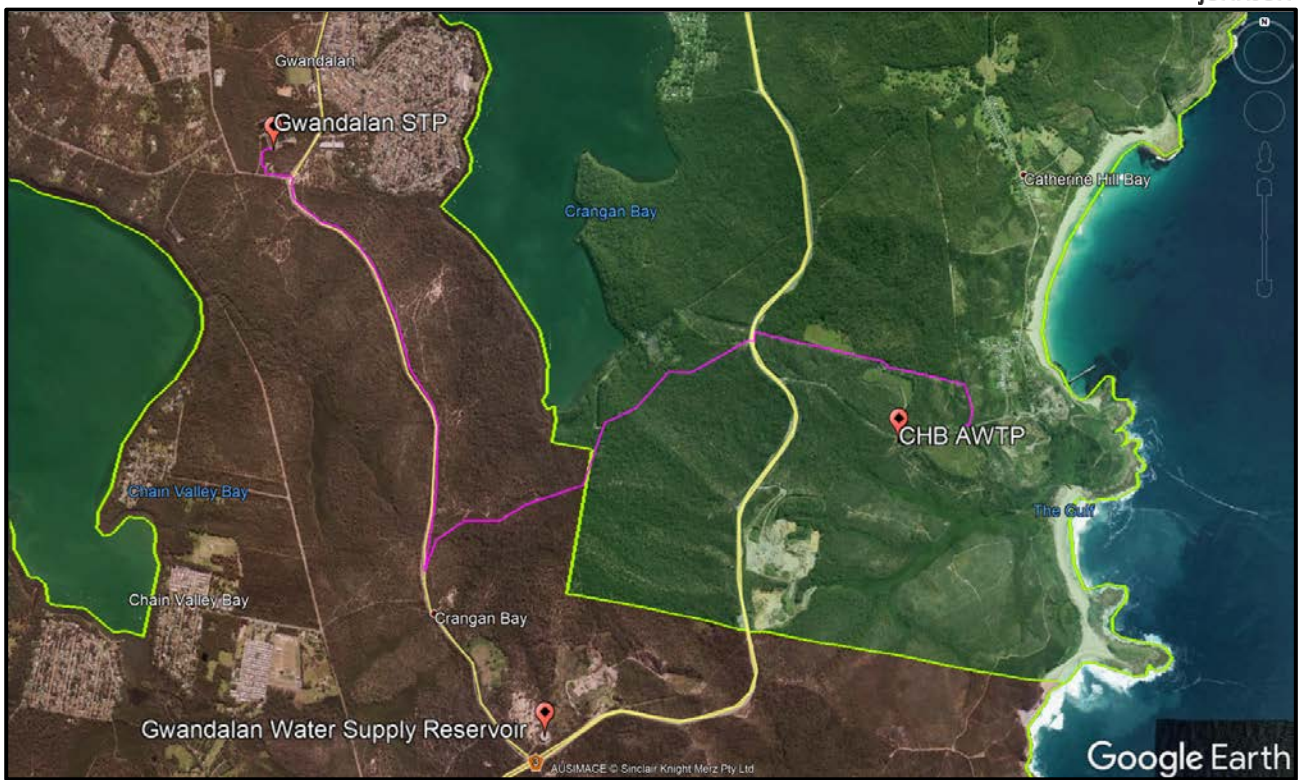

Figure 2 – Proposed SRWTM Pipe Alignment.

4.0 Consultation

ADW Johnson has consulted with multiple controlling authorities as part of the design engagement including RMS, Central Coast Council, NPWS and Solo Water. The following outlines the consultation had between all noteworthy parties.

4.1 ROADS & MARTIME SERVICES

RMS were consulted in regards to the crossing of the Pacific Highway and had no objection, in principal, to the proposed SRWTM. The following requirements were stipulated for crossing the Pacific Highway:

- A Section 138 Application will be required to be made with Issued For Construction (IFC) drawings, prior to the works being undertaken;
- The main is to have a minimum of 1.5 m cover to all existing or proposed surfaces in the State Highway corridor;
- Dependent on crossing methodology, the bore will be required to be encased and grouted, or grouted; and
- The bore will be required to be maintenance free construction in accordance with Hunter Water requirements for maintenance free installations.

Subsequent designs provided to RMS on the 6 September 2019 were provided with RMS S138 approval.

Correspondence had with RMS together with the S138 approval document are included in **Appendix A**.

4.2 CENTRAL COAST COUNCIL

Central Coast Council have been consulted with due to the SRWTM discharging into Gwandalan STP. An approval process exists for the construction and operation of the SRWTM. The following requirements were stipulated for the design of the SRWTM:

- The applicant would be responsible to design and construct the new pumping station and rising main from the CHB RWTP site to a new inlet at the Gwandalan STP (no stubs available);
- A magnetic flowmeter with telemetry connection would also be installed in a pit where the rising main crossing the STP site boundary along with an isolation valve upstream of the flowmeter;
- Council will undertake any required modifications to the inlet works to provide downstream capacity;
- Establishment of a set of operational rules that describes shutdown protocols, notification requirements and maintenance responsibilities;
- The rising main would be a Solo Water asset up to the boundary of the STP property boundary and treated as a private rising main by Council operational personnel downstream of that point;
- Asset ownership would transfer from Solo Water to Council at the property boundary with Council retaining ownership of the magnetic flowmeter and associated infrastructure;
- Include control valve to assist operation of the rising main noting the different high points, which would be the primary responsibility of Solo Water; and

- No objection to the transfer main operating as a variable grade sewer (VGS) into the Gwandalan STP considering many of their existing sewer rising mains are VGS.

Correspondence had with Council is included in **Appendix A**.

4.3 NSW NATIONAL PARKS & WILDLIFE SERVICES

NPWS were consulted with in regards to the application to install the CHB SRWTM through Lake Macquarie and Munmorah State Conservation Areas. The following comments and required amendments to the REF include:

- Amendments to the drawings specified in Attachment 9 sheet 16 and 17;
- An addendum to the REF specifying the proposed fence location and fencing design specification; and
- Reference to gate installation on page 22, 24 and 46 are not required.

Letter provided by NPWS is included in **Appendix A**.

4.4 SOLO WATER

Solo Water is an authorised person under the network operator licence to construct, maintain and operate the CHB RWTP. The following requirements were stipulated for the design of the SRWTM:

- Preferred pump supplier is Grundfos;
- Preferred valve supplier is Bermad Valves;
- Solo Water are to be involved in and approve the selection of all mechanical and electrical items including pumps, equipment and instrumentation;
- A Functional Description will need to be documented as part of the design that defines the monitoring and control requirements so they can be implemented by Solo Water's Electrical and SCADA team;
- The assets are to be designed and constructed to the latest versions of the Hunter Water Edition of the Water Supply Associated of Australia (WSAA) Codes to be consistent across the project site;
- The design will need to define and prepare any specific detailed drawings or standard drawings; and
- Solo Water specified approval to be issued by Solo Water for all design deliverables.

Correspondence had with Solo Water is include in **Appendix A**.

5.0 Hydraulic Design

5.1 PROCESS OPERATION

The following information has been extracted and summarised from the *Integrated Water Management Plan (IWMP)* prepared by Solo Water for the Independent Pricing and Regulatory Tribunal (IPART) to undertake assessment and approval of the CHBWU integrated water scheme under Part 5 of the EP&A Act.

All lots in the CHBWU scheme are serviced by a pressure sewer collection system. The pressure sewer units (PSU) are owned by CHBWU and service up to 4 lots. All PSU include duty/standby grinder pumps which macerate the sanitary wastewater and pump it directly into the pressure sewer network. The pressure sewer network discharges to CHBWU Wastewater Treatment Plant (WWTP).

All wastewater is treated at the WWTP via a membrane bioreactor (MBR) and is a modified activated sludge process with a number of treatment zones including primary treatment, inlet tank, anaerobic tank, anoxic tank, aeration tank and submerged membrane tank.

The treated effluent is then treated further at the RWTP which produces recycled water for supply to customers part of the CHBWU scheme. Surplus recycled water accumulates in the MBR Permeate Tank.

5.2 DESIGN LOADINGS

In consultation with CCC and Solo Water, it was agreed that the transfer pipeline be sized for ultimate development to avoid the need for major civil infrastructure upgrades in the future. This design basis adopted design criteria for the BPWM. The different development scenarios and corresponding equivalent tenements (ET) are outlined in **Table 1**.

Table 1 – Development Scenario ET's

Development Scenario	ET
The Beaches Development	540
CHB Village	60
Middle Camp Village	50
TOTAL (Ultimate Development Scenario)	**650**

The design loadings are based on the requirements shown in **Table 2**, with reference to Sydney water's version of WSA 02-2002 Sewerage Code of Australia, CHBWU IWMP REV D July 2015 prepared by Solo Water and the design criteria adopted for the BPWM.

Table 2 – Design Basis Requirements

Design Basis Requirements	Value Adopted	Unit Adopted
Occupancy Rate for Equivalent Population (EP)	3	EP/ET
Per Capita Wastewater Generation Rate[1]	150	L/EP/d
Average Dry Weather Flow (ADWF)	450	L/ET/d
Inflow and Infiltration (I&I) [2]	10%	%
Average Day Demand (ADD) for recycled water[1]	350	L/ET/d
Maximum pump duration	12	Hours
Ultimate Design Criteria[3]	650	ET

[1]WSA 02-2002-2.2 Sewerage Code of Australia (Sydney Water Edition 1 Version 4)
[2]Reference: CHBWU IWMP REV D July 2015
[3]Ultimate design criteria adopted for the bulk potable water main

The design wastewater load calculations are shown in **Table 3**.

Table 3 – Design Wastewater Loadings

Development Scenario	ET	Design Wastewater Loadings kL/d		
		ADWF	I&I	Total
The Beaches Development	540	243	24	267
CHB village	60	27	3	30
Middle Camp Village	50	23	2	25
TOTAL (Ultimate Design Criteria)	**650**	**293**	**29**	**322**

The design basis conservatively assumes a worst-case scenario of 100% recycled water produced by the plant requiring transfer via the scheme, that is, no recycled water usage back to dwellings or buffering in the MBR Permeate Tanks.

Initial consultation with Council limited the pump duration to 8 hours which has now been increased to a maximum pump duration of 12 hours for the design basis requirements. Adopting a longer maximum pump duration allows for efficiencies in pipe size and associated civil infrastructure. Assessment of flowrates based on the two development scenarios with the adopted pumping durations are shown in **Table 4**.

Table 4 – Ultimate Development Scenario and Pumping Duration

Scenario	Surplus Discharge (kL/d)	Pump Duration (hrs)	Flowrate (L/s)
Ultimate Design Criteria	322	12	7.45

In order to size infrastructure, adopting a maximum pump duration of 12 hours corresponds to a pump flowrate of 7.45 L/s, for the ultimate development scenario.

It is recommended to adopt a flowrate of 7.45 L/s for the design basis for the ultimate development scenario. This flowrate conservatively assumes there is no recycled water usage and no tank buffering, hence it is seen that this duration of pumping would occur infrequently.

The adopted ultimate design criteria are worse-case to be conservative.

5.3 CONTROL VALVE

The system includes pumping over an intermediate high point, being the Pacific Highway over to the discharge location, being Gwandalan STP. The discharge level of the Gwandalan STP inlet works is lower in elevation than the pumping location. Inclusion of a control valve is seen as best practice to ensure the pipeline operates efficiently under full pressure flow and does not allow excessive amounts of air into the pipeline when the pumps shutoff.

In consultation with Central Coast Council and Solo Water, preference is for the valve to be a pressure sustaining valve (PSV), not requiring power and hydraulically operated to negate the need for Programmable Logic Control (PLC) and telemetry requirements.
The general control philosophy of the PSV is:

- Pump On – upstream pressure on the valve will increase generating a differential pressure beyond the valve set point pressure allowing the valve to open;
- Pump Off – static head in the pipeline generated from the intermediate high point creates a differential pressure below the valve set point pressure forcing the valve to close; and
- Valve Closed – differential pressure across the valve is less than the valve set point pressure where the upstream pressure is governed by the static head in the pipeline generated from the intermediate high point and the downstream pressure is zero.

The PSV ensures the pipe is generally kept full during pump start up and the main does not expel large quantities of air form the system avoiding air locks and operational inefficiencies.

The location of the PSV has been determined in consultation with Solo Water who will have primary responsibility for the operation and maintenance of the PSV. In an effort to optimise the hydraulic functionality and accessibility, the proposed location of the PSV is at the starting point chainage along Kanangra Drive. This is to ensure the set point of the PSV does not induce an unacceptably high pressurised discharge at Gwandalan STP Inlet Works and to ensure the valve is accessible, operable and not overly susceptible to any risk of damage, bushfire threat and vandalism.

Correspondence has been made with Solo Water's preferred valve supplier Bermad Valves. The preferred valve is a Bermad 700 Series DN100 PSV. See correspondence with Bermad Valves in **Appendix B**.

Solo Water will operate and maintain the PSV as a private asset on the private transfer main as per Central Coast Council's stated requirements i.e. operation and maintenance pertains to asset ownership.

5.4 PIPE SELECTION

Pipe selection analysis was undertaken for a range of pipe sizes which considered the following design requirements and assumptions:

- Pipeline to be sized for ultimate development;
- PE100 PN16 pipe;
- Maximum delivery line velocities to prevent undue noise, water hammer, scouring and excessive head losses;

- Colebrook-White pipe roughness value of k = 0.015 with inclusion of minor fittings losses in accordance with AS 2200;
- Sensitivity has been provided for pipe roughness value of k = 0.3 with the exclusion of minor fitting losses;
- Minor fittings losses in accordance with AS 2200 and correspondence with valve suppliers;
- Acceptable Total Dynamic Head (TDH);
- Ability to pump over the intermediate high point (Pacific Highway); and
- Capital and Operation and Maintenance (O&M) cost optimization.

Preliminary iterations of the pipe sizing were undertaken, however following approval and acceptance of the location of the PSV, as discussed in **Section 5.3**, the preferred pipe size and selection allows for one practicable option.

The recommended arrangement proposes locating the PSV at the starting point chainage of Kanangra Drive with DN140 HDPE PN16 pipe installed to the PSV location followed by DN125 HDPE PN16 pipe installed downstream of the PSV location to the Gwandalan STP.

This configuration is preferred in order to limit the head loss through the pipe section upstream of the PSV to minimise pump head and associated operational costs. The preferred pipe size for the section upstream of the PSV is DN140 HDPE pipe due to constructability and cost.

Downstream of the PSV location, it is proposed to run DN125 HDPE pipe in an effort to increase head losses so to limit the differential pressure at the discharge point, governed by the PSV pressure set point, being the level of the intermediate high point (Pacific Highway). The proposed DN125 HDPE pipe is the smallest allowable pipe size that is hydraulically suitable to pump to the discharge point.

In adopting the recommended dual pipe size of DN125 and DN140 PE100 PN16, the system curve for the alignment is demonstrated in **Figure 3**. It can be seen that the duty point for the design is 7.45 L/s @ 46.9 m head (High Water Level), noting adoption of a roughness coefficient of 0.015 and inclusion of minor fitting losses.

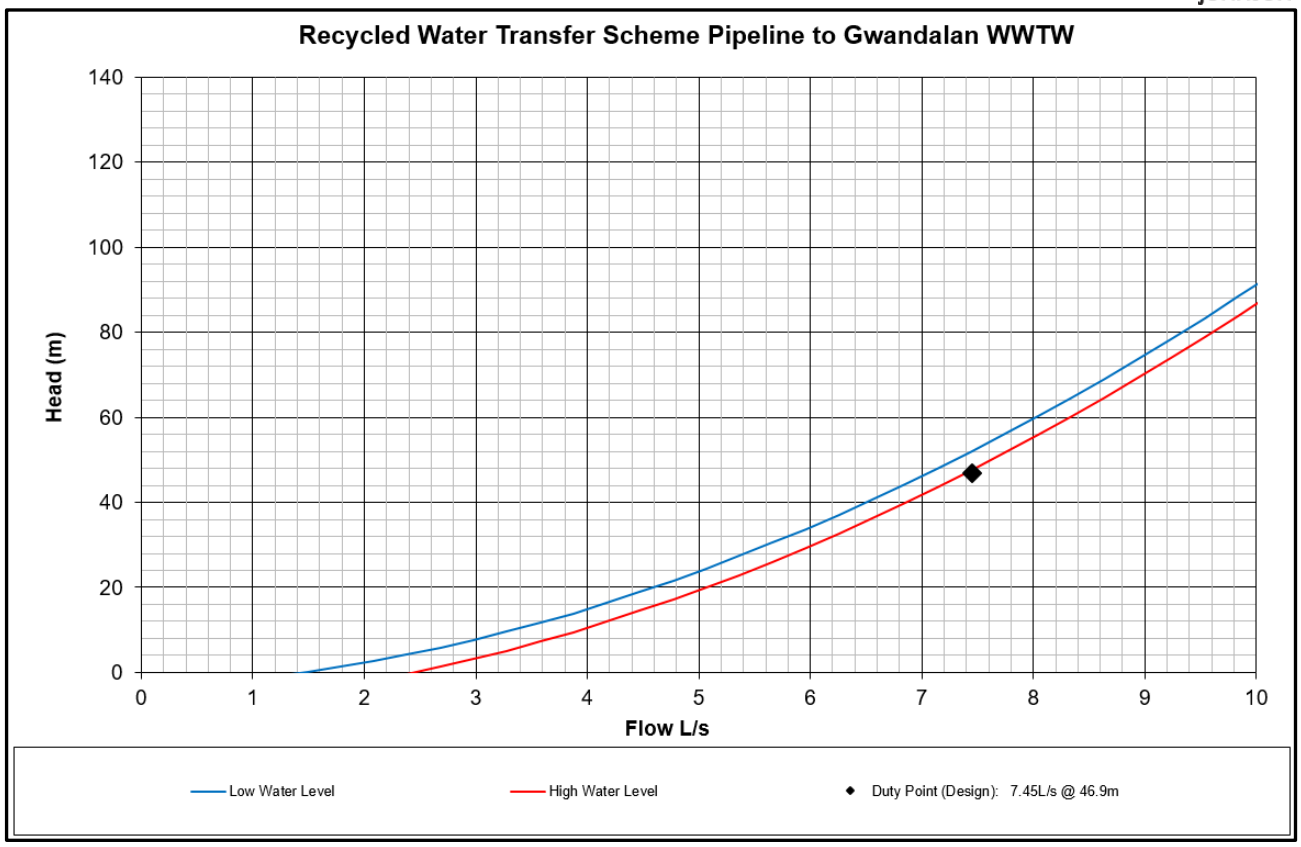

Figure 3 – System Curve.

The hydraulic grade line (HGL) for the adopted duty point and Total Dynamic Head (TDH) for the design is shown in **Figure 4**.

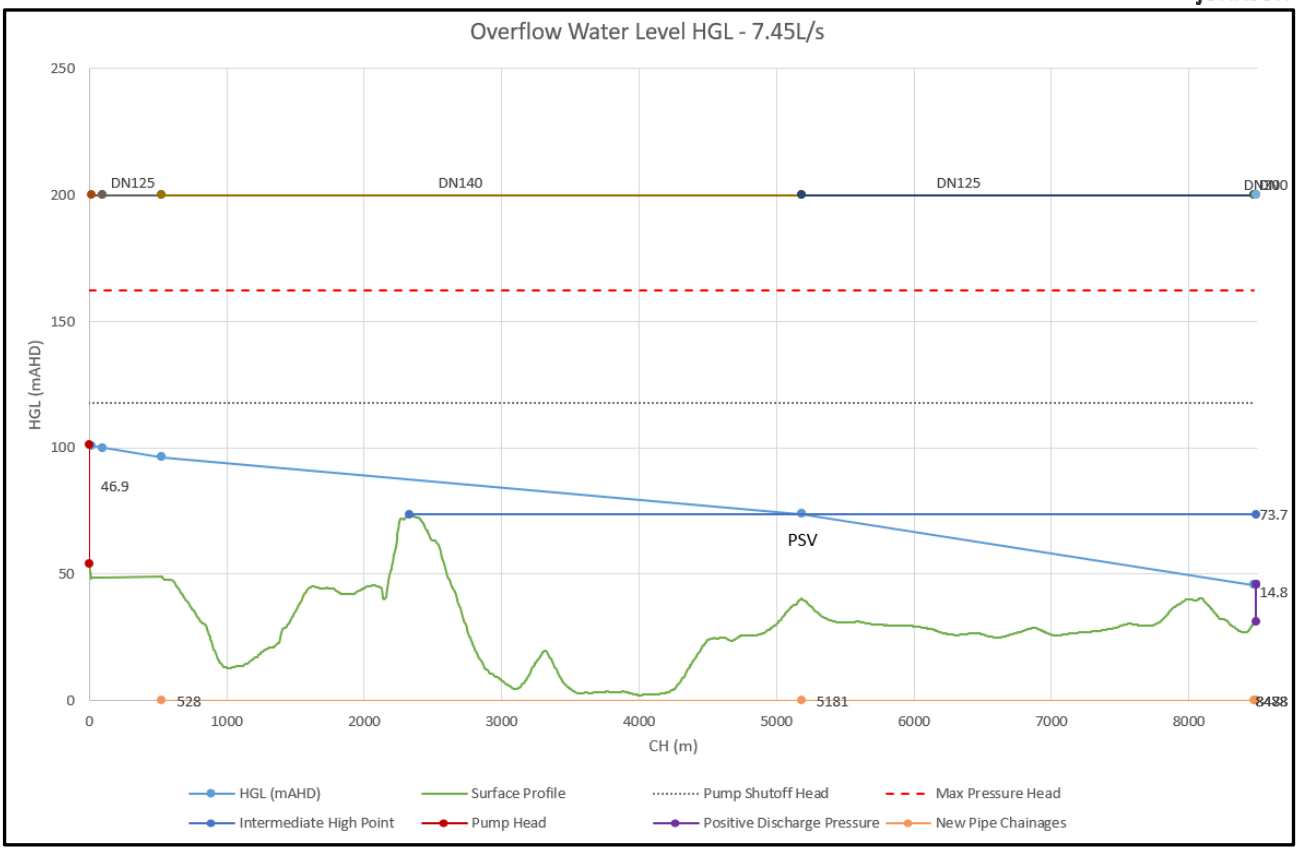

Figure 4 – Surface Profile and HGL.

5.5 OPERATING PRESSURES

The following hydraulic design parameters are noted:

- Maximum pressure experienced in the pipeline is ~750 kPa under steady state operating conditions; and
- Maximum pressure experienced in the pipeline is ~1,150 kPa at pump shutoff head.

The following design and test pressures have been adopted.

Delivery Pipework

- 1.25 x Normal Working Pressures (1.25 x 750 kPa) 937.5 kPa
- Shutoff Pressure 1,150 kPa
- Maximum pressure including surge (Section 5.8) 1,107 kPa

Suction Pipework

- 1.25 x Normal Working Pressure (1.25 x 50 kPa) 6.25 kPa
- Maximum suction pressure (MBR Tank) 5 kPa

A System test Pressure (STP) of 1,150 kPa has been adopted for the surplus recycled water transfer main delivery pipework.

A minimum STP of 1,000 kPa has been adopted for the surplus recycled water transfer main suction pipework. It is understood that this pipework has already undergone acceptance testing for the specified STP and pass quality assurance criteria.

5.6 OPERATING VELOCITIES

Velocities in the suction and delivery pipework are shown below in **Table 5**.

Table 5 – Pipe Velocities

Duty Flow (L/s)	Pipework Velocities (m/s)				
	Suction Pipework		Delivery Pipework		
	DN200 PE100 PN16 Suction	DN150 PVC-U PN12 Station	DN125 PE100 PN16 Delivery	DN140 PE100 PN16 Delivery	DN300 DICL PN20 Delivery
7.45	0.36	0.47	0.92	0.73	0.09

WSA 03-2011 specifies for non-drinking water with turbidity ≥2 NTU, the minimum velocity shall be at least 0.8 m/s at least once per day.

For the majority, velocities are acceptable, however the re-used sections of DN200 pipework shows low velocity along with the proposed section of DN300 (noting common pumping will deliver higher velocities). The velocities are considered acceptable for the application over the short lengths and due to the surplus recycled water having target turbidity ≤2 NTU.

5.7 FATIGUE ANALYSIS

Fatigue analysis has been undertaken as the proposed pipeline material is polyethylene PE100, a thermoplastic pipe material, which has been shown to undergo cyclic de-rating or fatigue over time when subject to a large number of repetitive events.

Adopting a 100-year design life and 1 pump start and stop (i.e. 2 cycles per day) for transferring the surplus recycled water, translates to a total number of cycles during the design lifetime of 73,000 which equates to a fatigue cycle factor, *f*, of 1.00. the Maximum Cyclic Pressure Range (MCPR) can then be calculated using the following equation:

MCPR = PN / 10 x *f* = 1.6 MPa

It can be seen in **Figure 5**, that up to a total number of cycles during the design lifetime of 300,000 (i.e. 8 cycles per day), the fatigue cycle factor is 1.00. Therefore, for the given estimated total number of cycles, the proposed PE100 pipeline will not undergo any cyclic de-rating or fatigue and the pressure class will remain at 16 bar or 1,600 kPa during the 100-year design life.

It should be noted that if the pipeline were to be operated beyond the design life specified, or if the pipeline were to be operated differently that intended as per this design basis and cycles exceed approx. 8 per day, then this fatigue analysis should be re-visited.

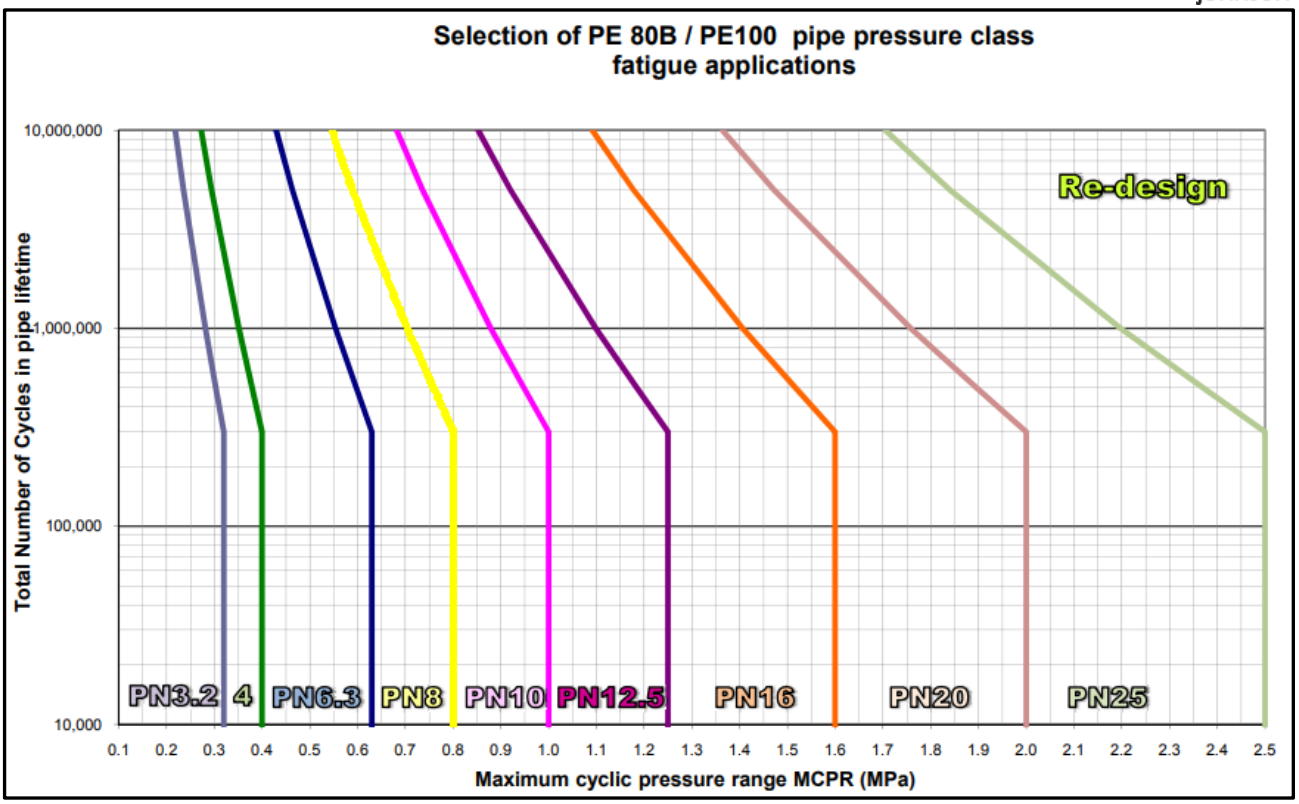

Figure 5 – MPCR v No. cycles for a range of pressure classes of PE80 and PE100 pipe.

5.8 TRANSIENT ANALYSIS

The proposed pipeline was modelled using the modelling software package "WATHAM" to simulate a transient (water-hammer) analysis of the pipeline for surge action scenarios. The transient analysis incorporated air relief valves at all high points and polyethylene pipe which has a low pipe celerity in comparison to other common pipeline materials.

Results of the transient analysis simulation for the following scenarios were modelled:

1. Normal pump start and stop with a 10 second ramp up to full speed;
2. Discharge isolation valve closed;
3. Power and pump failure; and
4. Air Valve failure.

Results of the transient analysis simulation for the event scenarios specified above and corresponding pressure results can be seen in **Table 6**. WATHAM results of the transient analysis can be found in **Appendix C**.

Table 6 – Transient Pressure Results (WATHAM)

Modelled Scenario	Minimum Internal Pressure (m)	Maximum Internal Pressure (m)	Maximum Variation in Pressure (m)
1. Normal Pump Start	-0.36	78.16	48.40
2. Discharge Valve	0.45	110.73	82.56
3. Power Failure	-0.42	78.17	49.15
4. Air Valve Failure	-10.37	78.18	48.41

From the results it can be seen that column separation does not occur under standard operation but could occur if the air valves fail to operate.

The results of the water hammer analysis were used in the pipe material selection. the maximum cyclic head variation can be seen to be 82.56m under model scenario 2, therefore PE100 PN16 SDR11 with a maximum allowable cyclic head of 160m (based on a maximum of 8 start/stops per day) is suitable for the anticipated cyclic head variation.

PE100 PN16 SDR11 was also checked for pipe critical collapse pressure, based on a maximum overburden depth of 1.85m in conjunction with vacuum pressure, the pipe material was deemed to have a factor of safety of approximately 4.6. Therefore, the selected pipe material is suitable and will be nominated as part of the design.

6.0 Pipeline Design

The pipeline is designed in accordance with Hunter Water's Edition Version 2 of the WSAA Code 03-2011-3.1. Design requirements imposed by authorities have also been incorporated into the design of the pipeline as specified under **Section 4.0**.

5.1 PIPE MATERIAL SELECTION

Two options were considered for the pipe material being polyethylene (PE) and oriented polyvinyl chloride (PVC-O) with ductile iron (DI) fittings. The recommended pipe material is PE100 pipe for ease of construction throughout alignment.

In order to comply with Solo Water's requirements for cross connections, the SRWM is to be purple stripe high-density polyethylene (HDPE).

The selected pipe material for the trenched sections is to be DN140 PE100 with a pressure rating (PN) 16 bar using electrofusion welded joints as this is the preferred method of pipe joining for ease of installation and cost-effectiveness.

5.2 FIELD LOCATION OF SERVICES

A Dial-Before-You-Dig (DBYD) was conducted during the design to identify the anticipated services along the pipeline route and to determine the proposed pipeline alignment. Following the pipeline alignment selection, above ground location of services was carried out following by potholing of critical crossing locations to determine more accurate location of underground infrastructure along the pipeline alignment.

An existing DN125 polyethylene (PE) PN16 irrigation water main exists from the site of the CHB RWTP to areas for development to the north of Montefiore Street. As can be seen within the attached plans, the existing DN125 irrigation water main has been installed predominately on the northern side of Montefiore Street continuing north east within the footpath allocation. The main is currently not being used. It is proposed to connect to this main near the intersection of Montefiore Street and Sunnyspot Boulevard. Connection into the existing main will require some limited excavation works within Montefiore Street for approximately 10 m through to Lot 105 DP 1129872.

The design alignment for the proposed SRWTM then generally follows the alignment of the existing fire access track and potable bulk water main. This alignment was chosen to avoid the need for any further vegetation clearing and will allow both mains to be located within a proposed dedicated easement. No other services are found to existing throughout this section of the alignment.

The Pacific Highway crossing includes existing services such as a high-pressure gas main and telecommunications that need to be considered when crossing via trenchless methods.

Following the Pacific Highway crossing, the design alignment then continues to follow the alignment of the existing potable bulk water main through NPWS land until the alignment reaches Kanangra Drive, Gwandalan. No other services are found to existing throughout this section of the alignment.

The alignment along the eastern side of Kanangra Drive does not include any existing services, with exception for a section where overhead power lines exist for approx. 150 m.

The alignment then reaches the roundabout intersection of Kanangra Drive and Summerland Road where other services are found including Central Coast Council asbestos cement (AC) DN450 watermain, telecommunications, overhead and below ground power.

The alignment through Central Coast Council's Gwandalan STP site will need to consider all private services and any process pipework. Two existing asbestos cement rising mains connect into the inlet works. Consideration of the existing rising mains and, in particular, existing concrete thrust blocks, not shown on WAC drawings, require consideration when installing the proposed SRWTM.

5.3 DESIGN COVER TO PIPELINE

For the purposes of the design, minimum cover requirements were adopted in accordance with Hunter Water's Edition of the WSAA 03-2011-3.1, as shown in **Table 7**.

Table 7 – Minimum Cover Requirements

Location	Minimum Cover (mm)
Private residential property and public land not subject to vehicular loading	600 – new developments 450 – existing developments
Private residential property subject to vehicular loading	750
Footways, nature strips and industrial property subject to vehicular loadings and sealed local road pavements	900
Unsealed road carriageways	1200
Future road, rail and tram pavements	1200
RMS State Road crossing (to crown of encasing pipe)	1500

5.4 TRENCHLESS CROSSING

Requirements imposed by RMS include trenchless construction of the pipeline crossing of the Pacific Highway. The proposed trenchless method is directional drill. It is proposed to run the DN140 PE100 line through a grout filled DN375 PE100 encasing pipe with minimum 1.5m cover to the encasing pipe for the full pavement width. The encasing pipe must extend 1m past the pavement extent and be constructed as "maintenance free".

There is a second road crossing proposed at Kanangra Drive. A similar method of trenchless crossing is preferred, only the subject pipe will be DN125 PE100 and the encasing pipe will be DN300 PE100 at that point on the alignment.

Trenchless methods other than directional drilling proposed by the Contractor will need prior approval.

6.0 Pump Station Design

6.1 LOCALITY

In consultation with Solo Water, the preferred site for the location of the Surplus Recycled Water Pump Station (SRWPS) is in the existing treatment plant building, located on Lot 1120 DP 1219395. An existing irrigation water pump station (WPS) is located on the proposed footprint which currently draws water on the inlet side of the pump through a DN200 PE100 line from the existing 2 x 1 ML MBR Permeate Reservoir (**Figure 6**).

Figure 6 – Permeate Reservoir and Irrigation Water Suction Line.

The existing irrigation WPS is located adjacent the existing potable water WPS and recycled water WPS, both located inside the existing treatment plant building on the concrete floor slab (**Figure 7**).

Figure 7 – Irrigation Pump Station.

Security will not be an issue for pumps housed in the existing treatment plant building.

6.2 PUMPING STATION PUMPS AND PIPEWORK SELECTION

Solo Water expressed a preference for re-use of the existing irrigation WPS, pending hydraulic suitability. Subsequently, Solo Water expressed a preference for using a single pump supplier throughout the CHBWU WWTP and RWTP, being Grundfos pumps. This provides efficiencies in operation, maintenance and spare parts at the plant.

In correspondence with Grundfos pump suppliers, the following details of the existing pump were provided as shown in **Table 8**.

Table 8 – Pump Details

Pump	Value	Units
Manufacturer	Grundfos	
Pump Type	Vertical, multistage centrifugal pump	
Model No.	CRIE 20-3	
Rated Motor Power	5.5	kW
Rated Motor Speed	3495	rpm
Frequency	50	Hz
Rated Voltage	3 x 380-500	V
Motor Efficiency	89.2	%
Net Weight	92	kg
Enclosure Class	IP55	
Duty Flow	7.5	L/s
Duty Head	47.4	m
Shutoff Head	63.5	m

It is proposed to re-use the existing irrigation WPS located on site and shown in **Figure 7**. Pump product information is provided in **Appendix D**.

The proposed system curve and existing irrigation WPS pump curve which is a Grundfos CRIE 20-3 Non-Standard 5.5 kW 3530 rpm @ 50 Hz fixed speed pump is shown in **Figure 8**.

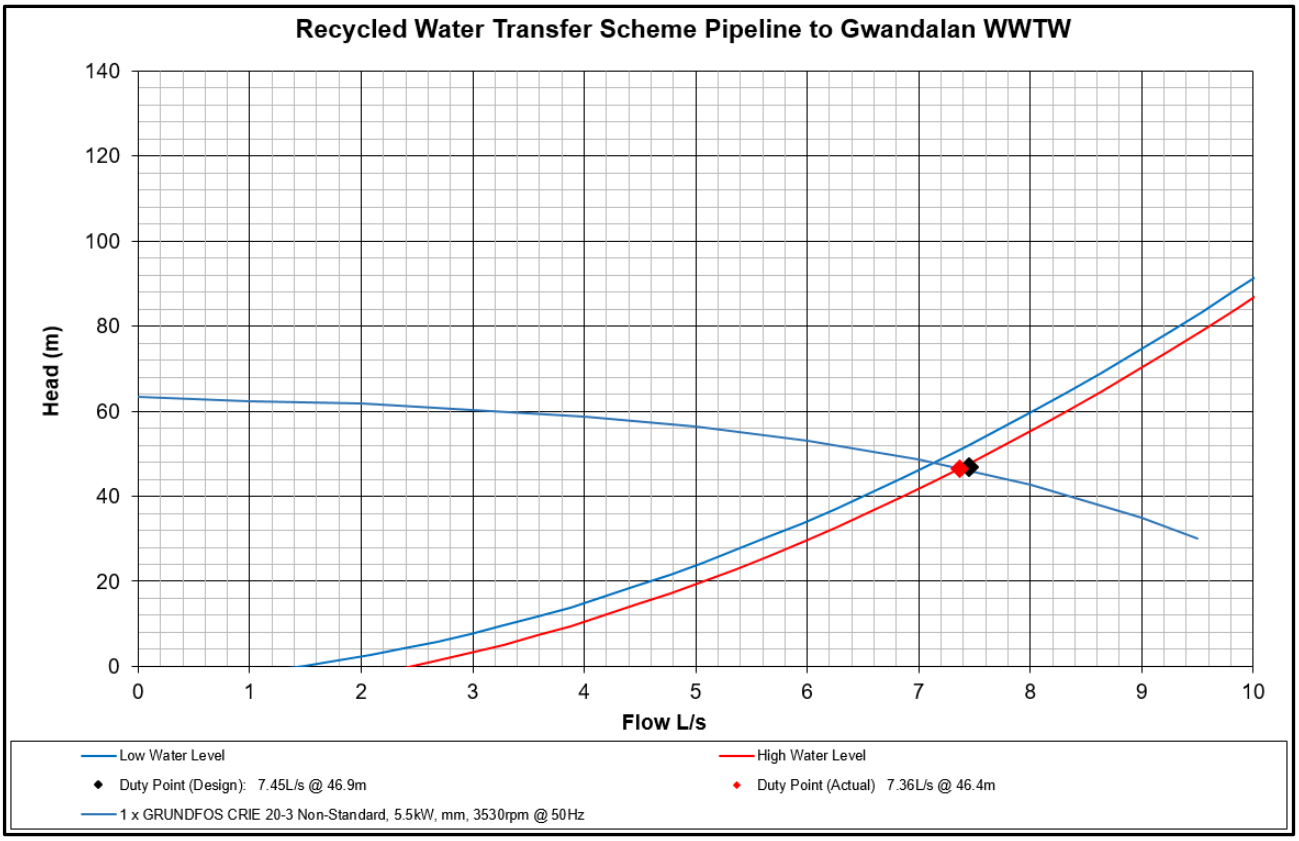

Figure 8 – System v Pump Curve.

It can be seen that the duty point (actual) of the intersection of the system and pump curves is 0.09 L/s less than the duty point (design). The difference is considered negligible, therefore it is recommended to re-use the existing irrigation WPS. This avoids the need for any unnecessary re-configuration requirements at the existing pump location and potential electrical upgrades. Solo Water have indicated satisfaction with inclusion of a 'hot spare' instead of a permanent duty-standby pumping arrangement for system redundancy. The risk associated with a single pump failure and need for changing the pumps over can be managed with the on-site storage.

6.3 PUMPING STATION CONTROL

The control philosophy of the pump station is discussed further within the draft Functional Description found in **Appendix E**. Solo Water will finalise the Functional Description during the construction and implementation stage. Telemetry control to the SRWPS will be routed through the RWTP with all physical infrastructure currently installed. PLC and SCADA code updates to be to Solo Water PLC and SCADA standards.

6.4 PREFERRED PUMP SUPPLIER

Solo Water stated preference for Grundfos pumps to be used for pump selection. It is proposed to re-use the existing irrigation WPS, which is a Grundfos pump and supplying a Grundfos 'hot spare' to be stored permanently on-site in the case of a pump failure.

7.0 Electrical Design

Due to the proposed option to re-use the existing irrigation pump as the SRWPS pump, no electrical work is required.

Mechanical and electrical infrastructure is existing and only PLC and SCADA changes are required for the change in operation of the pump.

Solo Water have preference to use their preferred electrical subcontractor for any required PLC and SCADA works, including design and installation.

Solo Water will prepare the Functional Specification along with implementing the necessary PLC and SCADA code changes following project approval.

8.0 Safety in Design

The purpose of a Safety in Design Report is to describe any project specific safety issues that have been identified during the design.

This report is prepared specifically to discharge duties of the designer to provide a safety report under the following legislation:

- The Work Health and Safety Act 2011 - Section 22 and/or; and
- Work Health and Safety Regulation 2011 – regulation 295.

ADW Johnson has prepared a Safety in Design Report which is shown in **Appendix F**.

Significant risks identified that could not be designed out include:

1. Working on or in close proximity to existing roads;
2. Excavation near gas main;
3. Failure of existing pipelines/services during connection;
4. Open pits and deep excavations; and
5. Steep gradients and poor ground conditions.

The Civil Contractor engaged to complete the installation of the proposed SRWTM should consider the items within the Safety in Design Report attached and include mitigation measures during construction works to mitigate the inherent risks during construction.

Appendix A

CONSULTATION CORRESPONDENCE

Cameron Black

From: Cameron Black
Sent: Wednesday, 18 September 2019 10:03 AM
To: Cameron Black
Subject: FW: RMS s138 Consent fA7003771 RE: HW10 Pacific Hwy, Catherine Hill Bay FW: Proposed Recycled Water Transfer Main
Attachments: RMS_s138Consent_RecycledWater_06September2019 _ADWJohnson_PacificHighway_CATHERINE HILL BAY.pdf

---

From: Hunter Road Asset <Hunter_Road_Asset@rms.nsw.gov.au>
Sent: Friday, 6 September 2019 11:59 AM
To: Rhys Johns <rhysj@adwjohnson.com.au>
Subject: RMS s138 Consent fA7003771 RE: HW10 Pacific Hwy, Catherine Hill Bay FW: Proposed Recycled Water Transfer Main

Rhys
Please find attached RMS Roads Act Section 138 Consent for proposed recycled water main under Pacific Highway, Catherine Hill Bay.
Regards,

Mark James
Asset Engineer
Regional Infrastructure Services
T 02 4908 7739
www.rms.nsw.gov.au
Every journey matters

Roads and Maritime Services
Level 8 266 King St Newcastle NSW 2300

From: Rhys Johns [mailto:rhysj@adwjohnson.com.au]
Sent: Friday, 6 September 2019 8:18 AM
To: Hunter Road Asset
Subject: RE: HW10 Pacific Hwy, Catherine Hill Bay FW: Proposed Recycled Water Transfer Main

REF No. CR2019/002148

To whom it may concern,

Please see attached the 'Issue For Construction' drawing sheets showing the details of the Pacific Highway crossing for the proposed Surplus Recycled Water Transfer Main from Catherine Hill Bay to Gwandalan Sewer Treatment Plant.

Please provide Section 138 Approval with any relevant conditions which need to be included into the detailed design and tender documentation.

Do not hesitate to contact me should you require any further information or wish to discuss further.

Regards,

Rhys Johns
Hunter Office
02 4978 5100
0422 578 027
Email : rhysj@adwjohnson.com.au
Website: www.adwjohnson.com.au

ADW Johnson Pty Limited

SYDNEY	Level 35 One International Towers, 100 Barangaroo Avenue, Sydney NSW 2000	**Ph.** 02 8046 7411
CENTRAL COAST	5 Pioneer Avenue, Tuggerah NSW 2259	**Ph.** 02 4305 4300
HUNTER	7/335 Hillsborough Road, Warners Bay NSW 2282	**Ph.** 02 4978 5100

From: Hunter Road Asset <Hunter_Road_Asset@rms.nsw.gov.au>
Sent: Tuesday, 21 May 2019 4:11 PM
To: Rhys Johns <rhysj@adwjohnson.com.au>
Subject: RE: HW10 Pacific Hwy, Catherine Hill Bay FW: Proposed Recycled Water Transfer Main

Rhys,

Thank You for your query with regard to the recycled water main. I have reviewed the submitted drawings titled "RECYCLED WATER MAIN CATHERINE HILL BAY" – Project No. 11688 - 45 sheets.

Please quote CR2019/002148 with any future correspondence.

The drawings are received as 'preliminary issue' and it is understood that the drawings are concept drawings.

RMS is responsible for the care, control and management the state road network and in this case RMS interest lies only in the state highway crossing. Please ensure approval is sought from other relevant authorities.

RMS has no objection in principal to the proposed recycled water main.

The following conditions are provided as guidance only for the design phase. Further conditions may be applied to the S138 approval once the detailed design is received with the S138 application.

1. A section 138 application will be required to be made with IFC drawings, prior to the works being undertaken.
2. The main is to have a minimum of 1.5m cover to all existing or proposed surfaces in the state highway corridor.
3. Dependant on methodology, the bore will be required to be encased and grouted, or grouted.
4. The bore will be required to be maintenance free construction in accordance with Hunter Water requirements for maintenance free installations.

If you have any further queries, please do not hesitate to contact the undersigned.

From: Rhys Johns [mailto:rhysj@adwjohnson.com.au]
Sent: Wednesday, 15 May 2019 9:01 AM

To: Hunter Road Asset
Cc: Cameron Black
Subject: Proposed Recycled Water Transfer Main

To whom it may concern,

ADW Johnson has been engaged to undertake the design of approximately 8 km of DN125 PE100 recycled water transfer main from Catherine Hill Bay Water Utility (CHBWU) to Gwandalan Sewer Treatment Plant (STP). A plan showing the proposed pipe alignment can be downloaded at the following link:
https://spaces.hightail.com/receive/DhUeUBSVEM/cmh5c2pAYWR3am9obnNvbi5jb20uYXU=

Could you please advise ADW Johnson of any requirements that will need to be incorporated in the design, in particular, the proposed trenchless crossing of the Pacific Highway?

Please do not hesitate to contact me on the below details should you require further information or wish to organise a meeting to discuss further.

I look forward to a response by Friday 24th May 2019.

Regards,

Rhys Johns
Hunter Office
02 4978 5100
0422 578 027
Email : rhysj@adwjohnson.com.au
Website: www.adwjohnson.com.au

ADW Johnson Pty Limited
SYDNEY Level 35 One International Towers, 100 Barangaroo Avenue, Sydney NSW 2000 **Ph.** 02 8046 7411
CENTRAL COAST 5 Pioneer Avenue, Tuggerah NSW 2259 **Ph.** 02 4305 4300
HUNTER 7/335 Hillsborough Road, Warners Bay NSW 2282 **Ph.** 02 4978 5100

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RMS Corro. No.: CR2019/002148
Your Ref:

ADW Johnson Pty Ltd
7/335 Hillsborough Road
Warners Bay NSW 2282

Att: Rhys Johns

Applicant Email: rhysj@adwjohnson.com.au

Determination of Application for undertaking Works in, on or over a public road, under Section 138 Roads Act 1993 as amended

RE: Proposed DN140 PE100 Surplus Recycled Water Main Directional Drill under Pacific Highway, Catherine Hill Bay

I refer to your email dated 6 September 2019, and related communications and you are advised as follows. In accordance with Section 138 of the Roads Act 1993, Roads & Maritime Services (RMS) has reviewed your application and hereby issues **ADW Johnson** (the Applicant) **Consent** for the proposed works on RMS State Road, **Pacific Highway**, as per your application and attachments as listed.

- 11688(13)NPWS-RWAT-10, 029(G).pdf

Your RMS Asset S138 Consent/Concurrence Number is: **fA7003771**

Please quote the RMS Consent/Concurrence number in any correspondence

The proposed scope of works for this acceptance is confirmed to be:

Scope:

- Directional Drill DN140 PE100 Recycled Water Main under Pacific Highway, Catherine Hill Bay
- Reinstatement of area upon completion of works

Conditions of RMS Consent

This consent is subject to the Applicants' agreement to the following conditions

1. No part of the RMS State Road sealed road pavement may be opened for the purpose of performing any aspect of these works.
2. All works are to be in accordance with supplied attachments. Any design variation will require a revised S138 application.
3. Crossing of RMS State Road to be by underbore with minimum 1.5m cover (including encasement) for full pavement width perpendicular to the State Road Centreline and be maintenance free.
4. Pressurised utilities under RMS State Roads are to be encased for the full width of pavement plus a minimum1m beyond pavement extent or to relevant Australian Standards.
5. Utilities are to be located in accordance with Streets Opening Conference (SOC) Guidelines.
6. Where new utilities are installed permanent surface markers are to be provided at the entry and exit points of the road reserve or on top of Kerb for the utility. Any access points/pits are to be located outside the road pavement.

7. Any openings outside of the RMS State Road sealed road pavement to be in accordance with RMS Specification *M209 Road Openings and Restorations* and local Council standards. Works in the footpath of the RMS State Road and on local Council roads will need the concurrence of Council.
8. Copies of this consent / concurrence and any related approvals (Road Occupancy Licence, etc.) must be held on site at all times and made available for RMS inspection when requested.
9. If there is any deviation to the approved proposed works or these conditions cannot be met the work must cease until a new written application is submitted and approved by RMS.
10. The Applicant is responsible for all legislative compliance including but not limited to Work Health & Safety and Environmental legislation.
11. The Applicant must obtain any necessary approvals, including but not limited to environmental approvals, prior to works commencing.
12. After RMS Asset consent / concurrence has been granted to undertake work in the RMS road reserve the applicant must then contact the RMS Hunter Regional Traffic Commander to obtain a Road Occupancy Licence (ROL).When applying for an ROL the applicant, designers, traffic controllers or contractor must submit the RMS Asset authorisation to the Hunter Regional Traffic Commander as evidence that works have consent / concurrence and that the consent / concurrence is current. ROL applications will not be reviewed until the letter from RMS Assets has been cited by the Traffic Commander. The Traffic Commander will advise if an ROL is required for each project and area in question.
13. Please contact Traffic Operations for Road Occupancy Licence (ROL) via the internet link; **https://myrta.com/oplinc2**
14. All backfill of excavation works is to be to a standard that no future sinking or depressions will occur. No excavations are to be left open and unattended. Shoring and fencing to WorkCover and Australian Standards are to be implemented.
15. The Applicant is required to reinstate all affected vegetation, materials, surfaces and structures to no lesser conditions than pre-existing conditions and to RMS requirements.
16. RMS is not liable for any sub-surface conditions or existing services encountered. It is entirely the responsibility of the Applicant to locate, identify and avoid any under or above ground infrastructure before work commences including as a minimum contacting Dial Before You Dig.
17. Any work undertaken in the Local Government Authority reserve or privately owned land is to be approved by the relevant owner of the property prior to work taking place.
18. The Applicant is to take out or extend a Public Risk Insurance Policy to cover RMS and for public liability in an amount of not less than twenty million dollars ($20,000,000). Evidence of such policy and its extension to cover RMS and its currency is to be produced for examination by the RMS upon request.
19. The RMS shall be indemnified by the Applicant and the Utility Owner against any suit, action, claim etc, which may arise from the presence of the utility within the RMS's road or median or generally within the road boundaries. The RMS shall be indemnified by the Applicant and the Utility Owner from and against all actions, suits, proceedings, losses, costs, damages, charges, claims and demands in any way arising from the proposed work.
20. This consent / concurrence is only valid for a period of six (6) months.

Please contact the undersigned should you require any further assistance with this matter.

Yours sincerely

Mark James
Asset Engineer
RMS Regional Infrastructure Services Hunter
Phone: 02 4908 7739
Email: Hunter_Road_Asset@rms.nsw.gov.au

Rhys Johns

From: Luke Drury <Luke.Drury@centralcoast.nsw.gov.au>
Sent: Friday, 31 August 2018 2:24 PM
To: Ian Brown
Cc: Tass Meli; Mark Coleman; Andrew Passafaro; Mark Dowdell; Ken Gerschler
Subject: TRIM: RE: External invitation - Catherine Hill Bay Effluent Discharge
Attachments: Catherine Hill Bay - surplus recycled water

Hi Ian,

Thanks for our recent meeting where your client described a potential discharge of treated effluent from their development site at Catherine Hill Bay to Gwandalan Sewage Treatment Plant. Council's Water and Sewer Unit has reviewed the proposal and offers the following advice, noting all the below charges are regulated charges as determined by IPART through its pricing determination process. I have copied in a few others within Council's Planning area as information ahead of potential future application to Council.

- The discharge point will be the recieval chamber at the inlet works for Gwandalan Sewage Treatment Plant (red circle on below plan). Council's Environmental Protection Licence (EPL) states that all inflows to the plant must receive full treatment through the nominated processes, there is no current option to bypass individual process units.

- Developer Charges are applicable inline with Council's existing 'Wyong Water Supply and Sewerage Development Servicing Plan' which is available on Council's website. The development is assessed as a 'wet industry' customer with Equivalent Tenements (ET) payable based on peak daily discharge rate as outlined below:
    - 1 ET = 576 L sewage/day (2.4 EP per ET x 240L/EP/day)

- The 2018/19 financial year sewerage developer charge is $5,327.44/ET. The DSP is next due for update on 1 July 2019.

- Annual sewerage service charge will apply based on the size of the meter (magnetic flow meter). A discharge factor of 1 would be applied to the meter, with sewage discharged to GWSTP charged at $0.83/kL. Annual sewerage service charges for different meter sizes are outlined below:
    - 100mm meter $7,103.80/year
    - 150mm meter $15,983.55/year
    - 200mm meter $28,415.20/year

- Ongoing volumetric charges would be billed monthly, with meter charge billed in quarterly instalments.

- Sewage discharged at GWSTP would not be classified as trade waste given the nature of the Catherine Hill Bay Catchment. Solo Water would however need to manage septicity within the rising main to minimise corrosion and odour issues at GWSTP, this would be subject to further investigations by the applicant at detail design stage. Solo Water would also be expected to manage any Trade Waste customers (if applicable) in Catherine Hill Bay in accordance with its Trade Waste Policy and Procedures.

- Dependant on the required timing of discharge capacity the applicant could consider staging the developer charges based on development milestones in a similar manner to the water supply developer charges.

- The applicant would be responsible to design and construct the new pumping station and rising main from the site at Catherine Hill Bay, to a new inlet at the Gwandalan Sewage Treatment Plant (no spare inlet stubs). A magnetic flow meter with telemetry connection would also be installed in a pit where the rising main crosses the treatment plant site boundary.

- Council will undertake any required modifications to its inlet works to provide downstream capacity required. Council is already planning modification to the inlet works channel (sections of channel wall raising) to cater for additional growth within the Gwandalan catchment and this project will ensure capacity required for Catherine Hill Bay is included as part of the design.

- Council would require lodgement of a Section 305 application (Water Management Act Approval) which will trigger the formal assessment of developer charges payable and review of the interface of the proposed pumping system with the Water Authorities assets. A development application will also be required to be lodged in tandem with the S305 application which will address the environmental planning and assessment act considerations relating to the proposed rising main construction (Statement of Environmental Effects, Traffic Management etc). For details relating to the lodgement of the development application feel free to contact Council's duty planner (Ken Gerschler) on 4350 5546.

- The establishment of a set of operational rules that describes shutdown protocols, notification requirements and maintenance responsibilities would also commence following the lodgement of the S305 application. All commercial terms would be as per regulated charges with no exception agreement applicable for the Catherin Hill Bay scheme. This likely reflects requirements for customer code of conduct documentation as part of the applicants WICA licences.

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For any further information please contact Luke Drury, Section Manager Water Services and Design, in the first instance. However, for any enquiries relating to the preparation of the development application for the private rising main, please contact Mr Ken Gerschler as described above.

Cheers,

From: Ian Brown [mailto:ianb@adwjohnson.com.au]
Sent: Thursday, 23 August 2018 8:11 PM
To: Luke Drury
Subject: RE: External invitation - Catherine Hill Bay Effluent Discharge

Hi Luke,

Just following up from our meeting, I understand you were going to send through a couple of notes regarding the rationale around Council accepting the excess recycled water from CHBWU and/or some information on what flows the Gwandalan treatment plant can accept?

Please excuse my lack of terminology as the sewer/water infrastructure space isn't my strong suit. Happy to discuss if required.

Thanks,

Ian Brown
SENIOR CIVIL ENGINEER
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From: Luke Drury <Luke.Drury@centralcoast.nsw.gov.au>
Sent: Tuesday, 7 August 2018 12:44 PM
To: Brad Irwin <brad.irwin@solowater.com.au>; Ian Brown <ianb@adwjohnson.com.au>
Cc: Nick Jackman <njackman@rosegroup.com.au>; Nathan Delaney <nathand@adwjohnson.com.au>; Tass Meli <Tass.Meli@centralcoast.nsw.gov.au>; Mark Coleman <Mark.Coleman@centralcoast.nsw.gov.au>
Subject: RE: External invitation - Catherine Hill Bay Effluent Discharge

Thanks Brad,

We are actually interested if there are any opportunities for beneficial use of a portion of the effluent stream within Central Coast area as we currently operate recycled water plants for internal (STP) and external usage rather than just putting it all into the treatment process. We understand we are not the regulators of your treatment process.

I can see that your PFD for the plant shows a U.V and chlorine treatment process for effluent used in the dual reticulation scheme which is what I assume you are referring to with the AGWR log reduction verification. Can you confirm whether the water currently approved to be disposed of by centralised irrigation is also required to undergo UV and chlorine treatment?

Cheers,

Luke Drury
Section Manager Water Services and Design
Water Planning and Development
Central Coast Council
P.O. Box 20 Wyong, NSW 2259
t: 02 4350 5109
m: 0400 734 217
e: Luke.Drury@centralcoast.nsw.gov.au

From: Brad Irwin [mailto:brad.irwin@solowater.com.au]
Sent: Tuesday, 7 August 2018 10:17 AM
To: Luke Drury
Cc: 'Ian Brown'; Nick Jackman; Nathan Delaney
Subject: RE: External invitation - Catherine Hill Bay Effluent Discharge

Hi Luke,

Thank you for arranging this meeting to discuss the options for the transfer of surplus recycled water from our CHB scheme across to your Gwandalan WWTP for final effluent disposal.

I have put some preliminary answers to your questions below in green.

I have also attached the latest PFD showing the potential offtake to CCC from the plant.

Note that CCC do not need to approve the treatment processes or anything else inside the CHB scheme, this is all approved by IPART under WICA.

The only thing that CCC would need to approve is the surplus recycled water main and connection onto your network in a volumetric trade waste type arrangement. I imagine we would do DA for this.
Similar to how CCC approved the bulk water pump station and transfer main inside CCC region but IPART approved the works inside the scheme.

I look forward to catching up on Thursday.
If you have any further questions in the mean time please send them through.

Can you provide a process flow diagram for the treatment system including the additional treatment (if any) provided to effluent used in the dual reticulation scheme. Can you include the proposed offtake for discharge to Central Coast Council.
See attached PFD of the overall scheme, including the options for offsite transfer of surplus water to Gwandalan WWTP.
The proposed offtake is shown in green in the PFD.
The surplus water is MBR permeate and contains little or no free chlorine that could potentially upset the Gwandalan WWTP processes.
The offtake would use variable speed drive pumps so we can control flows being transferred.

Can you confirm the status of the approvals for the effluent reuse scheme including:

Who is the regulator and under what act are the approvals granted?

IPART/Minister for Utilities is the main regulator and have approved the current scheme under the WIC Act and Part 5 of EP&A Act.
CCC also approved a DA for the potable water pump station and transfer main located in CCC area, which was under Part 4 of EP&A Act.

The current WICA approval is based on irrigation of surplus recycled water and needs to be updated to include an offsite discharge.
It is likely that a DA with CCC would be undertaken for the surplus recycled water main works located in CCC region, if this proves feasible.
CCC would also need to approve the discharge as a volumetric & pollutant load based trade waste discharge type arrangement.
Once this is done we would update our WICA licence with IPART, which will be reasonably straight forward if CCC approved the DA and Trade Waste Permits.

What approvals have been obtained to date?
The scheme is approved under WICA based on all surplus recycled water being irrigated.
This approval needs to be updated to include an offsite discharge if this is feasible.

What framework/guidelines was the scheme assessed under?
The treatment process was assessed under AGWR (2006).
Water and sewer networks are assessed under the WSAA codes.

Has the treatment system been validated/verified to achieve a certain log reduction for pathogen removal or production of a certain class of effluent (depends on assessment framework relevant to the site).
The overall process is verified to be compliant with the AGWR (2006) and exceeds the Log Reduction Targets required in this guideline.
The treatment process is currently being commissioned.
The process will be audited by IPART accredited auditors at the end of commissioning.

The treatment process itself does not require approval from CCC. It is only the surplus recycled water offsite discharge pipeline and connection to CCC system.

Please give me a call if you wish to discuss.

Cheers

Brad

Brad Irwin | **Environmental Engineer**
Solo Water Pty Ltd
A: 86-88 Chinderah Bay Drive Chinderah NSW 2487
P: 1300 765 698
E: brad.irwin@solowater.com.au
W: www.solowater.com.au

From: Ian Brown [mailto:ianb@adwjohnson.com.au]
Sent: Monday, 6 August 2018 10:13 AM
To: Brad Irwin; Nick Jackman; Nathan Delaney
Subject: FW: External invitation - Catherine Hill Bay Effluent Discharge

Hi all,

Please see below confirmation from Central Coast Council that the Thursday meeting time is now locked in.

Brad,

Are you able to provide further details on the items that Luke has requested below?

Thanks,

Ian Brown
SENIOR CIVIL ENGINEER
Central Coast Office
02 4305 4300
Email : ianb@adwjohnson.com.au
Website: www.adwjohnson.com.au

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HUNTER	7/335 Hillsborough Road, Warners Bay NSW 2282	Ph. 02 4978 5100

From: Luke Drury <Luke.Drury@centralcoast.nsw.gov.au>
Sent: Monday, 6 August 2018 9:54 AM
To: Ian Brown <ianb@adwjohnson.com.au>
Subject: RE: External invitation - Catherine Hill Bay Effluent Discharge

Hi Ian,

I have my manager confirmed for the meeting so will remove the tentative status from the meeting invitation.

Can you also follow up the following information which helps inform our review of the proposed discharge:

- Can you provide a process flow diagram for the treatment system including the additional treatment (if any) provided to effluent used in the dual reticulation scheme. Can you include the proposed offtake for discharge to Central Coast Council.
- Can you confirm the status of the approvals for the effluent reuse scheme including:
    - Who is the regulator and under what act are the approvals granted?
    - What approvals have been obtained to date?
    - What framework/guidelines was the scheme assessed under?
    - Has the treatment system been validated/verified to achieve a certain log reduction for pathogen removal or production of a certain class of effluent (depends on assessment framework relevant to the site).

Cheers,

Luke Drury
Section Manager Water Services and Design
Water Planning and Development

Central Coast Council
P.O. Box 20 Wyong, NSW 2259
t: 02 4350 5109
m: 0400 734 217
e: Luke.Drury@centralcoast.nsw.gov.au

From: Ian Brown [mailto:ianb@adwjohnson.com.au]
Sent: Monday, 6 August 2018 8:59 AM
To: Luke Drury
Subject: RE: External invitation - Catherine Hill Bay Effluent Discharge

Hi Luke,

Just wanted to follow up regarding the meeting on Thursday, has this date and time been confirmed? The water utility contact needs to travel down from Brisbane for the meeting so I just want to make sure he can book flights confidently.

Thanks,

Ian Brown
SENIOR CIVIL ENGINEER
Central Coast Office
02 4305 4300
Email : ianb@adwjohnson.com.au
Website: www.adwjohnson.com.au

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-----Original Appointment-----
From: Ian Brown
Sent: Tuesday, 31 July 2018 5:08 PM
To: Luke Drury
Subject: Accepted: External invitation - Catherine Hill Bay Effluent Discharge
When: Thursday, 9 August 2018 1:00 PM-2:00 PM (UTC+10:00) Canberra, Melbourne, Sydney.
Where: Central Coast Council - Hely Street Wyong Office

Thanks Luke,

I have forwarded the invite to the client, water utility contact, as well as Nathan D in our office who will also attend. Noted that this is a preliminary meeting time at the moment, feel free to send through an update if required once you have confirmation from Council staff.

Rhys Johns

From: Cameron Black
Sent: Wednesday, 31 October 2018 6:02 PM
To: Rhys Johns
Subject: FW: External invitation - Catherine Hill Bay Effluent Discharge
Attachments: Catherine Hill Bay - surplus recycled water

FYI

Regards,

Cameron Black
Hunter Office
02 4978 5100
0412 552 835
Email : cameronb@adwjohnson.com.au
Website: www.adwjohnson.com.au

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From: Ian Brown
Sent: Friday, 31 August 2018 2:50 PM
To: 'njackman@rosegroup.com.au' <njackman@rosegroup.com.au>; Brad Irwin <brad.irwin@solowater.com.au>; Nathan Delaney <nathand@adwjohnson.com.au>
Cc: Cameron Black <cameronb@adwjohnson.com.au>
Subject: FW: External invitation - Catherine Hill Bay Effluent Discharge

All,

Please see below advice from Central Coast Council following from the meeting held a few weeks ago regarding the potential recycled water discharge from CHB to Gwandalan.

Thanks,

Ian Brown
SENIOR CIVIL ENGINEER
Central Coast Office
02 4305 4300
Email : ianb@adwjohnson.com.au
Website: www.adwjohnson.com.au

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MINUTES OF MEETING

DATE: 16/11/2018

ATTENDEES: Stephanie Van Dissel, Patricia Daufenback, Rhys Johns (ADW Johnson)
Luke Drury, Mark Coleman, Hugh Williams, Mark Dowdell (Central Coast Council)

MEETING – CATHERINE HILL BAY CONNECTION DESIGN DISCUSSION

INTRODUCTION:

Meeting held between ADW Johnson and Central Coast Council regarding design and development application for the proposed recycled water (RW) transfer main from Catherine Hill Bay to Gwandalan Wastewater Treatment Plant (WWTP) Inlet Works. The aim is to discuss matters for consideration as part of the design and planning process.

DISCUSSION POINTS:

SVD introduced meeting and project and explained the two separate environmental approval processes would be used; one for the Kanangra Drive main and one for the National Parks & Wildlife Services (NPWS) main. ADWJ would be doing the environmental assessment for the Kanangra Drive Section and Solo Water would do the other section. ADWJ would however design the entire main.

Council raised that the transfer main may not need a DA approval as it falls under the Water Industry Competition Act (WICA) 2006. It was conferred that at the least, an Environmental Impact Assessment (EIA) will need to be undertaken.

SVD advised that due to time constraints, the client did not want to use Part 5 of the EP&A Act through IPART as they take too long to assess and as such, AWDJ were electing to use Part 4 of the EP&A Act.

SVD also advised that DA needed to be lodged next week to avoid new Biodiversity Legislation. For this reason, only the Kanangra Drive section was proposed under the DA as ecology surveys could not be conducted over Council land without consent which would take too long to obtain.

SVD explained that if the main from the round-about to Council's WWTP needed to remove trees, then AWDJ would deal with that and pay for credits if needed, however the area for this section looks relatively clear.

Council have confirmed that Gwandalan WWTP is able to cater for the proposed RW transfer main flowrate of 11 L/s, as stated in the attached email correspondence from Ian Brown (ADWJ) to Luke Drury (Council) on 27/07/2018.

Council are in the process of upgrading the inlet works at Gwandalan WWTP to cater for an additional wastewater pumping station (WWPS) in Gwandalan 9 (GW09) WWPS. ADWJ are undertaking the design of the GW09 WWPS and rising main. Council mentioned that the proposed alignment of GW09 WWPS rising main needs to be considered along with Council's existing asbestos cement (AC) trunk watermain. It's likely there will be a trenchless crossing of Kanangra Drive that will need to be mindful of existing services and Councils' existing major infrastructure. HW noted consideration of construction and other ground-breaking work activities close to the existing AC watermain to have minimal vibrational impacts.

Council have provided hard copy Work-As-Executed (WAC) drawings of the existing Gwandalan WWTP inlet works along with the design drawings of the upgrade. The upgrade includes a stub for future connection for GW09 WWPS and spare connection. Council have indicated that the spare connection point currently proposed on the GW09 WWTP inlet works connection is to remain spare for future development at Summerland Point. Connection of the proposed RW transfer main shall be made at an alternative point. It was suggested that if the diameter of the RW transfer main pipe permits, it would be Council's preference that the main be tapped into the proposed GW09 WWPS rising main at the vicinity of the inlet works. AWDJ design to include connection detail of RW transfer main to Gwandalan WWTP.

The inlet works upgrade timing will hinge off the Gwandalan 9 WWPS upgrade. ADWJ are currently developing the design of Gwandalan 9 WWPS, rising main and the connection to Gwandalan WWTP, which is yet to be finalised.

Council advised that the RW transfer main be treated as private up until where it crosses the boundary of the WWTP site, as stated in the attached email correspondence from Luke Drury (Council) to Ian Brown (ADWJ) on 31st August 2018. It is expected that the proposed automatic control valve be owned, operated and maintained by Solo Water and be located outside the WWTP site boundary. A manual isolation valve and magnetic flowmeter are to be located within the WWTP site and be operated and maintained by Council. The flowmeter is to include visual or manual meter read capabilities. The flowmeter is to be constructed in a pit, not buried. Council advised to use the potable watermain as a reference for the design of the RW transfer main.

Council satisfied with PVC or PE for the pipe material for the section along Kanangra Drive.

Telemetry requirements for the control valve and flowmeter are to be discussed with HW. Pressure transducer is also required by Council.

MC couldn't foresee any issues with the Biochemical Oxygen Demand (BOD) < 10 mg/L being received by WWTP as raw sewage typically BOD >= 300.

MD advised that client has previously been advised that DSP charges will apply.

ACTIONS:

Council to provide electronic copies of the WAC drawings of the inlet works and the final design plans for the inlet works upgrade at Gwandalan WWTP. Council are currently developing a concept plan based on the future inflow rates to the inlet works. This will not

be finalised until the proposed inflow rates are confirmed by the applicant. Works at the inlet works will be limited to increasing of the wall height only and will not impact the incoming mains design.

ADWJ to ensure design of both GW09 WWPS rising main and RW transfer main undertaken holistically to ensure suitable alignments and road crossing treatments are selected which do not impact existing assets.

ADWJ are to organise a site visit for Council staff, including trade waste officer, to Solo Water's Catherine Hill Bay Recycled Treatment Plant Facility. Actual reads of the water quality at Critical Control Points (CCP) is required to ensure quality is to Council standards, as Council have no control.

ADWJ to check with the client that no additional recycled water would be used by this RW transfer main as the Middle Camp development was also originally proposing private sewer. If so, this should be accounted for in the design to avoid upgrade costs later.

S305 application to be lodged with DA.

Rhys Johns

From: Luke Drury <Luke.Drury@centralcoast.nsw.gov.au>
Sent: Friday, 31 August 2018 2:24 PM
To: Ian Brown
Cc: Tass Meli; Mark Coleman; Andrew Passafaro; Mark Dowdell; Ken Gerschler
Subject: TRIM: RE: External invitation - Catherine Hill Bay Effluent Discharge
Attachments: Catherine Hill Bay - surplus recycled water

Hi Ian,

Thanks for our recent meeting where your client described a potential discharge of treated effluent from their development site at Catherine Hill Bay to Gwandalan Sewage Treatment Plant. Council's Water and Sewer Unit has reviewed the proposal and offers the following advice, noting all the below charges are regulated charges as determined by IPART through its pricing determination process. I have copied in a few others within Council's Planning area as information ahead of potential future application to Council.

- The discharge point will be the recieval chamber at the inlet works for Gwandalan Sewage Treatment Plant (red circle on below plan). Council's Environmental Protection Licence (EPL) states that all inflows to the plant must receive full treatment through the nominated processes, there is no current option to bypass individual process units.

- Developer Charges are applicable inline with Council's existing 'Wyong Water Supply and Sewerage Development Servicing Plan' which is available on Council's website. The development is assessed as a 'wet industry' customer with Equivalent Tenements (ET) payable based on peak daily discharge rate as outlined below:
    - 1 ET = 576 L sewage/day (2.4 EP per ET x 240L/EP/day)

- The 2018/19 financial year sewerage developer charge is $5,327.44/ET. The DSP is next due for update on 1 July 2019.

- Annual sewerage service charge will apply based on the size of the meter (magnetic flow meter). A discharge factor of 1 would be applied to the meter, with sewage discharged to GWSTP charged at $0.83/kL. Annual sewerage service charges for different meter sizes are outlined below:
    - 100mm meter $7,103.80/year
    - 150mm meter $15,983.55/year
    - 200mm meter $28,415.20/year

- Ongoing volumetric charges would be billed monthly, with meter charge billed in quarterly instalments.

- Sewage discharged at GWSTP would not be classified as trade waste given the nature of the Catherine Hill Bay Catchment. Solo Water would however need to manage septicity within the rising main to minimise corrosion and odour issues at GWSTP, this would be subject to further investigations by the applicant at detail design stage. Solo Water would also be expected to manage any Trade Waste customers (if applicable) in Catherine Hill Bay in accordance with its Trade Waste Policy and Procedures.

- Dependant on the required timing of discharge capacity the applicant could consider staging the developer charges based on development milestones in a similar manner to the water supply developer charges.

- The applicant would be responsible to design and construct the new pumping station and rising main from the site at Catherine Hill Bay, to a new inlet at the Gwandalan Sewage Treatment Plant (no spare inlet stubs). A magnetic flow meter with telemetry connection would also be installed in a pit where the rising main crosses the treatment plant site boundary.

- Council will undertake any required modifications to its inlet works to provide downstream capacity required. Council is already planning modification to the inlet works channel (sections of channel wall raising) to cater for additional growth within the Gwandalan catchment and this project will ensure capacity required for Catherine Hill Bay is included as part of the design.

- Council would require lodgement of a Section 305 application (Water Management Act Approval) which will trigger the formal assessment of developer charges payable and review of the interface of the proposed pumping system with the Water Authorities assets. A development application will also be required to be lodged in tandem with the S305 application which will address the environmental planning and assessment act considerations relating to the proposed rising main construction (Statement of Environmental Effects, Traffic Management etc). For details relating to the lodgement of the development application feel free to contact Council's duty planner (Ken Gerschler) on 4350 5546.

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- Council is currently finalising its next IPART pricing submission, with the next determination due to commence 1 June 2019. Details of the progress of the pricing review will be available on IPART's website as the process unfolds.

For any further information please contact Luke Drury, Section Manager Water Services and Design, in the first instance. However, for any enquiries relating to the preparation of the development application for the private rising main, please contact Mr Ken Gerschler as described above.

Cheers,

From: Ian Brown [mailto:ianb@adwjohnson.com.au]
Sent: Thursday, 23 August 2018 8:11 PM
To: Luke Drury
Subject: RE: External invitation - Catherine Hill Bay Effluent Discharge

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Please excuse my lack of terminology as the sewer/water infrastructure space isn't my strong suit. Happy to discuss if required.

Thanks,

Ian Brown
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From: Luke Drury <Luke.Drury@centralcoast.nsw.gov.au>
Sent: Tuesday, 7 August 2018 12:44 PM
To: Brad Irwin <brad.irwin@solowater.com.au>; Ian Brown <ianb@adwjohnson.com.au>
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Luke Drury
Section Manager Water Services and Design
Water Planning and Development
Central Coast Council
P.O. Box 20 Wyong, NSW 2259
t: 02 4350 5109
m: 0400 734 217
e: Luke.Drury@centralcoast.nsw.gov.au

From: Brad Irwin [mailto:brad.irwin@solowater.com.au]
Sent: Tuesday, 7 August 2018 10:17 AM
To: Luke Drury
Cc: 'Ian Brown'; Nick Jackman; Nathan Delaney
Subject: RE: External invitation - Catherine Hill Bay Effluent Discharge

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I have also attached the latest PFD showing the potential offtake to CCC from the plant.

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Similar to how CCC approved the bulk water pump station and transfer main inside CCC region but IPART approved the works inside the scheme.

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Can you provide a process flow diagram for the treatment system including the additional treatment (if any) provided to effluent used in the dual reticulation scheme. Can you include the proposed offtake for discharge to Central Coast Council.
See attached PFD of the overall scheme, including the options for offsite transfer of surplus water to Gwandalan WWTP.
The proposed offtake is shown in green in the PFD.
The surplus water is MBR permeate and contains little or no free chlorine that could potentially upset the Gwandalan WWTP processes.
The offtake would use variable speed drive pumps so we can control flows being transferred.

Can you confirm the status of the approvals for the effluent reuse scheme including:

Who is the regulator and under what act are the approvals granted?

IPART/Minister for Utilities is the main regulator and have approved the current scheme under the WIC Act and Part 5 of EP&A Act.
CCC also approved a DA for the potable water pump station and transfer main located in CCC area, which was under Part 4 of EP&A Act.

The current WICA approval is based on irrigation of surplus recycled water and needs to be updated to include an offsite discharge.
It is likely that a DA with CCC would be undertaken for the surplus recycled water main works located in CCC region, if this proves feasible.
CCC would also need to approve the discharge as a volumetric & pollutant load based trade waste discharge type arrangement.
Once this is done we would update our WICA licence with IPART, which will be reasonably straight forward if CCC approved the DA and Trade Waste Permits.

What approvals have been obtained to date?
The scheme is approved under WICA based on all surplus recycled water being irrigated.
This approval needs to be updated to include an offsite discharge if this is feasible.

What framework/guidelines was the scheme assessed under?
The treatment process was assessed under AGWR (2006).
Water and sewer networks are assessed under the WSAA codes.

Has the treatment system been validated/verified to achieve a certain log reduction for pathogen removal or production of a certain class of effluent (depends on assessment framework relevant to the site).
The overall process is verified to be compliant with the AGWR (2006) and exceeds the Log Reduction Targets required in this guideline.
The treatment process is currently being commissioned.
The process will be audited by IPART accredited auditors at the end of commissioning.

The treatment process itself does not require approval from CCC. It is only the surplus recycled water offsite discharge pipeline and connection to CCC system.

Please give me a call if you wish to discuss.

Cheers

Brad

Brad Irwin | **Environmental Engineer**
Solo Water Pty Ltd
A: 86-88 Chinderah Bay Drive Chinderah NSW 2487
P: 1300 765 698
E: brad.irwin@solowater.com.au
W: www.solowater.com.au

From: Ian Brown [mailto:ianb@adwjohnson.com.au]
Sent: Monday, 6 August 2018 10:13 AM
To: Brad Irwin; Nick Jackman; Nathan Delaney
Subject: FW: External invitation - Catherine Hill Bay Effluent Discharge

Hi all,

Please see below confirmation from Central Coast Council that the Thursday meeting time is now locked in.

Brad,

Are you able to provide further details on the items that Luke has requested below?

Thanks,

Ian Brown
SENIOR CIVIL ENGINEER
Central Coast Office
02 4305 4300
Email : ianb@adwjohnson.com.au
Website: www.adwjohnson.com.au

ADW Johnson Pty Limited

SYDNEY	Level 35 One International Towers, 100 Barangaroo Avenue, Sydney NSW 2000	Ph. 02 8046 7411
CENTRAL COAST	5 Pioneer Avenue, Tuggerah NSW 2259	Ph. 02 4305 4300
HUNTER	7/335 Hillsborough Road, Warners Bay NSW 2282	Ph. 02 4978 5100

From: Luke Drury <Luke.Drury@centralcoast.nsw.gov.au>
Sent: Monday, 6 August 2018 9:54 AM
To: Ian Brown <ianb@adwjohnson.com.au>
Subject: RE: External invitation - Catherine Hill Bay Effluent Discharge

Hi Ian,

I have my manager confirmed for the meeting so will remove the tentative status from the meeting invitation.

Can you also follow up the following information which helps inform our review of the proposed discharge:

- Can you provide a process flow diagram for the treatment system including the additional treatment (if any) provided to effluent used in the dual reticulation scheme. Can you include the proposed offtake for discharge to Central Coast Council.
- Can you confirm the status of the approvals for the effluent reuse scheme including:
    - Who is the regulator and under what act are the approvals granted?
    - What approvals have been obtained to date?
    - What framework/guidelines was the scheme assessed under?
    - Has the treatment system been validated/verified to achieve a certain log reduction for pathogen removal or production of a certain class of effluent (depends on assessment framework relevant to the site).

Cheers,

Luke Drury
Section Manager Water Services and Design
Water Planning and Development

Central Coast Council
P.O. Box 20 Wyong, NSW 2259
t: 02 4350 5109
m: 0400 734 217
e: Luke.Drury@centralcoast.nsw.gov.au

From: Ian Brown [mailto:ianb@adwjohnson.com.au]
Sent: Monday, 6 August 2018 8:59 AM
To: Luke Drury
Subject: RE: External invitation - Catherine Hill Bay Effluent Discharge

Hi Luke,

Just wanted to follow up regarding the meeting on Thursday, has this date and time been confirmed? The water utility contact needs to travel down from Brisbane for the meeting so I just want to make sure he can book flights confidently.

Thanks,

Ian Brown
SENIOR CIVIL ENGINEER
Central Coast Office
02 4305 4300
Email : ianb@adwjohnson.com.au
Website: www.adwjohnson.com.au

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CENTRAL COAST 5 Pioneer Avenue, Tuggerah NSW 2259 **Ph.** 02 4305 4300
HUNTER 7/335 Hillsborough Road, Warners Bay NSW 2282 **Ph.** 02 4978 5100

-----Original Appointment-----
From: Ian Brown
Sent: Tuesday, 31 July 2018 5:08 PM
To: Luke Drury
Subject: Accepted: External invitation - Catherine Hill Bay Effluent Discharge
When: Thursday, 9 August 2018 1:00 PM-2:00 PM (UTC+10:00) Canberra, Melbourne, Sydney.
Where: Central Coast Council - Hely Street Wyong Office

Thanks Luke,

I have forwarded the invite to the client, water utility contact, as well as Nathan D in our office who will also attend. Noted that this is a preliminary meeting time at the moment, feel free to send through an update if required once you have confirmation from Council staff.

Rhys Johns

From: Ian Brown
Sent: Friday, 27 July 2018 2:04 PM
To: Luke Drury
Subject: Catherine Hill Bay - surplus recycled water
Attachments: 211688(13)-ESK-(012-013)-B.pdf

Hi Luke,

Thanks very much for your time on the phone yesterday. As discussed, we would like to arrange a meeting with Council to discuss the feasibility of discharging the surplus recycled water from the Catherine Hill Bay Water Utility (CHBWU) facility, into the Gwandalan treatment plant. To give you a better understanding of the details around the surplus recycled water, the operators of the facility have provided me with the following information:

The pumps would also use VSDs so we can control the flows and pressures.

Material to be Pumped

Surplus Recycled Water with no solids or biological material that can go septic.

The pumps would also use VSDs so we can control the flows and pressures.

Indicative Water Quality
SS<5 mg/L
BOD<10 mg/L
TN<10 mg/L
TP<0.5 mg/L
TDS<1000 mg/L

Flows

Average Day Surplus = nominal 100 kL/day
Peak Day Surplus = nominal 300 kL/day (which is a standby measure required if for some reason the Recycled water plant has failed or is down for maintenance and all of the water is considered surplus)

For a 22 hour pump cycle the flow will be say 4 L/s, or for say 8 hours per day the flow rate would be say 11 L/s.

Wet weather peaking factor

Not applicable because we use a pressure sewer system before the plant and the surplus recycled water will be pumped from a 2 ML storage tank downstream of the MBR, which provides adequate flow balancing.

The 300 kL/day peak during failure of the plant would be the peak design flow for hydraulics.

I have also attached a high level concept plan of the proposed pipeline to give Council some perspective. Could you please review the above information and advise a time that would be suitable for Council to meet with the client and CHBWU operator. At this stage the only dates over

the next 2 weeks that are unavailable to our project team are Thur 2nd Aug (all day), Fri 3rd Aug (morning), and Tues 7th Aug (all day). Could you please advise a time outside of these dates that would be suitable for Council. If you would like any further information with regards to our proposal please let me know and I will be happy to source the required information.

Thanks again, look forward to hearing from you.

Ian Brown
SENIOR CIVIL ENGINEER
Central Coast Office
02 4305 4300
Email : ianb@adwjohnson.com.au
Website: www.adwjohnson.com.au

ADW Johnson Pty Limited

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MINUTES OF MEETING

DATE: 16/05/2019

ATTENDEES: Cameron Black, Rhys Johns (ADW Johnson)
Luke Drury, Johnson Zhang (Central Coast Council)

MEETING – CATHERINE HILL BAY CONNECTION DESIGN DISCUSSION

INTRODUCTION:

Meeting held between ADW Johnson (ADWJ) and Central Coast Council (CCC) regarding design development for the proposed recycled water transfer main (RWTM) from Catherine Hill Bay Water Utility (CHBWU) to Gwandalan Sewage Treatment Plant (STP) Inlet Works. The aim is to discuss matters for consideration as part of the design development and understand Council's design requirements.

DISCUSSION POINTS:

- ADWJ raised the opportunity to include a section of gravity main at the final section of the pipeline from the roundabout intersection of Kanangra Drive and Summerland Road to the Gwandalan STP Inlet Works in order to provide a dedicated high discharge point.

  CCC had preference for the pipeline to operate as a variable grade sewer (VGS) through the final section, rather than being a dedicated gravity line.

- ADWJ raised opportunity to connect into the proposed Gwandalan 9 Sewer Pumping Station (SPS) Rising Main (RM).

  CCC were satisfied with connection and provided comment on the space constraint in order to include the proposed flowmeter and isolation valve.

- CCC requested the proposed flowmeter and isolation valve be located within the Gwandalan STP site boundary, preferably located within close proximity to the inlet works for ease of access for CCC operations staff.

- ADWJ introduced the potential flowrate change from the initially proposed ~10 L/s adopting a maximum pump duration of 8 hours, to 7.5 L/s adopting a maximum pump duration of 12 hours.

  CCC had no issues with the change as there is capacity at the Gwandalan STP to accommodate for up to 10 L/s, in line with the initial proposal.

- CCC were keen to understand the space constraints around the connection details into the Gwandalan STP Inlet Works i.e. the existing asbestos cement (AC) rising mains and thrust block details. CCC has provided ADWJ (GW09 project) with GIS information of the existing rising mains, but no WAC information has been provided.

- CCC had a preference to use the A.R.I D-Series Combination Air Valve along the RWTM pipeline at dedicated high points.

- CCC to issue 306 Certificate for the CHB RWTM. Luke Drury mentioned that not necessary to have all final details in place, rather the Certificate will outline outstanding requirements to be incorporated.

- CCC interested in understanding the timeframes for both the GW09 SPS RM and CHB RWTM projects, both being designed by ADWJ. CCC require to modify the Gwandalan STP Inlet Works to provide additional capacity in the channel walls to allow sufficient freeboard capacity before connection of proposed infrastructure.

  ADWJ offered preliminary estimate of timing for the CHB RWTM with design expecting to take a further 2 months and Solo Water have quoted at least 8 months for approval by the Independent Pricing and Regulatory Tribunal (IPART).

  ADWJ did not offer timeframes for the GW09 SPS RM project, CCC should consult directly with ADWJ's Project Manager, Jason Yeo, for more information.

- ADWJ to provide CCC with further information following selection and details of the proposed automatic control valve.

  CCC offered internal review of the valve selection by their mechanical engineering department.

ACTIONS:

ADWJ are to provide details of the automatic control valve and details on the risk assessment of failure which has the potential for operational issues at the Gwandalan STP re: VGS. After details provided by ADWJ, CCC to provide review comments and preference of the arrangement at the CCC Gwandalan STP site boundary.

AWDJ to provide CCC with the draft design plans and design report for comment. Review comments will be incorporated, as best they can, into the final design.

Office of Environment & Heritage
NSW National Parks & Wildlife Service

Our Ref: DOC19/529851
Your Ref: 28/6/19

Mr Nick Jackman
Senior Development Manager
Coastal Hamlets Pty LTD
51 Riley Street
Woolloomooloo NSW 2300

Dear Mr Jackman

Re: Review of Environmental Factors – Proposed Catherine Hill Bay Recycled Water Main

I refer to Coastal Hamlet's application to the NSW National Parks and Wildlife Service (NPWS) to install the Catherine Hill Bay Recycled Water Main through Lake Macquarie and Munmorah State Conservation Areas.

NPWS received your application in the form of a Review of Environmental Factors (REF) on 23rd November 2018. The REF could not be determined because the document was not complete and failed to comply with the statutory requirements of Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Additional information was received in a revised REF on 13th May 2019 and this version is currently being determined.

A meeting with yourself and Ranger, Andrew Hampstead was held on Thursday 20th June 2019 regarding the proposed gate and bollard locations specified in the REF. After inspecting the proposed locations onsite, it was agreed that you would complete fencing sections along Kanangra Drive that amounted to 300-400 metres which would prevent illegal access in that area. A map indicating the proposed fence location is outlined in **Attachment 1** to this letter. Amendments to the REF that reflect the fencing agreement will need to be completed.

The following amendments to the REF will include:

1. Amendments to the drawings specified in Attachment 9 sheet 16 and 17
2. An addendum to the REF specifying the proposed fence location and fencing design specification
3. Reference to gate installation on page 22, 24 and 46 are not required

Please note that NPWS has stopped the determination 'clock' on the REF until such time as the proposed amendments to the fencing location plan and design specifications are completed and received.

Should you require further information please contact Ranger Andrew Hampstead on 4972 9007 or at andrew.hampstead@environment.nsw.gov.au.

PO Box 8068, Summerland Point NSW 2259
Blue Wren Drive WYBUNG NSW 2259
Tel: (02) 4974 9000 Fax: (02) 4972 9055
ABN 30 841 387 271
www.environment.nsw.gov.au

Yours sincerely

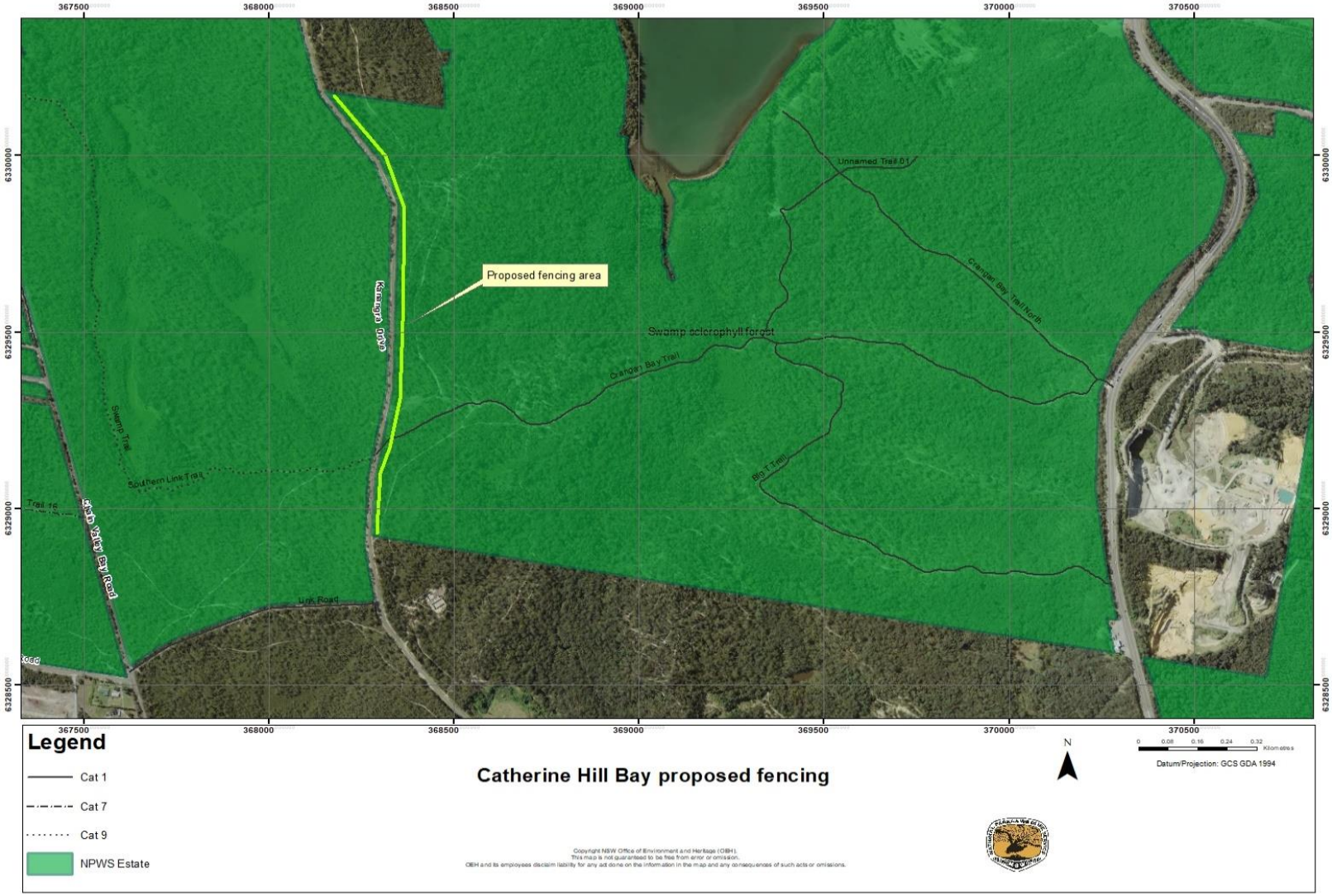
STEVE ATKINS
Manager, Central Coast Area
Hunter Central Coast Branch
National Parks and Wildlife Service

28 June 2019

Enclosure: Attachment 1 – Fencing map for the Catherine Hill Bay Recycled Water Main Review of Environmental Factors

Attachment 1: Fencing location map Catherine Hill Bay Recycled Water Main Review of Environmental Factors

i. **Catherine Hill Bay Proposed Fencing Map**



MINUTES OF MEETING

DATE: 23/01/2019

ATTENDEES: Ian Brown, Cameron Black, Rhys Johns (ADW Johnson)
Brad Irwin, Craig Heininger, Alan Irving (Solo Water)

SURPLUS RECYCLED WATER TRANSFER PIPELINE – START UP DESIGN MEETING

INTRODUCTION:

Meeting held between ADW Johnson (ADWJ) and Solo Water regarding design of the surplus recycled water transfer main and recycled water pump station (RWPS) from Catherine Hill Bay (CHB) Recycled Water Treatment Plant (RWTP) operated by Solo Water to Gwandalan Wastewater Treatment Works (WWTW) operated by Central Coast Council. The aim is to discuss matters for consideration as part of the design and planning process. Agenda is to discuss items listed in ADWJ's RFI #1 (attached), with reference to Solo Water's initial responses, and any other issues and information requirements.

DISCUSSION POINTS:

The dot points for each ADWJ RFI #1 is listed below with discussion points added below:

1. **Preferable pump run times and duration of pumping in order to determine pump flow rates.**

- 8 hours per day
- Due to operational flexibility, flow balancing and risk management in consultation with Council

2. **Information on future flows for ultimate staging.**

- Design loads to be provided by Rose Group/AWDJ to Solo Water for design purposes
- Solo Water noted potential inclusion of 200 ET development at Middle Camp that should be considered in the design development along with existing villages at CHB and Middle Camp
- Solo outlined that the recycled water main must provide for the same ET loading as the potable bulk water meter design and Solo Water operational approval i.e. 650 ET. This does not include the potential additional development of Middle Camp of 200 ET but it does include the Council and State Government requirement to

connect the existing Coastal Hamlets development to CHB and Middle Camp if required in the future.

3. Details of upstream tank

- 2 x 1 ML permeate irrigation water reservoirs which will be used to draw surplus recycled water from to avoid going through unnecessary processes i.e. Chlorine and UV, to send to Gwandalan WWTW
- Council agreed to surplus recycled water being drawn from the permeate irrigation water reservoir as they don't want free chlorine entering the plant process as it is a waste of energy and chemical
- 1 x 1 ML recycled water reservoir
- 1 x 1 ML potable water reservoir
- Permeate reservoir storage allows for approx. 10 days emergency storage – depending on operational scenario - TBC
- Potable Water reservoir provides around 5 days storage (TBC). Must maintain at least 500 kL in potable water reservoir for firefighting purposes. Any required outage of the existing potable water line during construction of the recycled water line must be co-ordinated with Solo Water to allow for contingency measures to be put in place for potable water supply.
- WAE and other necessary details to be sent through by Solo Water

4. Allocated area on site for RWPS

- Solo Water have preference for the new RWPS to be located in the same area as the existing irrigation pump inside the RWTP building alongside the existing recycled and potable water pump skids in order to minimise cost for Rose Group
- ADW Johnson to check whether existing irrigation pump has capability to be re-used as RWPS pump
- Location of new RWPS will need to be mindful of switchboard setback and other constraints inside the RWTP building
- Discussion was had around the need for a duty-standby pumping arrangement for contingency or whether a spare pump would suffice for design purposes
- Pumping arrangement to be assessed on a risk-based approach during design and pump selection

5. Details on the electrical power supply available on site

- Solo Water can provide electrical drawings for the RWTP site
- Required that Solo Water use their electrical subcontractor who understands the site to undertake electrical works, including electrical design and installation
- During pump selection process, Solo Water will consult with their electrical subcontractor to determine electrical requirements and foreseeable capacity constraints with the current switchboard
- Solo Water noted there is plenty of capacity and space in the current switchboards

6. Noise requirements on CHB RWTP site

- Current REF covers noise of the RWTP
- If pumps are located in the RWTP building, REF addendum to be prepared to assess new RWPS, however not seen to be issue considering other plant in the vicinity

- Solo Water raised who would be preparing the REF addendum outside the RWTP footprint where Solo Water would prepare documentation – ADWJ to confirm with Rose Group as this is needed to complete the IPART approval process that can take up to 12 months after lodgement

7. Drawings that show access arrangements to the proposed RWPS site

- As previously mentioned, preference for the new RWPS to be located in the same area as the existing irrigation pump inside the RWTP building
- Access arrangement will be considered as part of the design, although not likely to be an issue

8. Is telemetry currently provided on site for remote monitoring via Central Coast Council's existing SCADA system

- Solo Water have an existing SCADA system
- No link currently exists between the CHB RWTP site and Central Coast Council SCADA and preference is to keep it that way
- There is some read-only permission i.e. bulk water pump station mag flow meter, can be viewed on Solo Water SCADA. Envisaged that a similar system would be provided for the recycled water meter located at the Gwandalan WWTP.
- Solo Water noted that they would not allow Council direct access to their SCADA system for network security reasons, but would rather send or accept signals or alerts if needed
- Solo Water raised concerns about the provision of an electronically controlled automated control valve proposed to be located at Gwandalan WWTW. Noted that some type of control valve is required but Solo Water's preference is for the control valve to be mechanical only and not automated.
- Discussed use of a pressure sustaining valve (PSV) rather than an electronic control valve as a mechanical solution to avoid reliance on a signal as they currently experience issues with signals originating from Gwandalan
- ADWJ to consider inclusion of PSV for purposes of design, noting the potable bulk water main includes PSV for the same design reason

9. Security requirements for the RWPS

- Ideally the RWPS will be located inside the current RWTP building, replacing the existing irrigation pump, hence requiring no additional security
- In the case it does not fit in the location proposed, alternative security arrangements may need to be considered

10. WAE information of the existing watermain and any other private mains Solo Water maintain

- Solo Water to provide any WAE information on the existing recycled water, irrigation water, potable water and any other private mains for the purposes of the design
- Potential to re-use the existing DN125 PE100 PN16 irrigation main as part of the design to minimise cost to Rose Group pending hydraulic characteristics
- Solo Water showed the easiest location to cut-in to the main to minimise costs

11. Standard drawings or technical specifications that Solo Water will require the asset to be constructed to

- Solo Water noted to adopt Hunter Water's version of the WSAA Code as all other water and sewer on site at CHB was designed to that standard
- ADW Johnson noted Central Coast Council adopt Sydney Water's version of the WSAA Code – with key difference being the closing direction of valves
- Solo Water directed to adopt Hunter Water's convention for valve closure i.e. clockwise closing for convenience as they will be operating the assets, not Central Coast Council

12. Route preferences through existing and proposed stages

- Proposed alignment to follow the existing potable bulk water main corridor
- Design issues around the crossing of the Pacific Highway
- Solo Water have CCTV footage of culvert crossing showing the potable bulk water main threaded through. Solo Water to provide CCTV footage of the culvert crossing
- Potential to consider alternative alignment options i.e. Montefiore Street
- Solo Water mentioned that National Parks and Wildlife Services (NPWS) are to be consulted with during the design process and mentioned a Construction Risk Assessment (CRA) was developed for the previous potable bulk water main design which was sufficient for NPWS to assess.

13. Approved suppliers list i.e. for the pumps, if Solo Water have any

- Solo Water requested to be involved in the selection process for all mech/elec items including pumps, equipment and instrumentation
- Solo Water advised preference to use Grundfos for pump selection as they have a relationship with the supplier and hold critical spares of their parts
- Solo Water to install marker plates, everything else as per WSAA Code

14. Solo documentation review / approval process

- Solo Water to undertake design review for concept and detail design and equipment lists
- Solo Water to sign off on REF to cover works within Solo Area of operations only. Separate approval process for section of recycled water main through NPWS land and along Kanangra Drive.
- Design deliverables to be determined during the design process
- Solo Water nominated themselves to undertake construction review inspections for quality assurance

ACTIONS:

Solo Water to provide the following information:

- CCTV footage of the culvert crossing
- Construction photos, including those taken during concrete pier and footings near Pacific Highway crossing
- WAE of existing bulk water main

- WAE of existing recycled water (irrigation) main
- WAE of storage tanks (permeate and potable)
- Pump details of current recycled water (irrigation) pump
- Grundfos contact to consult with for pump selection

ADW Johnson to follow up on the following information from Rose Group

- Loadings and ET to be used for the design
- Who to prepare the REF addendum outside the RWTP site (Solo Water)

Appendix B

PRESSURE SUSTAINING VALVE CORRESPONDENCE

Rhys Johns

From: Charlie Chow <charlie@bermad.com.au>
Sent: Tuesday, 9 July 2019 11:03 AM
To: Rhys Johns
Cc: 'Colin Kirkland'
Subject: FW: RFI - Automatic Control Valve

G'Day Rhys,
Thank you for your email. I apologise for the delay in coming back to you but I have been snowed under with work. I sought a second opinion from our Colleague and he has also confirmed that the location you have chosen is sound. Please proceed as you would.
Thanks and regards
Charlie Chow

Charlie Chow
New South Wales / Australian Capital Territory State Manager
Phone (02) 9746 1788 Fax (02) 9746 1838 Mobile 0419 741 156
www.bermad.com.au

From: Colin Kirkland <colin@bermad.com.au>
Sent: Tuesday, 9 July 2019 10:05 AM
To: 'Charlie Chow' <charlie@bermad.com.au>
Subject: RE: RFI - Automatic Control Valve

Charlie

There is no issue in fitting the pressure sustaining valve at this location and the HGL and static flow condition look correct.

Best regards

Colin Kirkland
Air Valve Product Manager & Victoria / Tasmania Technical Sales
Phone (03) 9464 2374 Fax (03) 9464 2382 Mobile 0407 550 034
www.bermad.com.au

From: Charlie Chow <charlie@bermad.com.au>
Sent: Monday, 8 July 2019 2:05 PM
To: 'Colin Kirkland' <colin@bermad.com.au>
Subject: FW: RFI - Automatic Control Valve

Hi Colin,
Can you please cast your eye over this email. Rhys Johns wants to mount the Air Valve at Chainage 5180. I see no problems.
Can you confirm or with your experience offer a a better location and any other pertinent comments that I can pass on.
Thanks and regards

Charlie

Charlie Chow
New South Wales / Australian Capital Territory State Manager
Phone (02) 9746 1788 Fax (02) 9746 1838 Mobile 0419 741 156
www.bermad.com.au

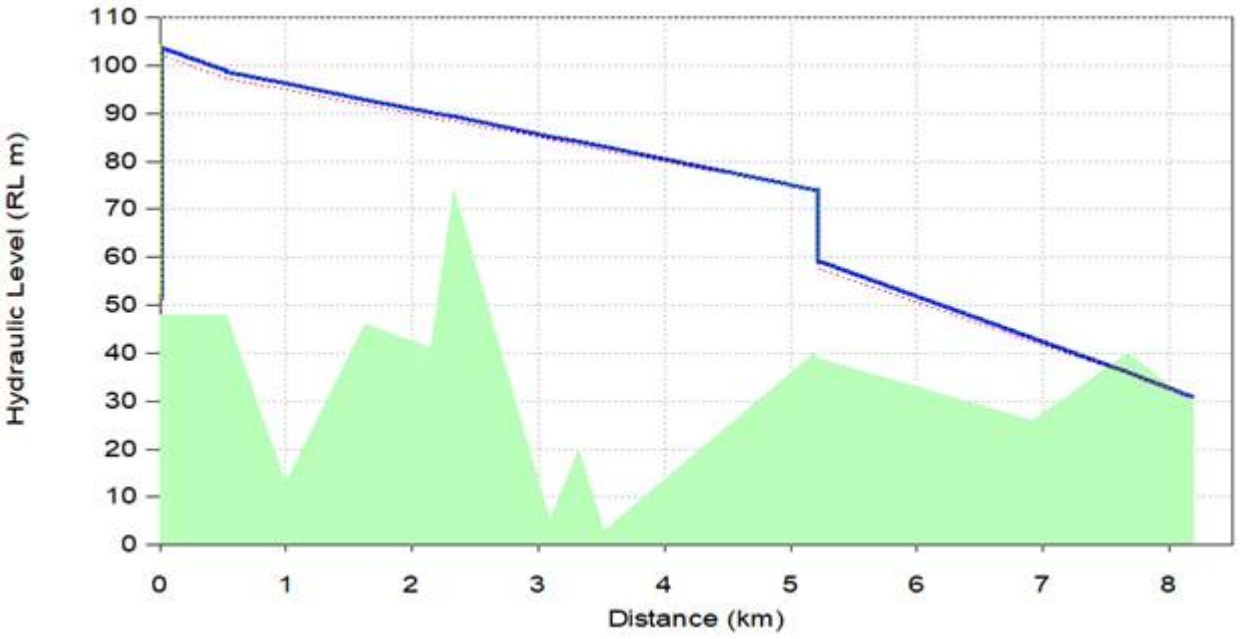
From: Rhys Johns <rhysj@adwjohnson.com.au>
Sent: Friday, 5 July 2019 2:19 PM
To: Charlie Chow <charlie@bermad.com.au>; colin@bermad.com.au
Cc: Cameron Black <cameronb@adwjohnson.com.au>
Subject: RE: RFI - Automatic Control Valve

Hi Charlie,

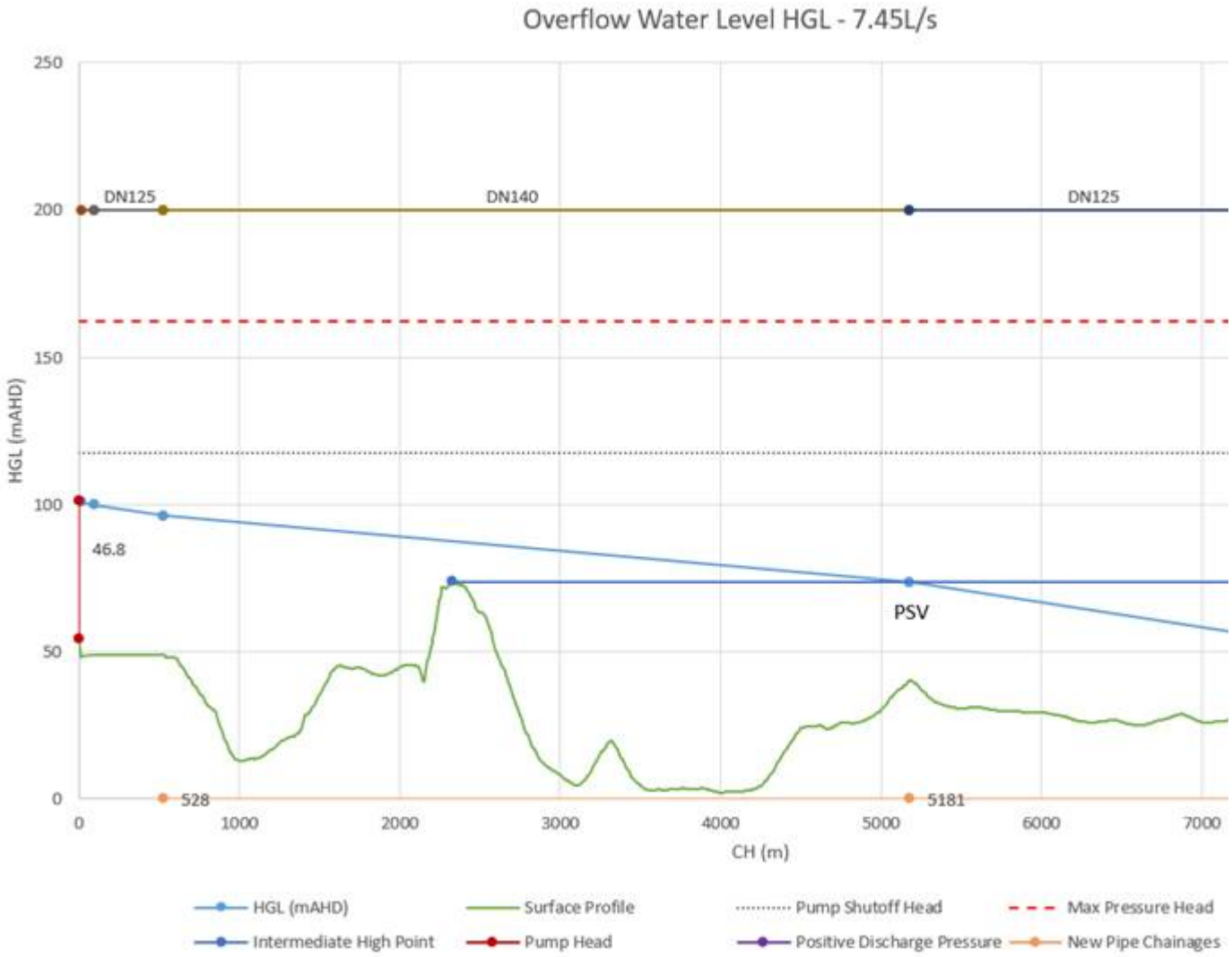
ADW Johnson are close to completing the draft detailed design package. We have proposed location of the valve at an accessible location along the alignment at approx. chainage 5180m.

I am hoping for some clarity around the operation, hydraulics and HGL at the PSV. Below I have produced screen shots from the (1) WATHAM modelling package showing the steady state analysis and (2) spreadsheet model analysis for steady state. Could you please provide comment on the likely steady state HGL, noting the difference in the two modelled scenarios?

(1) WATHAM



(2) SPREADSHEET



Regards,

Rhys Johns
Hunter Office
02 4978 5100
0422 578 027
Email : rhysj@adwjohnson.com.au
Website: www.adwjohnson.com.au

ADW Johnson Pty Limited

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CENTRAL COAST	5 Pioneer Avenue, Tuggerah NSW 2259	**Ph.** 02 4305 4300
HUNTER	7/335 Hillsborough Road, Warners Bay NSW 2282	**Ph.** 02 4978 5100

From: Charlie Chow <charlie@bermad.com.au>
Sent: Thursday, 23 May 2019 1:32 PM
To: Rhys Johns <rhysj@adwjohnson.com.au>
Cc: Cameron Black <cameronb@adwjohnson.com.au>
Subject: RE: RFI - Automatic Control Valve

G'Day Rys,
Thank you for your email and the contents are noted.

We still believe that the location of the Pressure sustaining valve at approx. Chainage 7000 is our preferred location. However, you as Designer has the final say.
The valve will be a Series 700, PN16 rated valve with Table D or Table E flanges trimmed with Copper tubing and Brass fittings.
Based on the following valve performance Criteria, we can confirm that there is no Cavitation concern and the expected life expectancy of the valve is 46,440 hours before a major overhaul provided the recommended maintenance is carried out at regular intervals.
As for the setting of the Pressure Sustaining valve, I suggest that we set the valve at approx.550 kpa.
This means that when the pump starts up, the valve will open when the upstream pressure hits 550 kpa and remains open until the pump shuts down. When this occurs, the line pressure will drop and the valve will close when it senses the 550 kpa pressure. The Pressure Sustaining valve is built with a adjustable Pilot and you can vary the setting as you wish.
I hope this will assist you.
Thanks and regards
Charlie Chow

Charlie Chow
New South Wales / Australian Capital Territory State Manager
Phone (02) 9746 1788 Fax (02) 9746 1838 Mobile 0419 741 156
www.bermad.com.au

From: Rhys Johns <rhysj@adwjohnson.com.au>
Sent: Wednesday, 22 May 2019 10:28 AM
To: Charlie Chow <charlie@bermad.com.au>
Cc: Cameron Black <cameronb@adwjohnson.com.au>
Subject: RE: RFI - Automatic Control Valve

Hi Charlie,

Thank you for sending through the information on the PSV. I understand the Bermad 700 Series Model 730 is being recommended for 'Preventing Line Emptying', as shown in the data sheet (attached) for scenario A.

Could I request more information in order to gain better understanding and confidence in the option proposed. I have attached a scan with some scribbled notes to demonstrate my concerns with more detail.

In the attachment 'Automatic Control Valve' I have shown the following information:

- Surface Profile (Green)
- Normal Operating HGL when the pumps are on (Blue)

Please note the client has preference for an automatic control valve (ACV) to avoid the need for any unwarranted telemetry and power supply infrastructure, also noting signal issues currently experienced due to the site location.

The purpose of implementing an automatic control valve (ACV) is to prevent the line from emptying and undesirable air entering into the pipeline for operational reasons. In order to achieve this I understand that the ACV needs to be located upstream of the discharge location either at ACV Location 1 or 2, as noted on the attachment. As expressed previously, my main concern is the operation of the ACV dependent on the location. The following zones for ACV Location 1 and 2 note the following operation:

1. ACV Location 1 is characterised by zone 1 where the normal operating HGL (pump on) pressure > static HGL (pump off, valve closed) pressure. ACV Location 1 seems logical whereby the pilot setting would be set higher than 73.7 m AHD so that when the pump turns off, the valve will see a drop in pressure triggering the valve to close. Conversely, when the pumps turn on the valve will see a rise in pressure triggering the valve to open.
2. ACV Location 2 is characterised by zone 2 where the normal operating HGL (pump on) pressure < static HGL (pump off, valve closed) pressure. My concern with ACV Location 2 is that the pilot setting to close the valve is higher than the normal operating HGL.

Could you please respond to this email with some more information on the valve operation and how the Bermad 700 Series Model 730 located at chainage 7000, as initially proposed, will operate as intended? Could I also request some further information on cavitation and headloss through the valve in the open and closed (or 70% closed) position for the flowrate i.e. ~7.5 L/s or 27 m^3/hr.

Your help is much appreciated.

Regards,

Rhys Johns
Hunter Office
02 4978 5100
0422 578 027
Email : rhysj@adwjohnson.com.au
Website: www.adwjohnson.com.au

ADW Johnson Pty Limited

SYDNEY	Level 35 One International Towers, 100 Barangaroo Avenue, Sydney NSW 2000	**Ph.** 02 8046 7411
CENTRAL COAST	5 Pioneer Avenue, Tuggerah NSW 2259	**Ph.** 02 4305 4300
HUNTER	7/335 Hillsborough Road, Warners Bay NSW 2282	**Ph.** 02 4978 5100

From: Charlie Chow <charlie@bermad.com.au>
Sent: Tuesday, 21 May 2019 7:28 PM
To: Rhys Johns <rhysj@adwjohnson.com.au>
Subject: RE: RFI - Automatic Control Valve

G'Day Rys,
My apologies for the mis-understanding. I thought we have discussed the use of a Pressure Sustaining valve built as a Double Chamber, Fast action valve and to be located at approx. chainage 7000.
Data Link:
https://www.bermad.com.au/products/730-pressure-reliefsustaining-valve/
We recommend that 50mm Combination Air Valves, PN16 rated should be mounted at all the three peaks as seen on the Profile of the pipeline.
Data link:
https://www.bermad.com.au/products/waterworks-air-release-valve-combination-ww-c30/

I hope this is sufficient information to assist you. If I can offer further assistance, please do not hesitate to call.
Thanks and regards
Charlie Chow

Charlie Chow
New South Wales / Australian Capital Territory State Manager
Phone (02) 9746 1788 Fax (02) 9746 1838 Mobile 0419 741 156
www.bermad.com.au

From: Rhys Johns <rhysj@adwjohnson.com.au>
Sent: Tuesday, 21 May 2019 8:47 AM
To: charlie@bermad.com.au
Subject: RE: RFI - Automatic Control Valve

Hi Charlie,

How are you progressing with the details of the Automatic Control Valve for the proposed recycled water main application?

It would be great to receive something this week so we can continue with the design documentation.

Your help is much appreciated.

Regards,

Rhys Johns
Hunter Office
02 4978 5100
0422 578 027
Email : rhysj@adwjohnson.com.au
Website: www.adwjohnson.com.au

ADW Johnson Pty Limited

SYDNEY	Level 35 One International Towers, 100 Barangaroo Avenue, Sydney NSW 2000	**Ph.** 02 8046 7411
CENTRAL COAST	5 Pioneer Avenue, Tuggerah NSW 2259	**Ph.** 02 4305 4300
HUNTER	7/335 Hillsborough Road, Warners Bay NSW 2282	**Ph.** 02 4978 5100

From: Rhys Johns
Sent: Tuesday, 14 May 2019 3:13 PM
To: 'charlie@bermad.com.au' <charlie@bermad.com.au>
Subject: RFI - Automatic Control Valve

Hi Charlie,

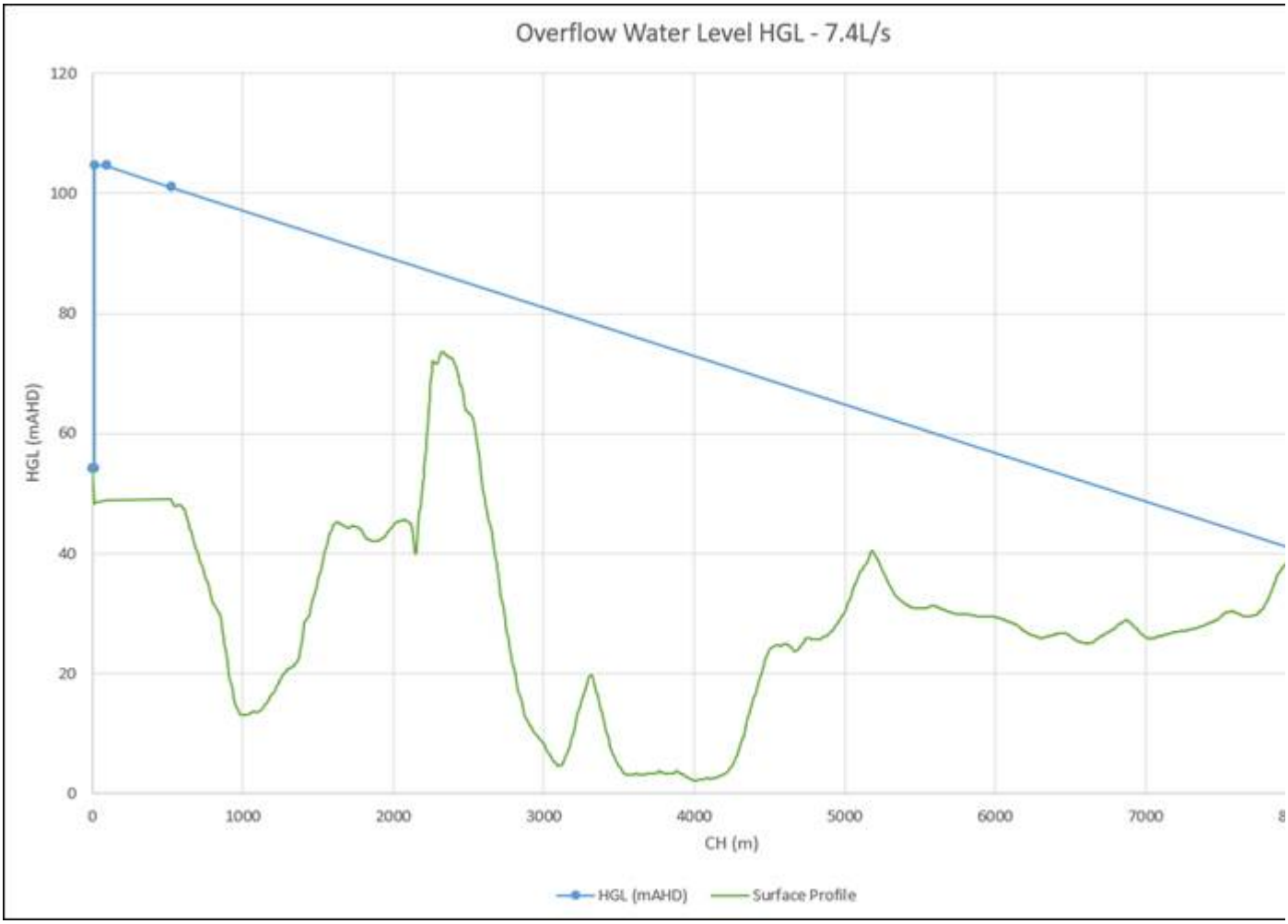
We've received your contact details from Solo Water. ADW Johnson has been engaged to undertake the design of a proposed 8 km recycled water transfer main and pumping station in the Lake Macquarie region in NSW.

The system includes pumping over an intermediate high point being the Pacific Highway over to the discharge location being Council's wastewater treatment plant (WWTP).

We are looking at a solution for an automatic control valve i.e. not requiring power supply or telemetry requirements, to allow the following operating scenarios:

1. Under normal operating conditions the pipeline and valve will allow full flow while pumps are running; and
2. When the pump is idle, the valve would be required to close to prevent the main from draining the section of pipe between the intermediate high point and the discharge location.

Could you please assist with selecting the optimum product for the application? I've attached a screenshot of hydraulic calculations (noting no inclusion of head loss through the proposed ACV) in order to give you an appreciation for the project and hydraulic design parameters:



Do not hesitate to contact on the details provided below if you wish to discuss further. It would be ideal to meet in person if you have the time to discuss the project.

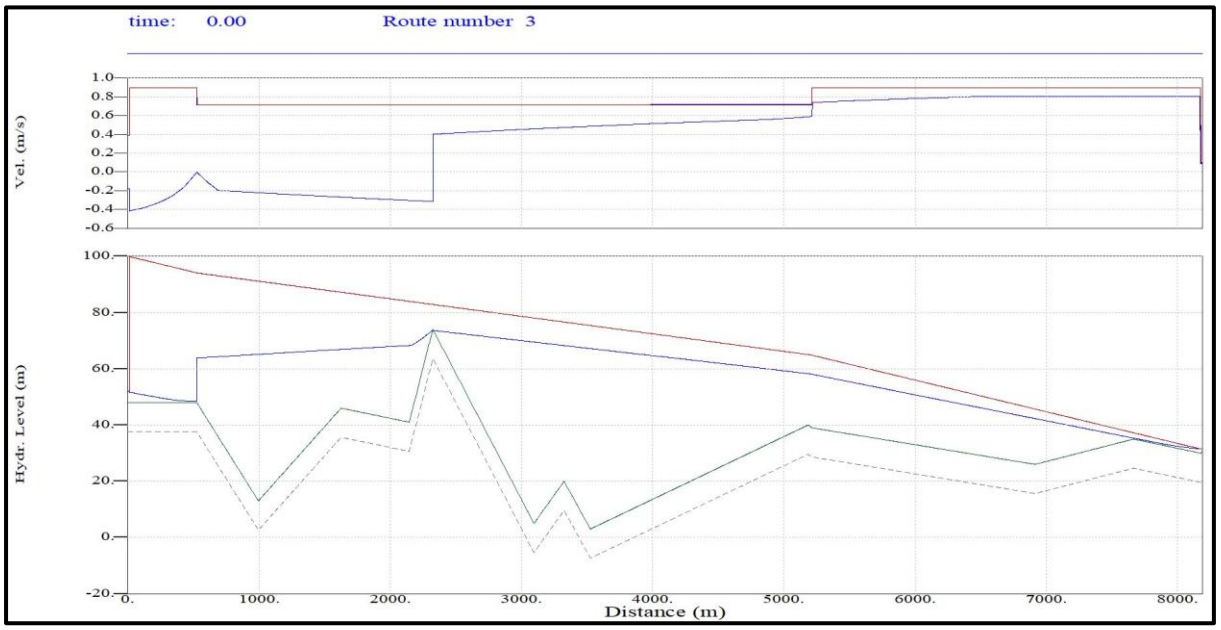
Regards,

Rhys Johns
Hunter Office
02 4978 5100
0422 578 027
Email : rhysj@adwjohnson.com.au
Website: www.adwjohnson.com.au

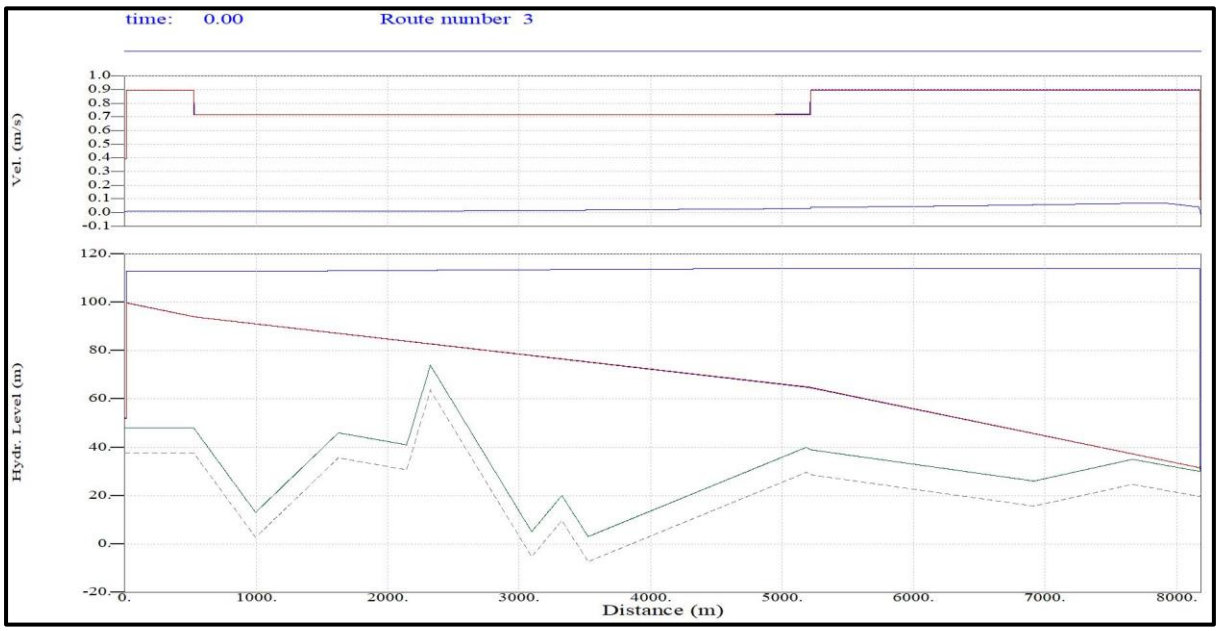
Appendix C

WATHAM MODELLING RESULTS

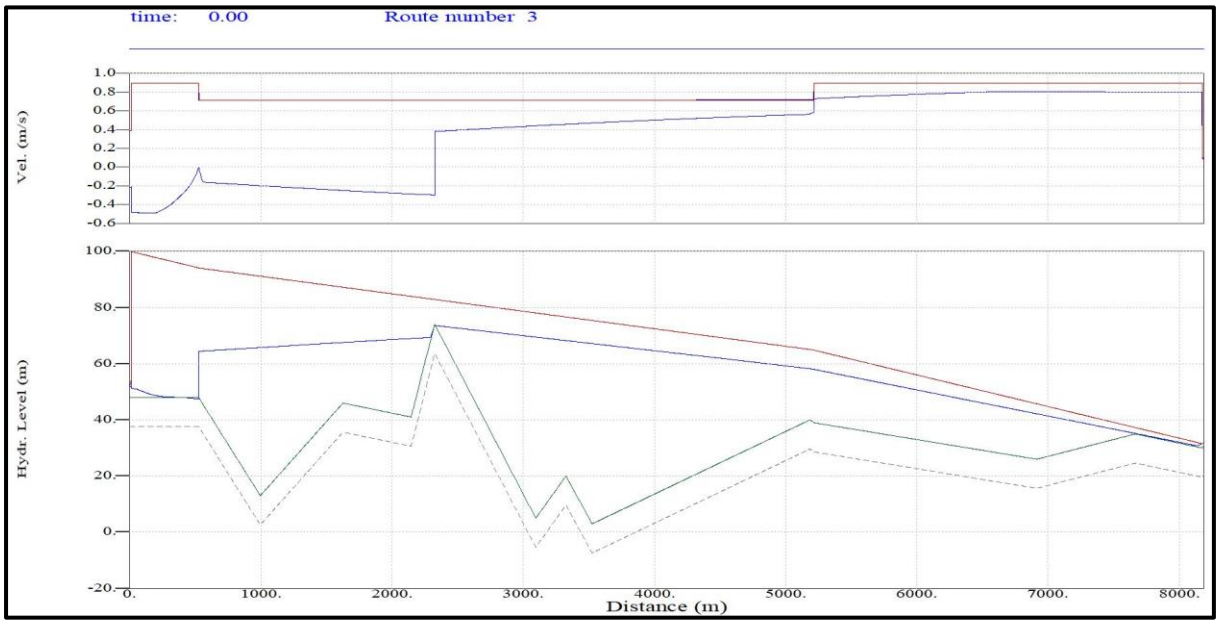
1 – Normal Pump Start



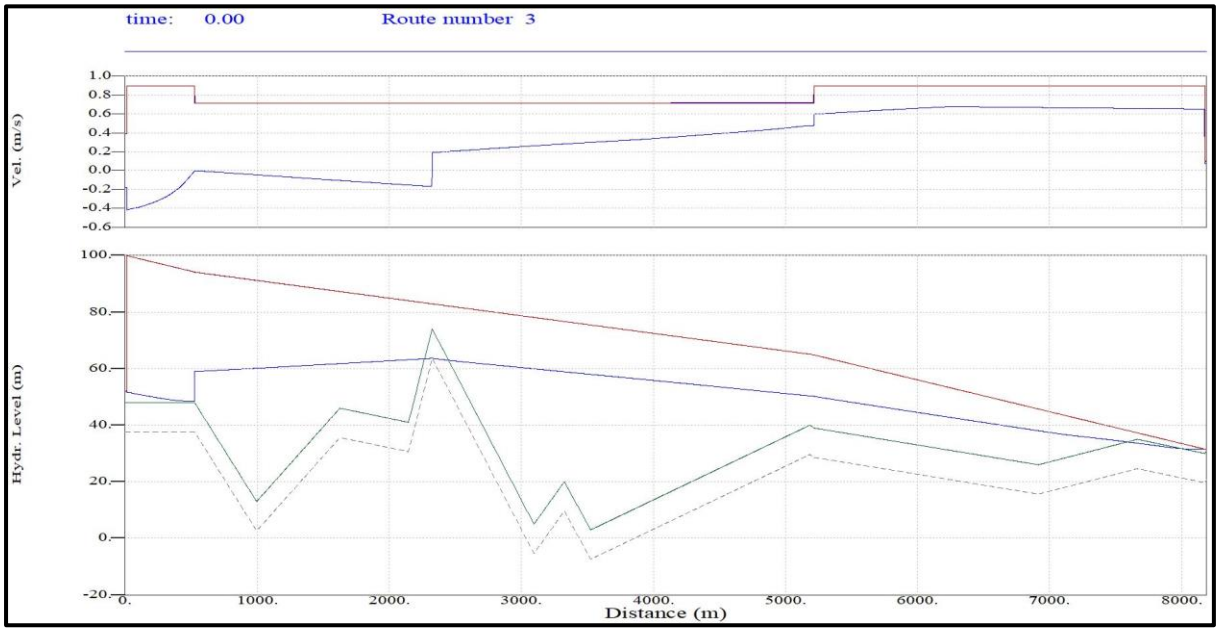
2 – Discharge Valve Closure



3 – Power Failure



4 – Air Valve Failure



Appendix D

PUMP INFORMATION

Company name:
Created by:
Phone:

Date: 02/07/2019

Qty.	Description
1	**CRIE 20-3 NV-FGJ-A-E-HQQE**

Note! Product picture may differ from actual product

Product No.: 99245018

Vertical, multistage centrifugal pump with inlet and outlet ports on same the level (inline). Pump materials in contact with the liquid are in stainless steel. A cartridge shaft seal ensures high reliability, safe handling, and easy access and service. Power transmission is via a rigid split coupling. Pipe connection is via combined DIN-ANSI-JIS flanges.

The pump is fitted with a 3-phase, fan-cooled, permanent-magnet, synchronous motor.
The motor efficiency is classified as IE5 in accordance with IEC 60034-30-2.
The motor includes a frequency converter and PI controller in the motor terminal box. This enables continuously variable control of the motor speed, which again enables adaptation of the performance to a given requirement.
The operating panel on the motor terminal box features a four-inch TFT display, push-buttons and the Grundfos Eye indicator.

The display gives an intuitive and user-friendly interface to all functions. The push-buttons are used to navigate through the menu structure to access pump and performance data on site and enable setting of required setpoint as well as setting of pump to "Min." or "Max." operation or to "Stop".

Communication with the pump is also possible by means of Grundfos GO Remote (accessory). The remote control enables further settings as well as reading out of a number of parameters such as "Actual value", "Speed", "Power input" and total "Power consumption".

The Grundfos Eye indicator on the operating panel provides visual indication of pump status:

"Power on": Motor is running (rotating green indicator lights) or not running (permanently green indicator lights)

"Warning": Motor is still running (rotating yellow indicator lights) or has stopped (permanently yellow indicator lights)

"Alarm": Motor has stopped (flashing red indicator lights).

The terminal box has a number of inputs and outputs enabling the motor to be used in advanced applications where many inputs and outputs are required:

two dedicated digital inputs
three analog inputs, 0(4)-20 mA, 0-5 V, 0-10 V, 0.5 - 3.5 V the factory-fitted pressure sensor is connected to one of these inputs
5 V voltage supply to potentiometer and sensor
one analog output, 0-10 V, 0(4)-20 mA
two configurable digital inputs or open-collector outputs
two Pt100/Pt1000 inputs
LiqTec, dry-running protection sensor input
Grundfos Digital Sensor input and output

Qty.	Description

24 V voltage supply for sensors
two signal-relay outputs (potential-free contacts)
GENIbus connection
interface for Grundfos CIM fieldbus module.

Controls:

Frequency converter:	Built-in
Pressure sensor:	Y

Liquid:

Pumped liquid:	Water
Liquid temperature range:	-20 .. 120 C
Selected liquid temperature:	20 C
Density at selected liquid temperature:	998.2 kg/m³

Technical:

Pump speed on which pump data are based:	3526 rpm
Actual calculated flow:	7.443 l/s
Rated flow:	7.028 l/s
Resulting head of the pump:	46.71 m
Pump orientation:	Vertical
Shaft seal arrangement:	Single
Code for shaft seal:	HQQE
Approvals on nameplate:	CE, EAC,ACS
Curve tolerance:	ISO9906:2012 3B

Materials:

Base:	Stainless steel EN 1.4408 AISI 316
Impeller:	Stainless steel EN 1.4301 AISI 304
Bearing:	SIC

Installation:

Maximum ambient temperature:	50 C
Maximum operating pressure:	16 bar
Max pressure at stated temp:	16 bar / 120 C 16 bar / -20 C
Type of connection:	DIN / ANSI / JIS
Si e of inlet connection:	DN 50 2 inch
Si e of outlet connection:	DN 50 2 inch
Pressure rating for pipe connection:	PN 25
Flange rating inlet:	300 lb
Flange si e for motor:	FF265

Electrical data:

Motor standard:	IEC
Motor type:	132SE
IE Efficiency class:	IE5
Rated power - P2:	5.5 kW
Power (P2) required by pump:	5.5 kW
Mains frequency:	50 H
Rated voltage:	3 x 380-500 V
Rated current:	10.3-8.20 A
Cos phi - power factor:	0.92-0.88

GRUNDFOS

Company name:
Created by:
Phone:

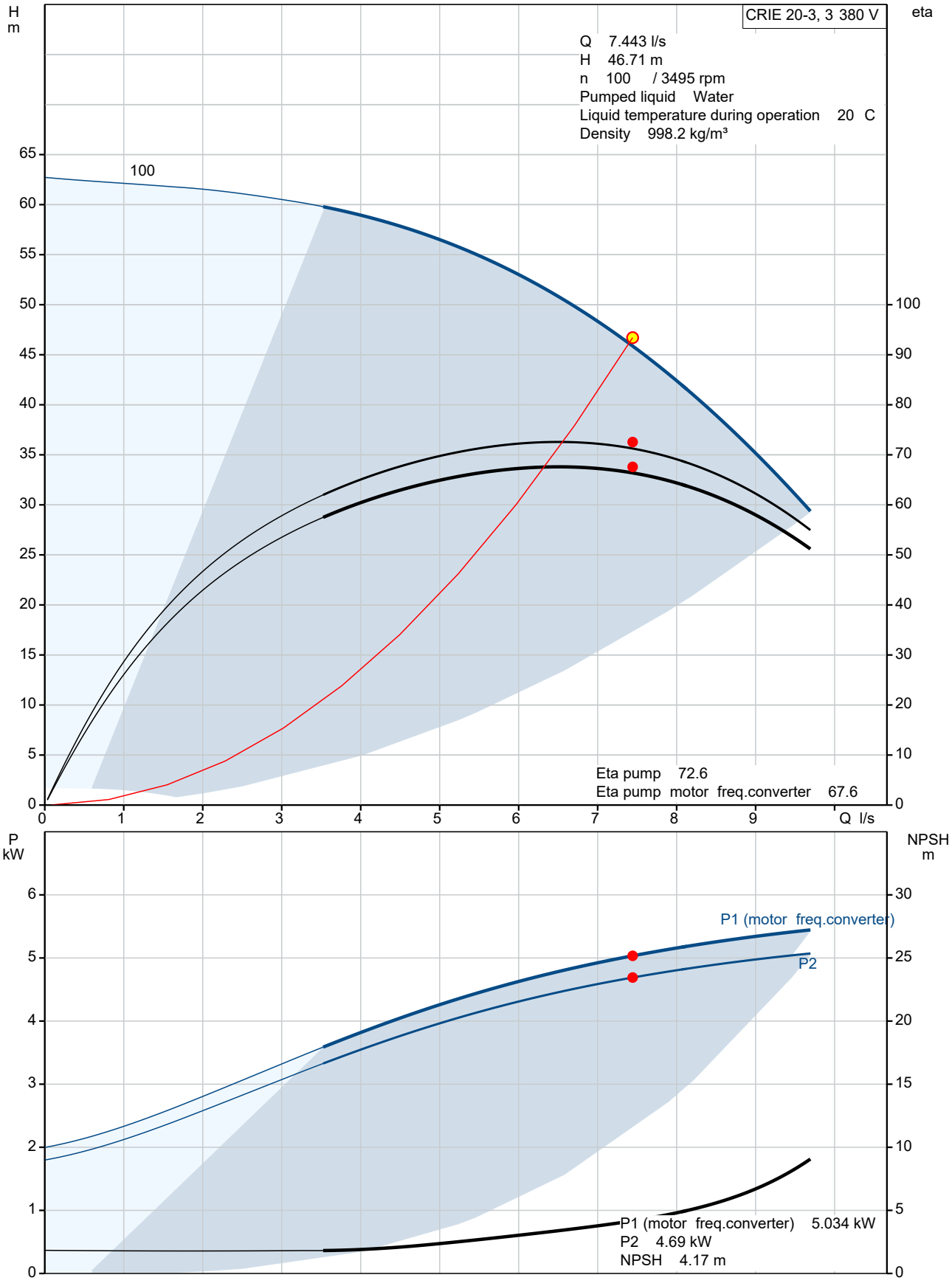
Date: 02/07/2019

Qty.	Description	
	Rated speed:	360-4000 rpm
	Efficiency:	92.7
	Motor efficiency at full load:	92.7
	Enclosure class (IEC 34-5):	IP55
	Insulation class (IEC 85):	F
	Motor No:	99137056
	Others:	
	Minimum efficiency index, MEI	: 0.70
	Net weight:	81 kg
	Gross weight:	109 kg
	Shipping volume:	0.37 m³

Company name:
Created by:
Phone:

Date: 02/07/2019

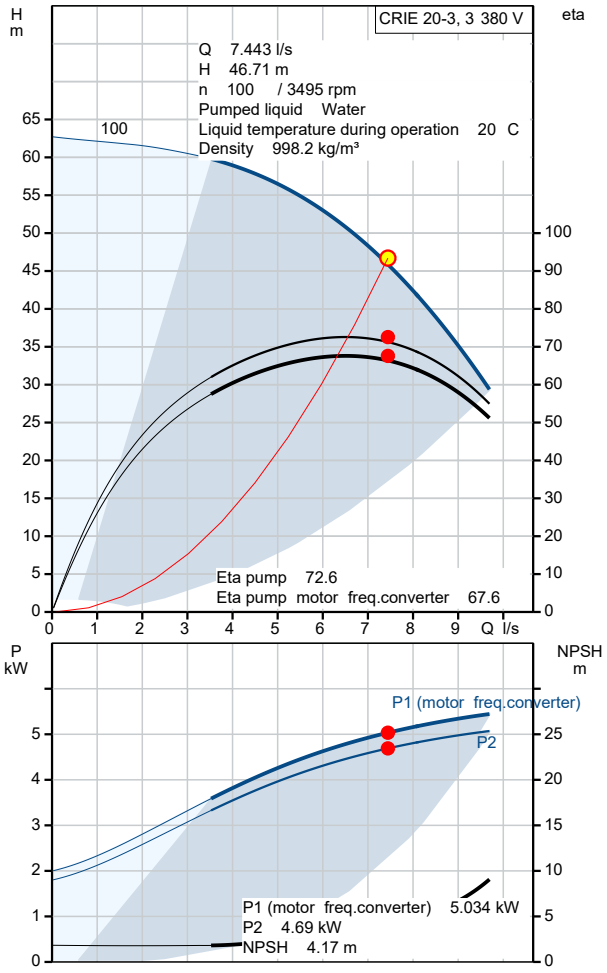
99245018 CRIE 20-3 NV-FGJ-A-E-HQQE 50 Hz



Company name:
Created by:
Phone:

Date: 02/07/2019

Description	Value
General information:	
Product name:	CRIE 20-3 NV-FGJ-A-E-HQQE
Product No:	99245018
EAN number:	5712609404381
Technical:	
Pump speed on which pump data are based:	3526 rpm
Actual calculated flow:	7.443 l/s
Rated flow:	7.028 l/s
Resulting head of the pump:	46.71 m
Head max:	63.3 m
Stages:	3
Impellers:	3
Number of reduced-diameter impellers:	0
Low NPSH:	N
Pump orientation:	Vertical
Shaft seal arrangement:	Single
Code for shaft seal:	HQQE
Approvals on nameplate:	CE, EAC,ACS
Curve tolerance:	ISO9906:2012 3B
Pump version:	NV
Model:	A
Materials:	
Base:	Stainless steel
	EN 1.4408
	AISI 316
Impeller:	Stainless steel
	EN 1.4301
	AISI 304
Material code:	A
Code for rubber:	E
Bearing:	SIC
Installation:	
Maximum ambient temperature:	50 C
Maximum operating pressure:	16 bar
Max pressure at stated temp:	16 bar / 120 C
	16 bar / -20 C
Type of connection:	DIN / ANSI / JIS
Si e of inlet connection:	DN 50
	2 inch
Si e of outlet connection:	DN 50
	2 inch
Pressure rating for pipe connection:	PN 25
Flange rating inlet:	300 lb
Flange si e for motor:	FF265
Connect code:	FGJ
Liquid:	
Pumped liquid:	Water
Liquid temperature range:	-20 .. 120 C
Selected liquid temperature:	20 C
Density at selected liquid temperature:	998.2 kg/m³
Electrical data:	
Motor standard:	IEC
Motor type:	132SE
IE Efficiency class:	IE5
Rated power - P2:	5.5 kW
Power (P2) required by pump:	5.5 kW



GRUNDFOS

Company name:
Created by:
Phone:

Date: 02/07/2019

Description	Value
Mains frequency:	50 H
Rated voltage:	3 x 380-500 V
Rated current:	10.3-8.20 A
Cos phi - power factor:	0.92-0.88
Rated speed:	360-4000 rpm
Efficiency:	92.7
Motor efficiency at full load:	92.7
Enclosure class (IEC 34-5):	IP55
Insulation class (IEC 85):	F
Motor protec:	YES
Motor No:	99137056
Controls:	
Control panel:	Graphical
Function Module:	FM300 - Advanced
Frequency converter:	Built-in
Pressure sensor:	Y
Others:	
Minimum efficiency index, MEI :	0.70
Net weight:	81 kg
Gross weight:	109 kg
Shipping volume:	0.37 m³
Sales region:	Australia

Appendix E

DRAFT FUNCTIONAL SPECIFICATION

Surplus Recycled Water Transfer Scheme – Draft Functional Design Description

PARENT EQUIPMENT NUMBER: XXXXX

1.0 INTRODUCTION

The Surplus Recycled Water Transfer Scheme (SRWTS) will comprise of components:

1. A pump station located within the CHB AWTP building;
2. A transfer pipeline of variable diameter ranging between DN125 and DN140 HDPE;
3. A pressure sustaining valve located within a pit adjacent to Kanagra Drive;
4. Various air valve and scour hydrants located along the transfer pipeline;
5. An isolation valve located at the boundary of the Gwandalan WWTP; and
6. Various pipework and fittings within the Gwandalan WWTP which will be owned, operated and maintained by Central Coast Council.

2.0 PUMPING STATION

The pumping station will comprise the existing Grundfos CRIE 20-3 vertical, multistage centrifugal pump (PMP-9300). The pump shall remain as a Variable Speed Drive pump programmed to ramp up to 100% speed over a 30 second period. The pump shall also be programmed to ramp down from 100% speed to off over a similar 30 second period. The ramp up and down time frame should be programable via the Danfoss VSD located on the MCC02- PLC2 switchboard.

A standby pump will be provided as a 'hot spare' which will require installation and change over in the scenario the lead duty pump is offline.

Pumping will be based on the amount of surplus recycled water generated by the AWTP on a daily basis based over a 12-hour maximum pumping duration. The lead duty pump is nominally rated at 7.36 L/s @ 46.4 m head for the motor's 100% synchronous speed (3530 rpm).

Suction will be from the existing outlet pipe from the MBR Permeate Storage Tank on slab level 48.621 m AHD. The suction HGL varies between the Tanks High-High or Overflow Level RL 53.929 m AHD and the Low-Low or Bottom Water Level (BWL) RL 48.796 m AHD.

The RWTP Site is already provided with PLC control c/w battery backup and an emergency standby generator with auto changeover switch for use in the event of loss of normal power supply.

Under normal pump operational mode, the pump will be in automatic mode and controlled via the PLC set points.

3.0 PUMP STATION ELECTRICAL CONTROLS

The pump station existing configuration is being retained as part of the scheme. The following WAE documentation is to be referred to for the pump station electrical controls:

- Switchboard - Recycled Water Pump Station & Potable Water Pump Station (MCC02–PLC03)
- PMP-9300 Discharge Pump
- Danfoss 5.0kW - 11kW VSD 10A – switchboard mounted
- RWPSPS switchboard supplied by 3 phase 415VAC supply from Main Switchboard (MSB01)

Refer to Control System Network Diagram (SW-56-CSN-E-001) for details.

4.0 OPERATING MODES

The modes of operation for the SRWTPS include:

1. Remote – Automatic Mode
2. Remote -Manual
3. Local Mode
4. Sequence Control (N/A)

'Remote – Automatic Mode' where Solo Water is not restricted by Central Coast Council.

This mode is the normal mode of operation for the plant. The pump will operate under the following operational mode:

1. Level in tank is greater than the operator adjustable *set point SRWTPS pump cut-in level*;
2. *Set point time* (operator adjustable) is met (to coincide with off-peak power supply periods i.e. 20:00 hrs through to 08:00hrs); and
3. The level in tank is greater than the SRWTPS pump stop level and the Permeate Tank Low-Low *set point minimum level*.
4. The equipment must have all fault conditions healthy to be able to start and run. In addition, all process interlocks are also required to be healthy in this mode. The fault conditions and process interlocks are to be defined during detailed design in accordance with SW PLC standards.

The pumps will cease operation given the following conditions are met:

1. Level in the tank falls below the SRWTPS *pump stop level set point*;
2. A *pump stop alarm* is raised due to any fault condition or process interlock failure; and
3. Time of operation falls outside the *Set Point Time* period.

The following operational parameters under this mode of operation include:

- Ability to operate the pump on an adjustable timer/duration control when the water level is within the acceptable operational BWL/TWL band;
- Adjustable normal operation TWL to ensure available storage to accept incoming flows from the MBR tank;

- Adjustable normal operating BWL override to shut the pump down to ensure a minimum volume of water for later recycling;
- Low-low level shutoff; and
- High-high level override to pump outside the Set Point Time period.

'Remote – Inhibit Mode' where Solo Water inhibit pump operation as directed by Central Coast Council or other.

The following operational parameters under this mode of operation include:

- Mode to be manually selected from SCADA following direction from Central Coast Council;
- This operational scenario will require the provision of an additional alarm set point to the 'normal operation' alarm set points. The additional alarm would be trigger if the recycled water permeate tank reaches XX% full (operator adjustable). This would then allow sufficient time for the plant operators to arrange for tankering of permeate water if required; and
- No pump override is available in this operation scenario.

'Remote – Manual' Operation Mode where Solo Water operate the system manually not automated. This mode allows the equipment to be remotely controlled manually on the SCADA system.

'Local Mode' where Solo Water operators will be able to start and stop the equipment at the equipment site independently of the SCADA system while in this mode (usually via pushbuttons on the switchboard).

The pump may only be started locally from the switchboard via the Variable Speed Drive keypad located on the switchboard panel if required.

5.0 PUMP CONTROL SCADA SET POINTS

The control system is to be designed in accordance with SW PLC Code Standard and SCADA Standards.

The PLC shall be programmed to receive the following signals:

- Control Mode: Remote - Automatic / Remote – Inhibit / Remote - Manual / Local Control;
- Tank level: high / high-high / low / low-low;
- Suction pressure: high / low;
- Downstream pressure: high / low;
- Flowmeter output: total flow / instantaneous flow / no-flow / high-flow; and
- Pump: healthy / not healthy.

The PLC shall be programmed to allow the following user adjustable set points:

- Pump normal cut-in level;
- Pump normal cut-out level;
- Pump time start;
- Pump time stop; and
- Pump speed set point.

Review and optimisation of the PLC system configuration and process interlocks will be undertaken during development of the function specification as part of SCADA detailed design process by Solo Water.

Recycled Water Transfer pump system operating levels are provided in existing RWTS functional description and below in **Table 1.**

Table 1: RWTS operating set point

Description	SCADA Setpoint	Reduced Level (m AHD)
Excess Recycled Discharge Start Level	TBC	TBC
Low-Low	TBC	TBC
Low	TBC	TBC
High	TBC	TBC
High High (Overflow)	TBC	TBC
Excess Recycled Discharge Stop Level	TBC	TBC

An extract from the current RWTP Functional Description is shown below for reference.

1.5.2 TNK-9200 Permeate Discharge Reservoir - Operating Levels

TAG PREFIX	TAG SUFFIX	STD	ADDITIONAL FUNCTIONALITY	ALARM CAT	VALUE	RL TO GROUND	UNITS
LIT-9200	Range	YES	Instrument Range (20mA – 4mA)	-	6.000	6.000	m
LIT-9200	Overflow		Level of overflow	-	5.330	5.330	
LSA-9202	HighLS	YES	High-High Level Switch Alarm (independent of LIT-9202)	1	5.280	5.280	m
LIT-9200	HighHigh	YES	High-High Level Alarm	1	4.800	4.800	m
LIT-9200	High	YES	High Level Alarm	2	4.600	4.600	m
LIT-9200	Low	YES	Low Level Alarm	2	0.800	0.800	m
LIT-9200	LowLow	YES	Low-Low Level Alarm	1	0.500	0.500	m
LSA-9201	LowLS	YES	Low Level Switch Alarm (Independent of LIT-9201)	1	0.300	0.300	m
LIT-9200	Zero	YES	Hanging height of the probe from bottom	-	0.200	0.200	m

6.0 MONITORING

Two existing pressure transmitters are already installed, one connected to the suction manifold and one connected to the delivery manifold. The pressure transmitters are directly mounted to the pipe fittings and are used for monitoring purposes via the SCADA and to raise alarms for *low suction pressure* and *low delivery pressure*. The signals from the transmitters are displayed in SCADA and on the transmitter panel.

The delivery pipeline is fitted with an electromagnetic flowmeter (FIT-9301) at the Solo RWTP. This will be for monitoring *instantaneous* and *totalised flows* with output signals displayed on SCADA. Totalised flows are to be made available on SCADA. These can be manually compared with the totalised flows generated by the Central Coast Council flowmeter at the end of the delivery main to identify any potential leakage issues or anomalies along the pipeline.

Pump speed as % of full speed on the VSD is to be displayed on the SCADA and is to be operator adjustable remotely via the SCADA.

7.0 ALARMS AND PUMP PROTECTION

Alarms and pump protection are to be in place for pump faults, power failure, change in pressure, excessive pump run times, excessive pump starts and high flow. The full list of alarms and protection will be confirmed upon finalisation of the functional description. An example if alarms and protection triggers are outlined below.

Alarm Description	Alarm Trigger	Alarm Priority
LOW SUCTION PRESSURE	Suction Pressure drops below set level for a sustained period as measured by the suction pressure transmitter	MEDIUM SCADA Alarm raised
MINIMUM SUCTION PRESSURE/PUMP STOP	Suction pressure drops below set level for a sustained period as measured by the suction pressure transmitter	MEDIUM SCADA Alarm raised Pump is to automatically stop
LOW DELIVERY PRESSURE	Delivery pressure falls below set level for a sustained period as measured by the delivery pressure transmitter	MEDIUM SCADA Alarm raised
MINIMUM DELIVERY PRESSURE/PUMP STOP	Delivery pressure falls below set level for a sustained period as measured by the delivery pressure transmitter	MEDIUM SCADA Alarm raised Pump is to automatically stop
NO FLOW	If the flow switch or flow meter does not detect flow after 2 minutes from when the pump starts or is running	HIGH SCADA Alarm raised Pump run inhibited
SURPLUS RECYCLED HIGH LEVEL OVERRIDE	If the SWRP starts operating during a high tank level override event	HIGH SCADA Alarm raised
HIGH TANK LEVEL	If the high level indicator in the tank is reached while pumps are running	HIGH SCADA Alarm raised
LOW TANK LEVEL	If the low level indicator in the tank is reached while pumps are running	HIGH SCADA Alarm raised

Minimum suction pressure pump protection is to apply during manual operation of the pumps.

An extract from the current RWTP Functional Description is shown below for reference.

Tag	Instrument	On Delay	Off Delay
RWTP-P-9000	WATER STORAGE TANKS		
LSA-9101	Class A+ Recycled Water Reservoir (Res-9100) - Level Switch - Low	2 sec	5 sec
LSA-9102	Class A+ Recycled Water Reservoir (Res-9100) - Level Switch - High	2 sec	5 sec
LSA-9201	Permeate Discharge Reservoir (Res-9200) - Level Switch - Low	2 sec	5 sec
LSA-9202	Permeate Discharge Reservoir (Res-9200) - Level Switch - High	2 sec	5 sec
LSA-9301	Permeate Reservoir (Res-9300) - Level Switch - Low	2 sec	5 sec
LSA-9302	Permeate Reservoir (Res-9300) - Level Switch - High	2 sec	5 sec
LSA-9401	Potable Water Reservoir (Res-9400) - Level Switch - Low	2 sec	5 sec
LSA-9402	Potable Water Reservoir (Res-9400) - Level Switch - High	2 sec	5 sec
RWTP-P-9100	COMMON PROCESS STORAGE TANKS		
LSA-9100	Storage Tank Sump - Level Switch - High	2 sec	5 sec

A	Tag	Instrument	Range Min	Range Max	Units	Low-Low	Low	High	High-High	Vol Kl/d	Vol kL	ROC
		Pressure										
P-9000	AIT-9200	Permeate Discharge Reservoir (Res-9200) - TDS	5	2000	uS/cm	1	2	1180	1200	-	-	-
	LIT-9100	Class A+ Recycled Water Reservoir (Res-9100) - Level Sensor	0.00	6.0	m	0.500	0.800	4.600	4.8	-	✓	✓
	LIT-9200	Permeate Discharge Reservoir (Res-9200) - Level Sensor	0.00	6.0	m	0.500	0.800	4.600	4.8	-	✓	✓
	LIT-9300	Permeate Reservoir (Res-9300) - Level Sensor	0.00	6.0	m	0.500	0.800	4.600	4.8	-	✓	✓
	LIT-9400	Permeate Reservoir (Res-9400) - Level Sensor	0.00	6.0	m	0.500	0.800	4.600	4.8	-	✓	✓
	FIT-9301	Discharge Pump (PMP-9300) - Discharge Flow	0.00	20.0	l/s	0.0	0.0	4.0	5.0	✓	-	-
	PIT-9301	Discharge Pump (PMP-9300) - Suction Main Pressure	0.000	1000	kPA	10	50	100	250	-	-	-
	PIT-9302	Discharge Pump (PMP-9300) - Discharge Main Pressure	0.000	1000	kPA	10	50	100	250	-	-	-

LIT-9200	dsHiHi	Permeate Water Reservoir 1 Level Sensor - High High Alarm	HIGH
LIT-9200	dsHi	Permeate Water Reservoir 1 Level Sensor - High Alarm	MEDIUM
LIT-9200	dsLo	Permeate Water Reservoir 1 Level Sensor - Low Alarm	LOW
LIT-9200	dsLoLo	Permeate Water Reservoir 1 Level Sensor - Low Low Alarm	MEDIUM
LIT-9200	dsLoopFlt	Permeate Water Reservoir 1 Level Sensor - Invalid Alarm	HIGH

100	LSA-9202	dsFault	Permeate Water Reservoir 1 - Level Sensor High High Alarm	CRITICAL
101	LSA-9202	dsProbeFault	Permeate Water Reservoir 1 - Level Sensor Probe Fault Alarm	MEDIUM
102	LSA-9202	dsFault	Permeate Water Reservoir 1 - Level Sensor Fault Alarm	MEDIUM

Appendix F

SAFETY IN DESIGN REPORT

DESIGNERS SAFETY REPORT

ADW JOHNSON PTY LTD
SURVEYING, ENGINEERING & PLANNING CONSULTANTS
Hunter Region Office
7/335 Hillsborough Road Warners Bay
Ph: 4978 5100
Fax: 4978 5199
Email: hunter@adwjohnson.com.au

Project: Recycled Water Main, Catherine Hill Bay
Project No: 211688(13)
Revision: A
Description: Recycled Water Main
Page No: 1 of 1
Client: Rose Group Pty Ltd
Date: 15/07/2019

RECIPIENTS

Organisation	Attention	Method	Copies	Format	Reason
Rose Group	Nick Jackman	E	1	A4	

DOCUMENTS

Document Reference	Document Title	Revision	Date		Document Reference	Document Title	Revision	Date
11688(13)-RWAT-001	Cover Sheet, Locality Plan and Drawing Index	E						
11688(13)-RWAT-002	Overall Site Plan	E						
11688(13)-RWAT-003	Recycled Water Main Alignment Plan – Sheet 1	E						
11688(13)-RWAT-004	Recycled Water Main Alignment Plan – Sheet 2	E						
11688(13)-RWAT-005	Recycled Water Main Alignment Plan – Sheet 3	E						
11688(13)-RWAT-006	Recycled Water Main Alignment Plan – Sheet 4	E						
11688(13)-RWAT-007	Recycled Water Main Alignment Plan – Sheet 5	E						
11688(13)-RWAT-008	Recycled Water Main Alignment Plan – Sheet 6	E						
11688(13)-RWAT-009	Recycled Water Main Alignment Plan – Sheet 7	E						
11688(13)-RWAT-010	Recycled Water Main Alignment Plan – Sheet 8	E						
11688(13)-RWAT-011	Recycled Water Main Alignment Plan – Sheet 9	E						
11688(13)-RWAT-012	Recycled Water Main Alignment Plan – Sheet 10	E						
11688(13)-RWAT-013	Recycled Water Main Alignment Plan – Sheet 11	E						
11688(13)-RWAT-014	Recycled Water Main Alignment Plan – Sheet 12	E						
11688(13)-RWAT-015	Recycled Water Main Alignment Plan – Sheet 13	E						
11688(13)-RWAT-016	Recycled Water Main Alignment Plan – Sheet 14	E						
11688(13)-RWAT-017	Recycled Water Main Alignment Plan – Sheet 15	E						
11688(13)-RWAT-018	Recycled Water Main Alignment Plan – Sheet 16	E						
11688(13)-RWAT-019	Recycled Water Main Alignment Plan – Sheet 17	E						
11688(13)-RWAT-020	Recycled Water Main Alignment Plan – Sheet 18	E						
11688(13)-RWAT-021	Recycled Water Main Alignment Plan – Sheet 19	E						
11688(13)-RWAT-022	Recycled Water Main Alignment Plan – Sheet 20	E						
11688(13)-RWAT-023	Recycled Water Main Alignment Plan – Sheet 21	E						
11688(13)-RWAT-024	Recycled Water Main Alignment Plan – Sheet 22	E						
11688(13)-RWAT-025	Recycled Water Main Alignment Plan – Sheet 23	E						
11688(13)-RWAT-026	Recycled Water Main Setout Table	E						
11688(13)-RWAT-027	Recycled Water Main Longitudinal Section – Sheet 1	E						
11688(13)-RWAT-028	Recycled Water Main Longitudinal Section – Sheet 2	E						
11688(13)-RWAT-029	Recycled Water Main Longitudinal Section – Sheet 3	E						
11688(13)-RWAT-030	Recycled Water Main Longitudinal Section – Sheet 4	E						
11688(13)-RWAT-031	Recycled Water Main Longitudinal Section – Sheet 5	E						
11688(13)-RWAT-032	Recycled Water Main Longitudinal Section – Sheet 6	E						
11688(13)-RWAT-033	Recycled Water Main Longitudinal Section – Sheet 7	E						
11688(13)-RWAT-034	Recycled Water Main Longitudinal Section – Sheet 8	E						
11688(13)-RWAT-0235	Recycled Water Main Longitudinal Section – Sheet 9	E						
11688(13)-RWAT-036	Recycled Water Main Longitudinal Section – Sheet 10	E						
11688(13)-RWAT-037	Re1cycled Water Main Longitudinal Section – Sheet 11	E						
11688(13)-RWAT-038	Recycled Water Main Longitudinal Section – Sheet 12	E						
11688(13)-RWAT-039	Recycled Water Main Longitudinal Section – Sheet 13	E						
11688(13)-RWAT-040	Inlet Works Connection Details	E						
11688(13)-RWAT-041	Typical Pump Out Scour and Air Valve Installation Details	E						
11688(13)-RWAT-042	Typical Cross Bank Rollover Details	E						
11688(13)-RWAT-043	Typical Cross Sections for NPWS Fire Trail	E						
11688(13)-RWAT-044	Erosion and Sediment Control Plan	E						
11688(13)-RWAT-045	Erosion and Sediment Control Details	E						
11688(13)-RWAT-046	Pressure Sustaining Valve Installation Details	E						
11688(13)-RWAT-047	Typical Concrete Encasement Keying and Thrust Block Details	E						
11688(13)-RWAT-048	Approval Delineation Plan	E						

Method of delivery — *M - Mail, C - Courier, H - Hand, P - Client pick up, E - email*
Information Format — *A0,A1,A2,A3,A4 - Drawing media, R - Report, E - Electronic, CD - Burnt*
Reason for transmittal — *A - Approval, C - Construction, I - Information, R - Review, T - Tender, P - Preliminary, O - Other*

SITE SPECIFIC HAZARDS

Guide Word	Hazard	Detail of Hazard	What are the consequences?	Who is at risk?	Potential Risk			RISK REDUCTION MEASURES	SMP	CRITICAL DESIGN ELEMENTS	RELEVANT REGS AND STANDARDS	OTHER
					Likelihood	Severity	Risk		Applicable items marked with an X			
UTILITIES	Underground water mains	Flooding, In the case of high pressure mains potential for blasts causing injury to personnel and damage to machinery and infrastructure	Serious injury or fatality	Construction workers & general public	C	IV	5	Liaise with utility authority to carefully locate water mains using service locator and non destructive excavation methods in the vicinity of the water mains prior to commencing works. Make site workers and visitors aware of hazards during induction and daily toolbox talk	X			
UTILITIES	Overhead power lines	Potential electrocution of personnel, ignition point for fire or explosion. Potential collapse of power poles & support structures	Serious injury or fatality	Construction workers and site visitors	B	II	2	Provide warning signage of hazard, use spotters when working in the vicinity of overhead power lines make site workers and visitors aware of hazard during induction and daily toolbox talk	X		X	
UTILITIES	Underground gas mains	Potential for explosion, fire or poisoning if ruptured	Serious injury or fatality	Construction workers & general public	B	I	1	Liaise with utility authority to carefully locate gas mains using service locator and non destructive excavation methods in the vicinity of gas mains prior to commencing works. Make site workers and visitors aware of hazards during induction and daily toolbox talk	X			
UTILITIES	Underground Telecommunications	Damage to services may result in substantial fines and penalties	Serious injury or fatality	Construction workers	B	III	3	Liaise with utility authority to carefully locate telecommunications cabling using service locator and non destructive excavation methods in the vicinity of telecommunications cabling prior to commencing works. Make site workers and visitors aware of hazards during induction and daily toolbox talk	X			
ENVIRONMENT	Trees & Vegetation	Excavation close to an existing tree may cause the tree to become unstable particularly during strong winds. If the tree falls there is the potential for crush injuries or death of personnel as well as damage to machinery and plant	Serious injury or fatality	Construction workers and site visitors	A	III	2	Fence off and provide warning signage of hazard make site workers and visitors aware of hazard during induction and daily toolbox talk	X			

SITE SPECIFIC HAZARDS

Guide Word	Hazard	Detail of Hazard	What are the consequences?	Who is at risk?	Potential Risk			RISK REDUCTION MEASURES	SMP	CRITICAL DESIGN ELEMENTS	RELEVANT REGS AND STANDARDS	OTHER
ENVIRONMENT	Poor ground conditions	Personnel injured due to slips & falls, machinery roll over. Poor slope stability may result in landslips or avalanches	Serious injury or fatality	Construction workers and site visitors	A	III	2	Fence off and provide warning signage of hazard make site workers and visitors aware of hazard during induction and daily toolbox talk. Site remediation works including drying or slope stability works	X			
ENVIRONMENT	Working on or in close proximity to existing roads	Potential injury or death of site workers and/or general public (pedestrians/drivers) due to changed traffic conditions	Serious injury or fatality	Construction workers & general public	A	I	1	Implementation of a Traffic Management Plan to provide safe passage of vehicles pedestrians and site workers during construction	X		X	
ENVIRONMENT	Sun exposure	Sun related illnesses eg melanoma, heat exhaustion	Illness or in some cases fatality	Construction workers and site visitors	A	III	2	Contractor to include information for workers and visitors in SMP	X			
ENVIRONMENT	Public access to site	Thegeneral public may be unaware or unable to identify potential dangers on a construction site resulting in injury or potential death	Serious injury or fatality	General public	B	III	3	Securely fence off work area and closely monitor site during works for unauthorised visitors	X			

3.1A - RISK ASSESSMENT CALCULATOR						
SEVERITY			LIKELIHOOD			
LEVEL	DESCRIPTIVE	OUTCOMES	A IMMINENT	B VERY LIKELY	C LIKELY	D UNLIKELY
I	Catastrophic	Death, permanent disability, huge financial loss, could lead to closure of the business	1	1	2	3
II	Critical	Lost-time injuries, major financial loss, major disruption to business activities	1	2	3	4
III	Marginal	Medical treatment or first-aid treatment required, moderate financial loss, disruption to a job	2	3	4	5
IV	Warning	No injury, illness or property damage, nuisance interruption, low financial loss, minor breakdown that can be fixed immediately	3	4	5	6

RISK LEVEL

1 Very high risk, consider discontinuing activity until hazard eliminated or appropriate controls are implemented
2 High risk, immediate corrective action required to reduce risk
3 Substantial risk, correction required
4 Moderate risk, need for attention indicated
5 Low priority risk, do something when possible
6 Low risk, risk perhaps acceptable, monitor as appropriate

COMMON CONSTRUCTION HAZARDS

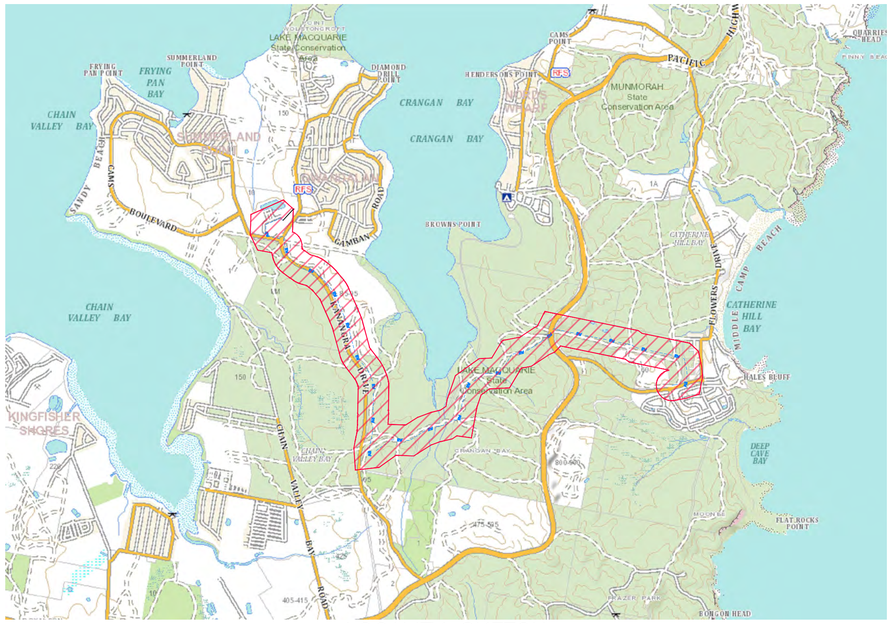
Guide Word	Hazard	Detail of Hazard	What are the consequences?	Who is at risk?	Potential Risk			RISK REDUCTION MEASURES	SMP	CRITICAL DESIGN ELEMENTS	RELEVANT REGS AND STANDARDS	OTHER
					Likelihood	Severity	Risk		Applicable items marked with an X			
GENERAL	Working plant and equipment	Noise, falling objects,amage to existing surfaces, material spillage hit by moving plant	Serious injury or fatality	Construction workers site visitors & general public	C	II	3	Suitable PPE, operator assistant/spotter and construction planning	X			
POST CONSTRUCTION	Failure of existing pipelines/services during conection	Risk of flooding,drowning, excavation collapse	Serious injury or fatality	Construction workers	A	II	1	Review of existing WAE documentation & consultation with utility owner to determine size, material and operational conditions	X			
GENERAL	Lifting Components & materials	Lifting injuries, crushing	Serious injury or fatality	Construction workers	C	III	4	Suitable lifting equipment and procedure and construction planning	X			
POST CONSTRUCTION	Public access trips and falls	Potential injury to general public due to trips and falls	Serious injury or fatality	General Public	D	III	5	Infrastructure is to be designed & constructed with lids, grates and surrounds flush with surrounding surface levels	X			
EARTHWORKS	Trenching	Collapse of trench walls or embankments has the potential to cause injury or death to construction workers eg crush injuries or asphyxiation	Serious injury or fatality	Construction workers	C	II	3	Suitably designed/installed trench support systems/ props/ benching of excavation	X			
EARTHWORKS	Open Excavations, Pits or Infrastructure	Risk of fall or injury	Serious injury or fatality	Construction workers site visitors & general public	B	I	1	Suitable fencing or visual indicators eg signage & warning tape	X		X	
GENERAL	Failure of existing pipelines/services during conection	Risk of flooding,drowning, excavation collapse	Serious injury or fatality	Construction workers	D	III	5	Review of existing WAE documentation & consultation with utility owner to determine size, material and operational conditions	X			
ROAD	Working on or in close proximity to existing roads	Potential injury or death of site workers and/or general public (pedestrians/drivers) due to changed traffic conditions	Serious injury or fatality	Construction workers & general public	B	I	1	Implementation of a Traffic Management Plan to provide safe passage of vehicles pedestrians and site workers during construction	X		X	
GENERAL	Use of Cutting equipment	Cutting injuries, debris, inhalation of dust/foreign material	Serious injury or fatality	Construction workers	A	III	2	Suitable PPE, operator assistant/spotter and construction planning	X			

GENERAL CONDITIONS

Assumed Conditions	Comments
Onsite safety inductions	Onsite safety inductions, including hazards identified in this report, should be conducted for all staff and site visitors
Preparation of safety management plans	Safety Management Plans should be prepared for the hazards identified in this report
Adherence to design requirements (no substitution)	There should be no variation on design requirements without consultation with the designers
Handover procedures to avoid hazard creation (ie open trenches)	Onsite management of contractors to ensure that hazards that arise through starting/completion of jobs does not occur
Design interface	This design may interface with other plans and account should be taken of any interface issues
Preparation of a traffic Management plan	The civil works contractor is to prepare a traffic management plan for works subject to vehicular and pedestrian traffic to ensure construction workers, site staff and general public safety
Adherance to manufacturers guidelines & instructions	All materials and products used during construction should be handled, stored and installed in accordance with the manufacturers guidelines and instructions

11688(13)NPWS-RWAT-001 to 026(H)

SURPLUS RECYCLED WATER MAIN
CATHERINE HILL BAY



LOCALITY SKETCH

NOT TO SCALE

WATER PIPE DATA

PIPE SIZE (mm)	PIPE MATERIAL	TOTAL LENGTH (m)
DN140	PE100 SDR11	4647.15
DN125	PE100 SDR11	3293.66

CONSTRUCTION NOTES:

1. WORKS MUST BE CONSTRUCTED IN ACCORDANCE WITH THE DESIGN DRAWINGS, CONSTRUCTION SPECIFICATION, WSA 03–2011–3.1 AND WSA 03 STANDARDS DRAWINGS.
2. THE CONSTRUCTOR IS TO VERIFY THE POSITIONS AND LEVELS OF ALL EXISTING AND PROPOSED BOUNDARIES, SERVICES, PIPES, CABLES AND CONDUITS.
3. HYDRANTS, STOP VALVES AND ALL OTHER FITTINGS TO BE THE SAME SIZE AS THE THROUGH SURPLUS RECYCLED WATER MAIN, AND IN ACCORDANCE WITH WSA03–2011–3.1.
4. TESTING OF RECYCLED WATER MAIN, INCLUDING SWABBING, FLUSHING AND PRESSURE SHALL BE CARRIED OUT IN STRICT ACCORDANCE WITH WSA03–2011–3.1 REQUIREMENTS.
   ALL TESTING TO BE CARRIED OUT UNDER DIRECT SUPERVISION OF THE DESIGN CERTIFIER, SOLO WATER OR CCC REPRESENTATIVE.
   A MINIMUM OF 14 DAYS NOTICE PRIOR TO TESTING BEING UNDERTAKEN IS REQUIRED.
   CONNECTION TO, OR OPERATION OF ANY EXISTING SYSTEM VALVES CANNOT BE UNDERTAKEN UNTIL THE DESIGN CERTIFIER, SOLO WATER OR CCC REPRESENTATIVE HAS PASSED AND VALIDATED ALL TESTS MENTIONED ABOVE AND GIVEN WRITTEN APPROVAL TO THE CONTRACTOR TO PROCEED WITH CONNECTION.
5. ALL SURPLUS RECYCLED WATER PIPE, VALVES AND APPURTENANCES SHALL BE COLOUR CODED IN ACCORDANCE WITH WSA03–2011–3.1 SECTION 4.2 (DIFFERENTIATION OF DRINKING AND NON–DRINKING PIPE SYSTEMS).

SERVICE CLEARANCES

SERVICE	HORIZONTAL (mm)	VERTICAL (mm)
WATERMAIN ≥ DN375	600	300
WATERMAIN ≤ DN375	300	150
GAS MAIN	300	150
TELECOMMUNICATIONS	300	150
ELECTRICITY	500	225
SEWER (GRAVITY)	1000	500
SEWER (PRESSURE)	600	300
STORMWATER	300	150
KERBS	150	150

REFER TO WSA03-2011-3.1 PART 1 TABLE 5.5
SHOULD MINIMUM CLEARANCES NOT BE ACHIEVABLE THE CONTRACTOR IS TO CONSULT WITH THE SITE SUPERINTENDENT.

DRAWING INDEX

Sheet Title	Sheet Description
11688(13)NPWS–RWAT–001	COVER SHEET, LOCALITY PLAN AND DRAWING INDEX
11688(13)NPWS–RWAT–002	OVERALL SITE PLAN
11688(13)NPWS–RWAT–003	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 1
11688(13)NPWS–RWAT–004	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 2
11688(13)NPWS–RWAT–005	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 3
11688(13)NPWS–RWAT–006	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 4
11688(13)NPWS–RWAT–007	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 5
11688(13)NPWS–RWAT–008	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 6
11688(13)NPWS–RWAT–009	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 7
11688(13)NPWS–RWAT–010	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 8
11688(13)NPWS–RWAT–011	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 9
11688(13)NPWS–RWAT–012	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 10
11688(13)NPWS–RWAT–013	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 11
11688(13)NPWS–RWAT–014	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 12
11688(13)NPWS–RWAT–015	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 13
11688(13)NPWS–RWAT–016	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 14
11688(13)NPWS–RWAT–017	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 15
11688(13)NPWS–RWAT–018	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 16
11688(13)NPWS–RWAT–019	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 17
11688(13)NPWS–RWAT–020	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 18
11688(13)NPWS–RWAT–021	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 19
11688(13)NPWS–RWAT–022	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 20
11688(13)NPWS–RWAT–023	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 21
11688(13)NPWS–RWAT–024	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 22
11688(13)NPWS–RWAT–025	SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN – SHEET 23
11688(13)NPWS–RWAT–026	SURPLUS RECYCLED WATER MAIN SETOUT TABLE
11688(13)NPWS–RWAT–027	SURPLUS RECYCLED WATER MAIN LONGITUDINAL SECTION – SHEET 1
11688(13)NPWS–RWAT–028	SURPLUS RECYCLED WATER MAIN LONGITUDINAL SECTION – SHEET 2
11688(13)NPWS–RWAT–029	SURPLUS RECYCLED WATER MAIN LONGITUDINAL SECTION – SHEET 3
11688(13)NPWS–RWAT–030	SURPLUS RECYCLED WATER MAIN LONGITUDINAL SECTION – SHEET 4
11688(13)NPWS–RWAT–031	SURPLUS RECYCLED WATER MAIN LONGITUDINAL SECTION – SHEET 5
11688(13)NPWS–RWAT–032	SURPLUS RECYCLED WATER MAIN LONGITUDINAL SECTION – SHEET 6
11688(13)NPWS–RWAT–033	SURPLUS RECYCLED WATER MAIN LONGITUDINAL SECTION – SHEET 7
11688(13)NPWS–RWAT–034	SURPLUS RECYCLED WATER MAIN LONGITUDINAL SECTION – SHEET 8
11688(13)NPWS–RWAT–035	SURPLUS RECYCLED WATER MAIN LONGITUDINAL SECTION – SHEET 9
11688(13)NPWS–RWAT–036	SURPLUS RECYCLED WATER MAIN LONGITUDINAL SECTION – SHEET 10
11688(13)NPWS–RWAT–037	SURPLUS RECYCLED WATER MAIN LONGITUDINAL SECTION – SHEET 11
11688(13)NPWS–RWAT–038	SURPLUS RECYCLED WATER MAIN LONGITUDINAL SECTION – SHEET 12
11688(13)NPWS–RWAT–039	SURPLUS RECYCLED WATER MAIN LONGITUDINAL SECTION – SHEET 13
11688(13)NPWS–RWAT–040	INLET WORKS CONNECTION DETAILS
11688(13)NPWS–RWAT–041	TYPICAL PUMP OUT SCOUR AND AIR VALVE INSTALLATION DETAILS
11688(13)NPWS–RWAT–042	TYPICAL CROSS BANK ROLLOVER DETAILS
11688(13)NPWS–RWAT–043	TYPICAL CROSS SECTIONS FOR NPWS FIRE TRAIL
11688(13)NPWS–RWAT–044	EROSION AND SEDIMENT CONTROL PLAN
11688(13)NPWS–RWAT–045	EROSION AND SEDIMENT CONTROL DETAILS
11688(13)NPWS–RWAT–046	PRESSURE SUSTAINING VALVE INSTALLATION DETAILS
11688(13)NPWS–RWAT–047	TYPICAL CONCRETE ENCASEMENT KEYING AND THRUST BLOCK DETAILS
11688(13)NPWS–RWAT–048	APPROVAL DELINEATION PLAN

DIAL1100 BEFORE YOU DIG

CONSTRUCTION ISSUE

50mm AT FULL SIZE

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
A	20.11.2018	PRELIMINARY ISSUE	J.N.	R.J.	H.M.	C.B.
B	01.04.2019	AMENDED ISSUE	J.N.	R.J.	H.M.	C.B.
C	03.05.2019	NPWS ISSUE	S.HO.	R.J.	H.M.	C.B.
D	04.07.2019	AMENDED NPWS ISSUE NPWS COMMENTS	J.N.	R.J.	H.M.	C.B.
E	08.07.2019	AMENDED NPWS ISSUE	J.N.	R.J.	H.M.	C.B.
F	02.09.2019	AMENDED NPWS ISSUE – CLIENT COMMENTS	J.N.	R.J.	H.M.	C.B.
G	06.09.2019	ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.
H	17.09.2019	RE ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.

DESIGN FILE S:\190238\Design\12D\WWPS CONCEPT DESIGN

SCALES

ALL DIMENSIONS ARE IN METRES. DO NOT SCALE

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Hunter Office
Unit 7/335 Hillsborough Rd
Warners Bay N.S.W. 2282
Phone: (02) 4978 5100
Fax: (02) 4978 5199
email:hunter@adwjohnson.com.au
www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION: SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ

DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: COVER SHEET, LOCALITY PLAN AND DRAWING INDEX

PROJECT No.	DISCIPLINE	NUMBER	REV.
11688(13)NPWS	RWAT	001	H

Plotted By: jaysonn Plot Date: 18/09/19 – 11:25 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) – Issue H (NPWS)\11688(13)NPWS–RWAT–001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

MGA

PLAN
SCALE 1: 7500

DIAL1100
BEFORE YOU DIG

CONSTRUCTION ISSUE

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
A	20.11.2018	PRELIMINARY ISSUE	J.N.	R.J.	H.M.	C.B.
B	01.04.2019	AMENDED ISSUE	J.N.	R.J.	H.M.	C.B.
C	03.05.2019	NPWS ISSUE	S.HO.	R.J.	H.M.	C.B.
D	04.07.2019	AMENDED NPWS ISSUE NPWS COMMENTS	J.N.	R.J.	H.M.	C.B.
E	08.07.2019	AMENDED NPWS ISSUE	J.N.	R.J.	H.M.	C.B.
F	02.09.2019	AMENDED NPWS ISSUE – CLIENT COMMENTS	J.N.	R.J.	H.M.	C.B.
G	06.09.2019	ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.
H	17.09.2019	RE ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.

DESIGN FILE S:\190238\Design\12D\WWPS CONCEPT DESIGN

SCALES
0 150 300 375m
SCALE: 1:7500 (FULL)

ALL DIMENSIONS ARE IN METRES. DO NOT SCALE

adw johnson
Hunter Office
Unit 7/335 Hillsborough Rd
Warners Bay N.S.W. 2282
Phone: (02) 4978 5100
Fax: (02) 4978 5199
email: hunter@adwjohnson.com.au
www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT
ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED WATER MAIN
CATHERINE HILL BAY.

SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: OVERALL SITE PLAN

PROJECT No.	DISCIPLINE	NUMBER	REV.
11688(13)NPWS	RWAT	002	H

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 – 11:19 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) – Issue H (NPWS)\11688(13)NPWS–RWAT–001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

MGA

MONTEFIORE STREET

ROCKPOOL ROAD

204
D.P.1164883

1120
D.P.1219395

CATHERINE HILL BAY
WATER UTILITY
TREATMENT PLANT

EXISTING DN125 PE100
SURPLUS RECYCLED WATER MAIN

REVERSE OSMOSIS PONDS TO
BE FILLED IN AND REGRADED
(BY OTHERS)

1120
D.P.1219395

JOINS DRG-004

PLAN
SCALE 1:500

LEGEND

- PROPOSED ISOLATION VALVE
- RW — PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EX BWTM — EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- ex w — EXISTING WATERMAIN
- T — EXISTING TELECOMMUNICATIONS
- ex e — EXISTING UNDERGROUND POWER
- OHP — EXISTING OVERHEAD POWER

DIAL1100
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CONSTRUCTION ISSUE

50mm AT FULL SIZE

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
A	20.11.2018	PRELIMINARY ISSUE	J.N.	R.J.	H.M.	C.B.
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G	06.09.2019	ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.
H	17.09.2019	RE ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.

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SCALES: 0 10 20 A1 / A3 1:500 / 1:1000

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CLIENT: ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED WATER MAIN
CATHERINE HILL BAY.

SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 1

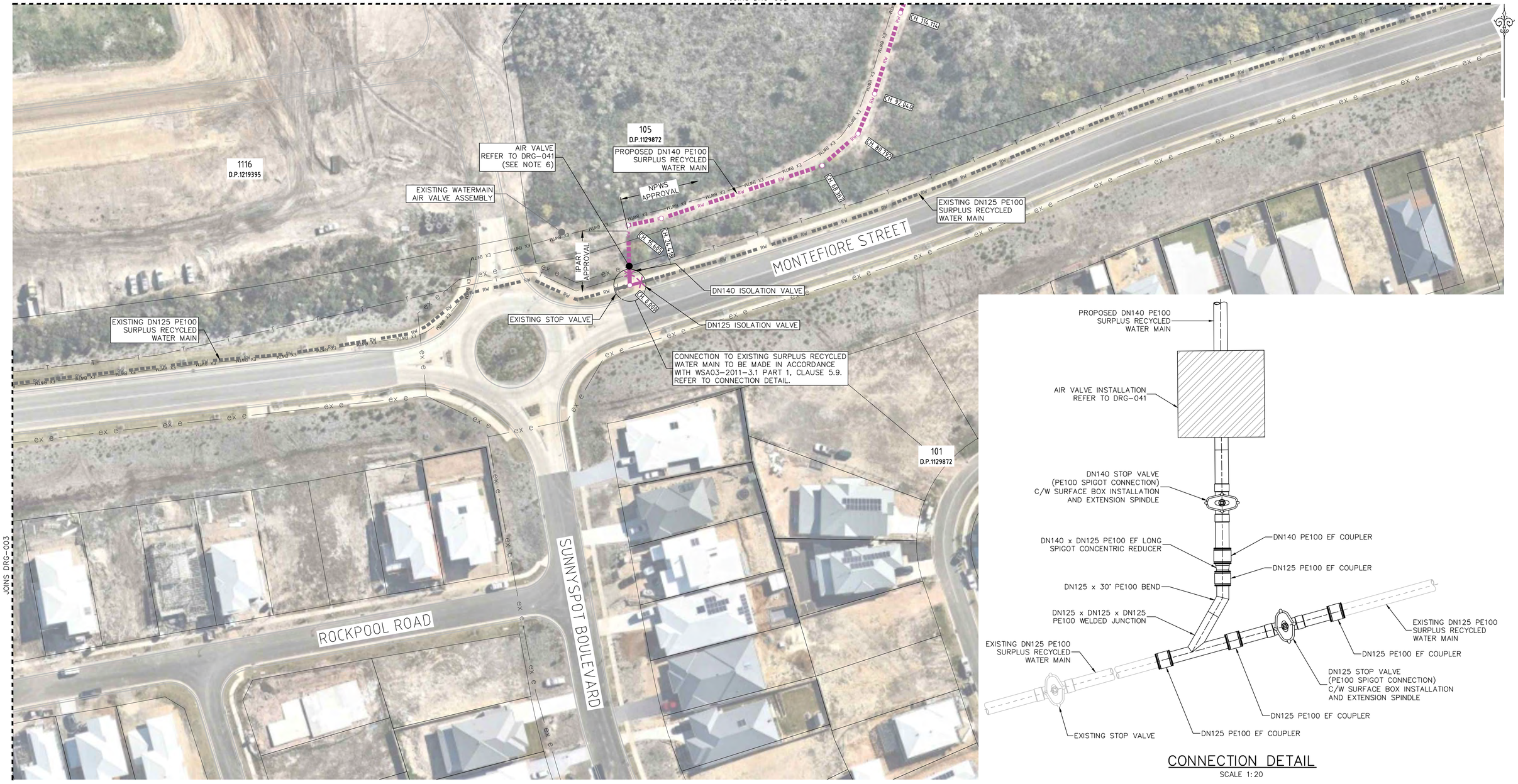
PROJECT No.	DISCIPLINE	NUMBER	REV.
11688(13)NPWS	RWAT	003	H

Plotted By: jaysonn Plot Date: 18/09/19 - 11:19 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

JOINS DRG-005

MGA



JOINS DRG-003

CONNECTION DETAIL
SCALE 1:20

PLAN
SCALE 1:500

LEGEND

- PROPOSED ISOLATION VALVE
- RW — PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EX BWTM — EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- ex w — EXISTING WATERMAIN
- T — T — EXISTING TELECOMMUNICATIONS
- ex e — EXISTING UNDERGROUND POWER
- OHP — OHP — OHP — EXISTING OVERHEAD POWER

NOTES:

1. EXISTING SERVICES SHOWN HAVE NOT BEEN LOCATED BY SURVEY AND ARE INDICATIVE ONLY. THE CONTRACTOR IS TO VERIFY THE POSITIONS AND LEVELS OF ALL EXISTING SERVICES, PIPES, CABLES AND CONDUITS.
2. H.D. POLYETHYLENE PIPE SHALL NOT BE BENT TO A RADIUS LESS THAN MANUFACTURERS RECOMMENDATIONS. IF THE PROPOSED ALIGNMENT CAN NOT BE ACHIEVED BY BENDING THE PIPE THE CONTRACTOR IS TO USE ELECTROFUSION FITTINGS TO ACHIEVE REQUIRED DEFLECTIONS.
3. REFER TO DRG-026 FOR SURPLUS RECYCLED WATER MAIN SETOUT DETAILS.
4. SEDIMENT AND EROSION CONTROLS TO BE IN PLACE PRIOR TO CONSTRUCTION WORKS WITHIN AREA. SEDIMENT AND EROSION CONTROLS TO BE PROVIDED IN ACCORDANCE WITH THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION'S RESOURCE GUIDE FOR LOCAL COUNCILS.
5. ANY DISTURBANCE TO IMPROVED AREAS TO BE FULLY REINSTATED ON INSTALLATION OF PIPELINE TO PRE-EXISTING CONDITIONS TO THE SATISFACTION OF THE APPROVING AUTHORITY.
6. LOCATIONS SHOWN FOR SCOUR AND AIR VALVE INSTALLATIONS ARE INDICATIVE ONLY. CONTRACTOR IS TO INSTALL SCOURS AT LOCAL LOW POINTS AND LOW POINT BETWEEN IN LINE STOP VALVES. CONTRACTOR IS TO INSTALL AIR VALVES AT LOCAL HIGH POINTS AND IMMEDIATELY DOWNHILL OF MAJOR ISOLATION VALVES. REFER TO DRG-041 FOR TYPICAL INSTALLATION DETAILS.

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CONSTRUCTION ISSUE

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H	17.09.2019	RE ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.

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SCALES: 0 10 20 A1 / A3 1:500 / 1:1000

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ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED WATER MAIN
CATHERINE HILL BAY.

SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 2

PROJECT No.	DISCIPLINE	NUMBER	REV.
11688(13)NPWS	RWAT	004	H

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 - 11:19 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

JOINS DRG-006

MGA

JOINS DRG-004

PLAN
SCALE 1:500

LEGEND

- PROPOSED ISOLATION VALVE
- RW — PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EX BWTM — EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- ex w — EXISTING WATERMAIN
- T — T — EXISTING TELECOMMUNICATIONS
- ex e — EXISTING UNDERGROUND POWER
- OHP — OHP — OHP — EXISTING OVERHEAD POWER

NOTES:

1. EXISTING SERVICES SHOWN HAVE NOT BEEN LOCATED BY SURVEY AND ARE INDICATIVE ONLY. THE CONTRACTOR IS TO VERIFY THE POSITIONS AND LEVELS OF ALL EXISTING SERVICES, PIPES, CABLES AND CONDUITS.
2. H.D. POLYETHYLENE PIPE SHALL NOT BE BENT TO A RADIUS LESS THAN MANUFACTURERS RECOMMENDATIONS. IF THE PROPOSED ALIGNMENT CAN NOT BE ACHIEVED BY BENDING THE PIPE THE CONTRACTOR IS TO USE ELECTROFUSION FITTINGS TO ACHIEVE REQUIRED DEFLECTIONS.
3. REFER TO DRG-026 FOR SURPLUS RECYCLED WATER MAIN SETOUT DETAILS.
4. SEDIMENT AND EROSION CONTROLS TO BE IN PLACE PRIOR TO CONSTRUCTION WORKS WITHIN AREA. SEDIMENT AND EROSION CONTROLS TO BE PROVIDED IN ACCORDANCE WITH THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION'S RESOURCE GUIDE FOR LOCAL COUNCILS.
5. ANY DISTURBANCE TO IMPROVED AREAS TO BE FULLY REINSTATED ON INSTALLATION OF PIPELINE TO PRE-EXISTING CONDITIONS TO THE SATISFACTION OF THE APPROVING AUTHORITY.

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www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED WATER MAIN
CATHERINE HILL BAY.

SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 3

PROJECT No. 11688(13)NPWS - DISCIPLINE RWAT - NUMBER 005 - REV. H

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 - 11:19 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

PLAN
SCALE 1:500

LEGEND

- PROPOSED ISOLATION VALVE
- PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- EXISTING WATERMAIN
- EXISTING TELECOMMUNICATIONS
- EXISTING UNDERGROUND POWER
- EXISTING OVERHEAD POWER

NOTES:

1. EXISTING SERVICES SHOWN HAVE NOT BEEN LOCATED BY SURVEY AND ARE INDICATIVE ONLY. THE CONTRACTOR IS TO VERIFY THE POSITIONS AND LEVELS OF ALL EXISTING SERVICES, PIPES, CABLES AND CONDUITS.
2. H.D. POLYETHYLENE PIPE SHALL NOT BE BENT TO A RADIUS LESS THAN MANUFACTURERS RECOMMENDATIONS. IF THE PROPOSED ALIGNMENT CAN NOT BE ACHIEVED BY BENDING THE PIPE THE CONTRACTOR IS TO USE ELECTROFUSION FITTINGS TO ACHIEVE REQUIRED DEFLECTIONS.
3. REFER TO DRG-026 FOR SURPLUS RECYCLED WATER MAIN SETOUT DETAILS.
4. SEDIMENT AND EROSION CONTROLS TO BE IN PLACE PRIOR TO CONSTRUCTION WORKS WITHIN AREA. SEDIMENT AND EROSION CONTROLS TO BE PROVIDED IN ACCORDANCE WITH THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION'S RESOURCE GUIDE FOR LOCAL COUNCILS.
5. ANY DISTURBANCE TO IMPROVED AREAS TO BE FULLY REINSTATED ON INSTALLATION OF PIPELINE TO PRE-EXISTING CONDITIONS TO THE SATISFACTION OF THE APPROVING AUTHORITY.
6. LOCATIONS SHOWN FOR SCOUR AND AIR VALVE INSTALLATIONS ARE INDICATIVE ONLY. CONTRACTOR IS TO INSTALL SCOURS AT LOCAL LOW POINTS AND LOW POINT BETWEEN IN LINE STOP VALVES. CONTRACTOR IS TO INSTALL AIR VALVES AT LOCAL HIGH POINTS AND IMMEDIATELY DOWNHILL OF MAJOR ISOLATION VALVES. REFER TO DRG-041 FOR TYPICAL INSTALLATION DETAILS.

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www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 4

PROJECT No.	DISCIPLINE	NUMBER	REV.
11688(13)NPWS	RWAT	006	H

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 - 11:19 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

LEGEND

- PROPOSED ISOLATION VALVE
- RW PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EX BWTM EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- ex w EXISTING WATERMAIN
- T EXISTING TELECOMMUNICATIONS
- ex e EXISTING UNDERGROUND POWER
- OHP EXISTING OVERHEAD POWER

PLAN
SCALE 1:500

NOTES:

1. EXISTING SERVICES SHOWN HAVE NOT BEEN LOCATED BY SURVEY AND ARE INDICATIVE ONLY. THE CONTRACTOR IS TO VERIFY THE POSITIONS AND LEVELS OF ALL EXISTING SERVICES, PIPES, CABLES AND CONDUITS.
2. H.D. POLYETHYLENE PIPE SHALL NOT BE BENT TO A RADIUS LESS THAN MANUFACTURERS RECOMMENDATIONS. IF THE PROPOSED ALIGNMENT CAN NOT BE ACHIEVED BY BENDING THE PIPE THE CONTRACTOR IS TO USE ELECTROFUSION FITTINGS TO ACHIEVE REQUIRED DEFLECTIONS.
3. REFER TO DRG-026 FOR SURPLUS RECYCLED WATER MAIN SETOUT DETAILS.
4. SEDIMENT AND EROSION CONTROLS TO BE IN PLACE PRIOR TO CONSTRUCTION WORKS WITHIN AREA. SEDIMENT AND EROSION CONTROLS TO BE PROVIDED IN ACCORDANCE WITH THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION'S RESOURCE GUIDE FOR LOCAL COUNCILS.
5. ANY DISTURBANCE TO IMPROVED AREAS TO BE FULLY REINSTATED ON INSTALLATION OF PIPELINE TO PRE-EXISTING CONDITIONS TO THE SATISFACTION OF THE APPROVING AUTHORITY.
6. LOCATIONS SHOWN FOR SCOUR AND AIR VALVE INSTALLATIONS ARE INDICATIVE ONLY. CONTRACTOR IS TO INSTALL SCOURS AT LOCAL LOW POINTS AND LOW POINT BETWEEN IN LINE STOP VALVES. CONTRACTOR IS TO INSTALL AIR VALVES AT LOCAL HIGH POINTS AND IMMEDIATELY DOWNHILL OF MAJOR ISOLATION VALVES. REFER TO DRG-041 FOR TYPICAL INSTALLATION DETAILS.

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ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION: SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ

DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 5

PROJECT No. 11688(13)NPWS - DISCIPLINE RWAT - NUMBER 007 - REV. H

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 - 11:19 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

LEGEND

- PROPOSED ISOLATION VALVE
- RW PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EX BWTM EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- ex w EXISTING WATERMAIN
- T T EXISTING TELECOMMUNICATIONS
- ex e EXISTING UNDERGROUND POWER
- OHP OHP OHP EXISTING OVERHEAD POWER

PLAN
SCALE 1:500

NOTES:

1. EXISTING SERVICES SHOWN HAVE NOT BEEN LOCATED BY SURVEY AND ARE INDICATIVE ONLY. THE CONTRACTOR IS TO VERIFY THE POSITIONS AND LEVELS OF ALL EXISTING SERVICES, PIPES, CABLES AND CONDUITS.
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3. REFER TO DRG-026 FOR SURPLUS RECYCLED WATER MAIN SETOUT DETAILS.
4. SEDIMENT AND EROSION CONTROLS TO BE IN PLACE PRIOR TO CONSTRUCTION WORKS WITHIN AREA. SEDIMENT AND EROSION CONTROLS TO BE PROVIDED IN ACCORDANCE WITH THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION'S RESOURCE GUIDE FOR LOCAL COUNCILS.
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6. LOCATIONS SHOWN FOR SCOUR AND AIR VALVE INSTALLATIONS ARE INDICATIVE ONLY. CONTRACTOR IS TO INSTALL SCOURS AT LOCAL LOW POINTS AND LOW POINT BETWEEN IN LINE STOP VALVES. CONTRACTOR IS TO INSTALL AIR VALVES AT LOCAL HIGH POINTS AND IMMEDIATELY DOWNHILL OF MAJOR ISOLATION VALVES. REFER TO DRG-041 FOR TYPICAL INSTALLATION DETAILS.

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www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION: SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ

DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 6

PROJECT No. 11688(13)NPWS - DISCIPLINE RWAT - NUMBER 008 REV. H

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 - 11:19 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

LEGEND

- PROPOSED ISOLATION VALVE
- RW — PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EX BWTM — EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- ex w — EXISTING WATERMAIN
- T — EXISTING TELECOMMUNICATIONS
- ex e — EXISTING UNDERGROUND POWER
- OHP — OHP — OHP — EXISTING OVERHEAD POWER

PLAN
SCALE 1:500

NOTES:

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3. REFER TO DRG-026 FOR SURPLUS RECYCLED WATER MAIN SETOUT DETAILS.
4. SEDIMENT AND EROSION CONTROLS TO BE IN PLACE PRIOR TO CONSTRUCTION WORKS WITHIN AREA. SEDIMENT AND EROSION CONTROLS TO BE PROVIDED IN ACCORDANCE WITH THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION'S RESOURCE GUIDE FOR LOCAL COUNCILS.
5. ANY DISTURBANCE TO IMPROVED AREAS TO BE FULLY REINSTATED ON INSTALLATION OF PIPELINE TO PRE-EXISTING CONDITIONS TO THE SATISFACTION OF THE APPROVING AUTHORITY.
6. LOCATIONS SHOWN FOR SCOUR AND AIR VALVE INSTALLATIONS ARE INDICATIVE ONLY. CONTRACTOR IS TO INSTALL SCOURS AT LOCAL LOW POINTS AND LOW POINT BETWEEN IN LINE STOP VALVES.
CONTRACTOR IS TO INSTALL AIR VALVES AT LOCAL HIGH POINTS AND IMMEDIATELY DOWNHILL OF MAJOR ISOLATION VALVES.
REFER TO DRG-041 FOR TYPICAL INSTALLATION DETAILS.

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CONSTRUCTION ISSUE

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
A	20.11.2018	PRELIMINARY ISSUE	J.N.	R.J.	H.M.	C.B.
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G	06.09.2019	ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.
H	17.09.2019	RE ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.

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SCALES: 0 10 20 A1 / A3 1:500 / 1:1000

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www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 7

PROJECT No.	DISCIPLINE	NUMBER	REV.
11688(13)NPWS	RWAT	009	H

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 - 11:19 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

PLAN
SCALE 1:500

LEGEND

- PROPOSED ISOLATION VALVE
- RW — PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EX BWTM — EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- ex w — EXISTING WATERMAIN
- T — T — EXISTING TELECOMMUNICATIONS
- ex e — EXISTING UNDERGROUND POWER
- OHP — OHP — OHP — EXISTING OVERHEAD POWER

NOTES:

1. EXISTING SERVICES SHOWN HAVE NOT BEEN LOCATED BY SURVEY AND ARE INDICATIVE ONLY. THE CONTRACTOR IS TO VERIFY THE POSITIONS AND LEVELS OF ALL EXISTING SERVICES, PIPES, CABLES AND CONDUITS.
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3. REFER TO DRG-026 FOR SURPLUS RECYCLED WATER MAIN SETOUT DETAILS.
4. SEDIMENT AND EROSION CONTROLS TO BE IN PLACE PRIOR TO CONSTRUCTION WORKS WITHIN AREA. SEDIMENT AND EROSION CONTROLS TO BE PROVIDED IN ACCORDANCE WITH THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION'S RESOURCE GUIDE FOR LOCAL COUNCILS.
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6. LOCATIONS SHOWN FOR SCOUR AND AIR VALVE INSTALLATIONS ARE INDICATIVE ONLY. CONTRACTOR IS TO INSTALL SCOURS AT LOCAL LOW POINTS AND LOW POINT BETWEEN IN LINE STOP VALVES. CONTRACTOR IS TO INSTALL AIR VALVES AT LOCAL HIGH POINTS AND IMMEDIATELY DOWNHILL OF MAJOR ISOLATION VALVES. REFER TO DRG-041 FOR TYPICAL INSTALLATION DETAILS.

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email: hunter@adwjohnson.com.au
www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 8

PROJECT No. 11688(13)NPWS - DISCIPLINE RWAT - NUMBER 010 - REV. H

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 - 11:20 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

PLAN
SCALE 1:500

LEGEND

- PROPOSED ISOLATION VALVE
- PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- EXISTING WATERMAIN
- EXISTING TELECOMMUNICATIONS
- EXISTING UNDERGROUND POWER
- EXISTING OVERHEAD POWER

NOTES:

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REFER TO DRG-041 FOR TYPICAL INSTALLATION DETAILS.

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ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 9

PROJECT No.	DISCIPLINE	NUMBER	REV.
11688(13)NPWS	RWAT	011	H

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 - 11:20 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

PLAN
SCALE 1:500

LEGEND

- PROPOSED ISOLATION VALVE
- RW — PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EX BWTM — EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- ex w — EXISTING WATERMAIN
- T — T — EXISTING TELECOMMUNICATIONS
- ex e — EXISTING UNDERGROUND POWER
- OHP — OHP — OHP — EXISTING OVERHEAD POWER

NOTES:

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www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 10

PROJECT No. 11688(13)NPWS – DISCIPLINE RWAT – NUMBER 012 – REV. H

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 – 11:20 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) – Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

PLAN
SCALE 1:500

LEGEND

- PROPOSED ISOLATION VALVE
- RW — PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EX BWTM — EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- ex w — EXISTING WATERMAIN
- T — EXISTING TELECOMMUNICATIONS
- ex e — EXISTING UNDERGROUND POWER
- OHP — EXISTING OVERHEAD POWER

NOTES:

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50mm AT FULL SIZE

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ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION: SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ | DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 11

PROJECT No. 11688(13)NPWS – DISCIPLINE RWAT – NUMBER 013 | REV. H

Plotted By: jaysonn Plot Date: 18/09/19 – 11:20 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) – Issue H (NPWS)\11688(13)NPWS–RWAT–001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

LEGEND

- PROPOSED ISOLATION VALVE
- RW — PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EX BWTM — EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- ex w — EXISTING WATERMAIN
- T — T — EXISTING TELECOMMUNICATIONS
- ex e — EXISTING UNDERGROUND POWER
- OHP — OHP — OHP — EXISTING OVERHEAD POWER

PLAN
SCALE 1:500

NOTES:

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ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED WATER MAIN
CATHERINE HILL BAY.

SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 12

PROJECT No.	DISCIPLINE	NUMBER	REV.
11688(13)NPWS	RWAT	014	H

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 - 11:20 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

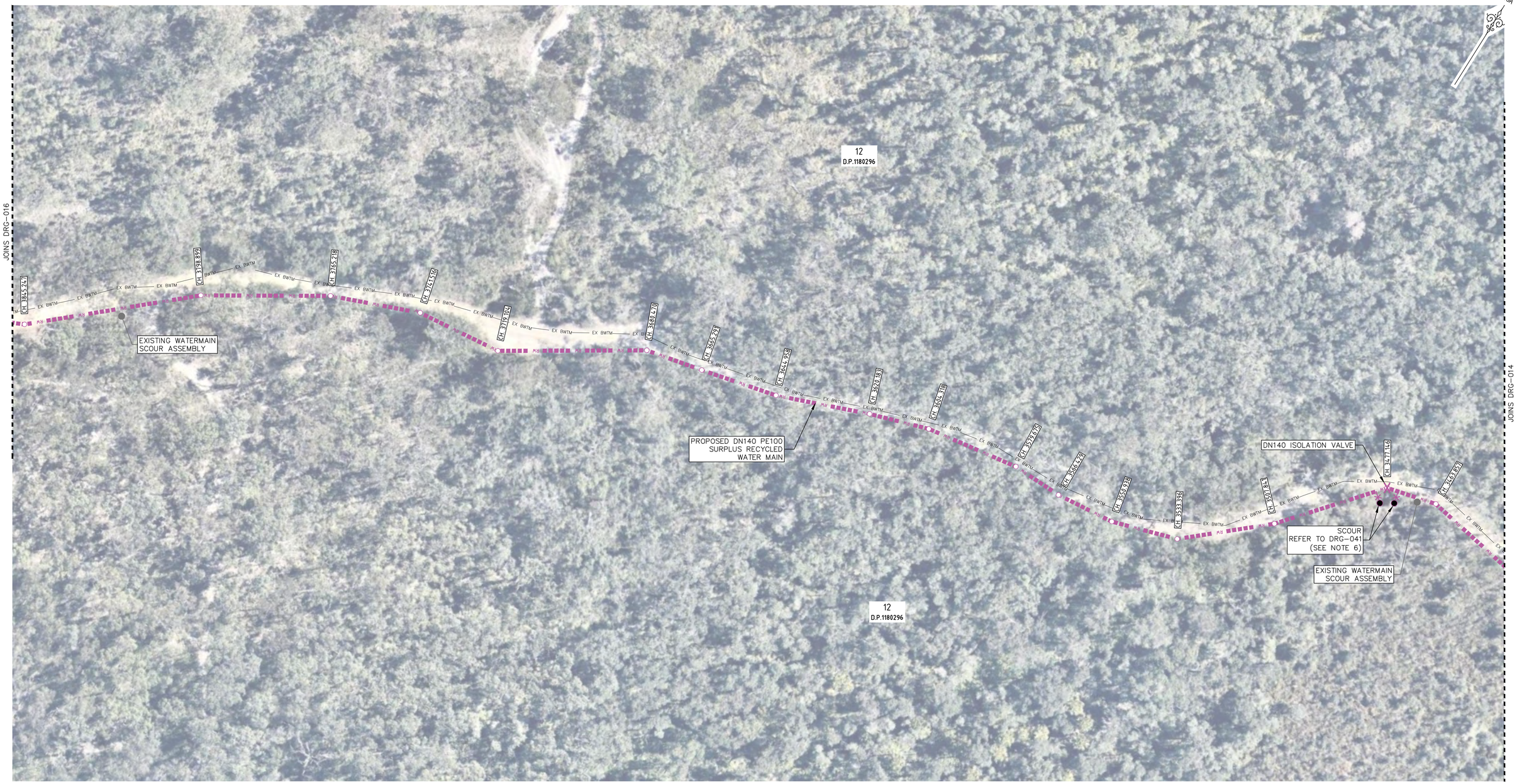
11688(13)NPWS-RWAT-001 to 026(H)

JOINS DRG-016

JOINS DRG-014

MGA

12
D.P.1180296



12
D.P.1180296

LEGEND

- PROPOSED ISOLATION VALVE
- RW — PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EX BWTM — EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- ex w — EXISTING WATERMAIN
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- OHP — OHP — OHP — EXISTING OVERHEAD POWER

PLAN
SCALE 1:500

NOTES:

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3. REFER TO DRG-026 FOR SURPLUS RECYCLED WATER MAIN SETOUT DETAILS.
4. SEDIMENT AND EROSION CONTROLS TO BE IN PLACE PRIOR TO CONSTRUCTION WORKS WITHIN AREA. SEDIMENT AND EROSION CONTROLS TO BE PROVIDED IN ACCORDANCE WITH THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION'S RESOURCE GUIDE FOR LOCAL COUNCILS.
5. ANY DISTURBANCE TO IMPROVED AREAS TO BE FULLY REINSTATED ON INSTALLATION OF PIPELINE TO PRE-EXISTING CONDITIONS TO THE SATISFACTION OF THE APPROVING AUTHORITY.
6. LOCATIONS SHOWN FOR SCOUR AND AIR VALVE INSTALLATIONS ARE INDICATIVE ONLY. CONTRACTOR IS TO INSTALL SCOURS AT LOCAL LOW POINTS AND LOW POINT BETWEEN IN LINE STOP VALVES. CONTRACTOR IS TO INSTALL AIR VALVES AT LOCAL HIGH POINTS AND IMMEDIATELY DOWNHILL OF MAJOR ISOLATION VALVES. REFER TO DRG-041 FOR TYPICAL INSTALLATION DETAILS.

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CONSTRUCTION ISSUE

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F	02.09.2019	AMENDED NPWS ISSUE - CLIENT COMMENTS	J.N.	R.J.	H.M.	C.B.
G	06.09.2019	ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.
H	17.09.2019	RE ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.

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SCALES: 0 10 20 A1 / A3 1:500 / 1:1000

ALL DIMENSIONS ARE IN METRES. DO NOT SCALE

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www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION: SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 13

SURVEYED	DATUM	PROJECT No.	DISCIPLINE	NUMBER	REV.
ADWJ	A.H.D.	11688(13)NPWS	RWAT	015	H

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 - 11:20 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

50mm AT FULL SIZE

LEGEND

- PROPOSED ISOLATION VALVE
- RW — PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EX BWTM — EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- ex w — EXISTING WATERMAIN
- T — T — EXISTING TELECOMMUNICATIONS
- ex e — EXISTING UNDERGROUND POWER
- OHP — OHP — OHP — EXISTING OVERHEAD POWER

PLAN
SCALE 1:500

NOTES:

1. EXISTING SERVICES SHOWN HAVE NOT BEEN LOCATED BY SURVEY AND ARE INDICATIVE ONLY. THE CONTRACTOR IS TO VERIFY THE POSITIONS AND LEVELS OF ALL EXISTING SERVICES, PIPES, CABLES AND CONDUITS.
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3. REFER TO DRG-026 FOR SURPLUS RECYCLED WATER MAIN SETOUT DETAILS.
4. SEDIMENT AND EROSION CONTROLS TO BE IN PLACE PRIOR TO CONSTRUCTION WORKS WITHIN AREA. SEDIMENT AND EROSION CONTROLS TO BE PROVIDED IN ACCORDANCE WITH THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION'S RESOURCE GUIDE FOR LOCAL COUNCILS.
5. ANY DISTURBANCE TO IMPROVED AREAS TO BE FULLY REINSTATED ON INSTALLATION OF PIPELINE TO PRE-EXISTING CONDITIONS TO THE SATISFACTION OF THE APPROVING AUTHORITY.
6. LOCATIONS SHOWN FOR SCOUR AND AIR VALVE INSTALLATIONS ARE INDICATIVE ONLY. CONTRACTOR IS TO INSTALL SCOURS AT LOCAL LOW POINTS AND LOW POINT BETWEEN IN LINE STOP VALVES. CONTRACTOR IS TO INSTALL AIR VALVES AT LOCAL HIGH POINTS AND IMMEDIATELY DOWNHILL OF MAJOR ISOLATION VALVES. REFER TO DRG-041 FOR TYPICAL INSTALLATION DETAILS.

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ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

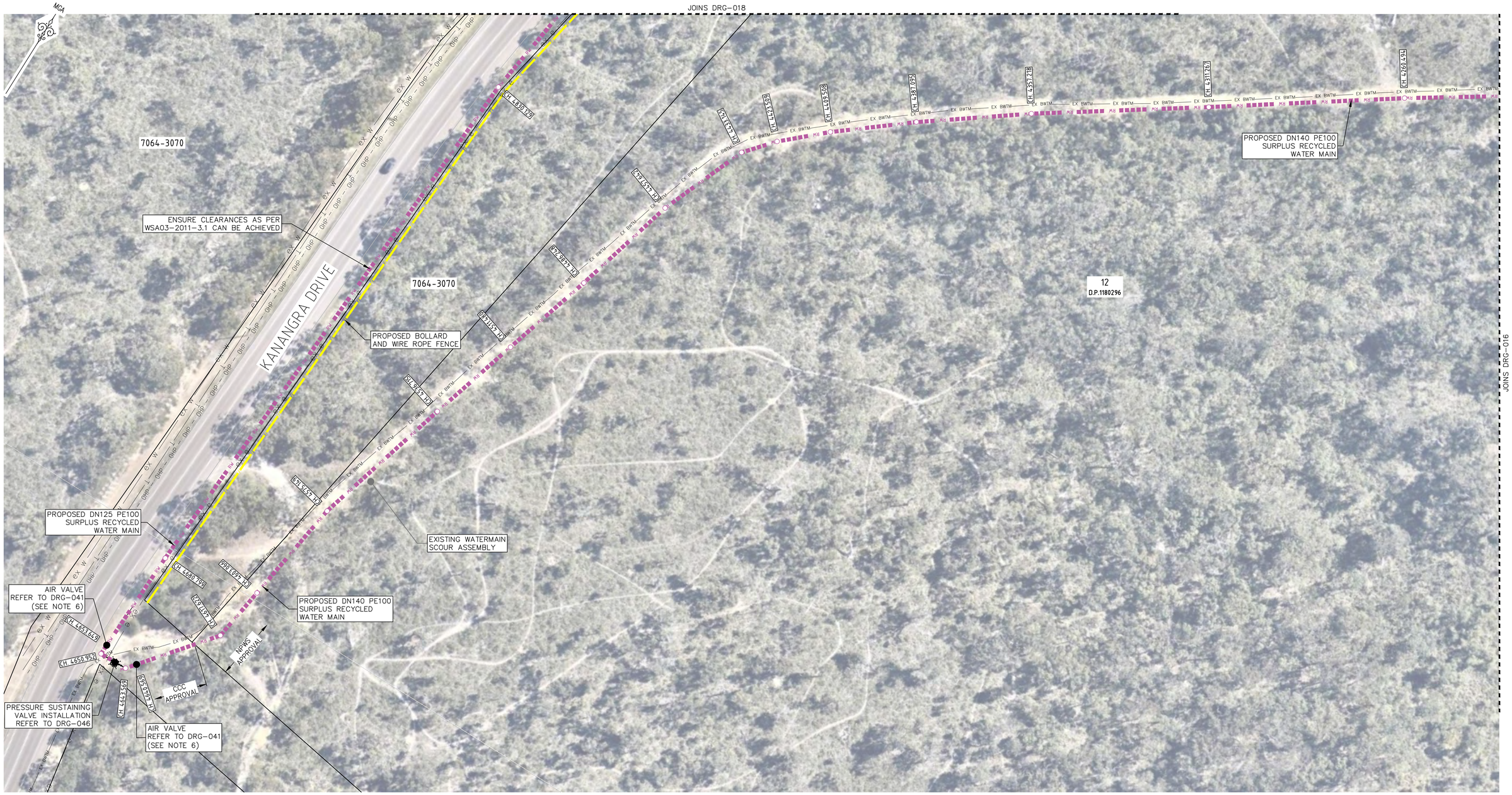
PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 14

SURVEYED	DATUM	PROJECT No.	DISCIPLINE	NUMBER	REV.
ADWJ	A.H.D.	11688(13)NPWS -	RWAT -	016	H

Plotted By: jaysonn Plot Date: 18/09/19 - 11:20 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)



LEGEND

- PROPOSED ISOLATION VALVE
- PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- EXISTING WATERMAIN
- EXISTING TELECOMMUNICATIONS
- EXISTING UNDERGROUND POWER
- EXISTING OVERHEAD POWER
- PROPOSED PROPERTY BOUNDARY
- EXISTING TREES TO BE RETAINED
- EXISTING TREES TO BE REMOVED

NOTE: EXCAVATION WITHIN 2m OF TREE DRIP LINE TO BE UNDERTAKEN WITH MINIMUM DISTURBANCE AND UNDER THE SUPERVISION OF A TRAINED ECOLOGIST TO ENSURE MAXIMUM SURVIVAL POTENTIAL FOR THE TREE.

- PROPOSED BOLLARD AND WIRE ROPE FENCE (SEE NOTE 9)

PLAN
SCALE 1:500

NOTES:

1. EXISTING SERVICES SHOWN HAVE NOT BEEN LOCATED BY SURVEY AND ARE INDICATIVE ONLY. THE CONTRACTOR IS TO VERIFY THE POSITIONS AND LEVELS OF ALL EXISTING SERVICES, PIPES, CABLES AND CONDUITS.
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3. REFER TO DRG-026 FOR SURPLUS RECYCLED WATER MAIN SETOUT DETAILS.
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7. WHERE NECESSARY, REMOVE EXISTING POST AND WIRE GUARDRAIL FENCE ALONG KANANGRA DRIVE TO ALLOW CONSTRUCTION OF PROPOSED SURPLUS RECYCLED WATERMAIN. FOLLOWING INSTALLATION OF WATERMAIN, REINSTATE/REPLACE FENCING TO MATCH EXISTING.
8. PIPE ALIGNMENT ALONG KANANGRA DRIVE AND SUMMERLAND ROAD IS TO BE NOM. 450mm OFFSET FROM EDGE OF EXISTING BITUMEN U.N.O.
9. PROVIDE H.D. GALV. BOLLARD AND STEEL WIRE ROPE FENCE. FENCE TO BE OFFSET NOM. 1.0m OUTSIDE OF ROAD RESERVE BOUNDARY. LOCALLY ADJUST ALIGNMENT OF FENCE AS NECESSARY TO MINIMISE REMOVAL OF EXISTING VEGETATION.

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ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 15

PROJECT No.	DISCIPLINE	NUMBER	REV.
11688(13)NPWS	RWAT	017	H

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 - 11:21 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

LEGEND

- PROPOSED ISOLATION VALVE
- RW — PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EX BWTM — EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- ex w — EXISTING WATERMAIN
- T — T — EXISTING TELECOMMUNICATIONS
- ex e — EXISTING UNDERGROUND POWER
- OHP — OHP — OHP — EXISTING OVERHEAD POWER
- PROPOSED PROPERTY BOUNDARY
- EXISTING TREES TO BE RETAINED
- EXISTING TREES TO BE REMOVED

NOTE: EXCAVATION WITHIN 2m OF TREE DRIP LINE TO BE UNDERTAKEN WITH MINIMUM DISTURBANCE AND UNDER THE SUPERVISION OF A TRAINED ECOLOGIST TO ENSURE MAXIMUM SURVIVAL POTENTIAL FOR THE TREE.

- PROPOSED BOLLARD AND WIRE ROPE FENCE (SEE NOTE 9)

PLAN
SCALE 1:500

NOTES:

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4. SEDIMENT AND EROSION CONTROLS TO BE IN PLACE PRIOR TO CONSTRUCTION WORKS WITHIN AREA. SEDIMENT AND EROSION CONTROLS TO BE PROVIDED IN ACCORDANCE WITH THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION'S RESOURCE GUIDE FOR LOCAL COUNCILS.
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7. WHERE NECESSARY, REMOVE EXISTING POST AND WIRE GUARDRAIL FENCE ALONG KANANGRA DRIVE TO ALLOW CONSTRUCTION OF PROPOSED SURPLUS RECYCLED WATERMAIN. FOLLOWING INSTALLATION OF WATERMAIN, REINSTATE/REPLACE FENCING TO MATCH EXISTING.
8. PIPE ALIGNMENT ALONG KANANGRA DRIVE AND SUMMERLAND ROAD IS TO BE NOM. 450mm OFFSET FROM EDGE OF EXISTING BITUMEN U.N.O.
9. PROVIDE H.D. GALV. BOLLARD AND STEEL WIRE ROPE FENCE. FENCE TO BE OFFSET NOM. 1.0m OUTSIDE OF ROAD RESERVE BOUNDARY. LOCALLY ADJUST ALIGNMENT OF FENCE AS NECESSARY TO MINIMISE REMOVAL OF EXISTING VEGETATION.

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ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED WATER MAIN
CATHERINE HILL BAY.

SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 16

PROJECT No.	DISCIPLINE	NUMBER	REV.
11688(13)NPWS	RWAT	018	H

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 - 11:21 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

LEGEND

- PROPOSED ISOLATION VALVE
- RW PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EX BWTM EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- ex w EXISTING WATERMAIN
- T T EXISTING TELECOMMUNICATIONS
- ex e EXISTING UNDERGROUND POWER
- OHP OHP OHP EXISTING OVERHEAD POWER
- PROPOSED PROPERTY BOUNDARY
- EXISTING TREES TO BE RETAINED
- EXISTING TREES TO BE REMOVED

NOTE: EXCAVATION WITHIN 2m OF TREE DRIP LINE TO BE UNDERTAKEN WITH MINIMUM DISTURBANCE AND UNDER THE SUPERVISION OF A TRAINED ECOLOGIST TO ENSURE MAXIMUM SURVIVAL POTENTIAL FOR THE TREE.

- PROPOSED BOLLARD AND WIRE ROPE FENCE (SEE NOTE 9)

PLAN
SCALE 1:500

NOTES:

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7. WHERE NECESSARY, REMOVE EXISTING POST AND WIRE GUARDRAIL FENCE ALONG KANANGRA DRIVE TO ALLOW CONSTRUCTION OF PROPOSED SURPLUS RECYCLED WATERMAIN. FOLLOWING INSTALLATION OF WATERMAIN, REINSTATE/REPLACE FENCING TO MATCH EXISTING.
8. PIPE ALIGNMENT ALONG KANANGRA DRIVE AND SUMMERLAND ROAD IS TO BE NOM. 450mm OFFSET FROM EDGE OF EXISTING BITUMEN U.N.O.
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ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 17

PROJECT No.	DISCIPLINE	NUMBER	REV.
11688(13)NPWS -	RWAT -	019	H

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 - 11:21 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

JOINS DRG-019

LEGEND

- PROPOSED ISOLATION VALVE
- RW — PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EX BWTM — EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- ex w — EXISTING WATERMAIN
- T — T — EXISTING TELECOMMUNICATIONS
- ex e — EXISTING UNDERGROUND POWER
- OHP — OHP — OHP — EXISTING OVERHEAD POWER
- PROPOSED PROPERTY BOUNDARY
- EXISTING TREES TO BE RETAINED
- EXISTING TREES TO BE REMOVED

NOTE: EXCAVATION WITHIN 2m OF TREE DRIP LINE TO BE UNDERTAKEN WITH MINIMUM DISTURBANCE AND UNDER THE SUPERVISION OF A TRAINED ECOLOGIST TO ENSURE MAXIMUM SURVIVAL POTENTIAL FOR THE TREE.

- PROPOSED BOLLARD AND WIRE ROPE FENCE (SEE NOTE 9)

PLAN

SCALE 1:500

NOTES:

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6. LOCATIONS SHOWN FOR SCOUR AND AIR VALVE INSTALLATIONS ARE INDICATIVE ONLY. CONTRACTOR IS TO INSTALL SCOURS AT LOCAL LOW POINTS AND LOW POINT BETWEEN IN LINE STOP VALVES. CONTRACTOR IS TO INSTALL AIR VALVES AT LOCAL HIGH POINTS AND IMMEDIATELY DOWNHILL OF MAJOR ISOLATION VALVES. REFER TO DRG-041 FOR TYPICAL INSTALLATION DETAILS.
7. WHERE NECESSARY, REMOVE EXISTING POST AND WIRE GUARDRAIL FENCE ALONG KANANGRA DRIVE TO ALLOW CONSTRUCTION OF PROPOSED SURPLUS RECYCLED WATERMAIN. FOLLOWING INSTALLATION OF WATERMAIN, REINSTATE/REPLACE FENCING TO MATCH EXISTING.
8. PIPE ALIGNMENT ALONG KANANGRA DRIVE AND SUMMERLAND ROAD IS TO BE NOM. 450mm OFFSET FROM EDGE OF EXISTING BITUMEN U.N.O.
9. PROVIDE H.D. GALV. BOLLARD AND STEEL WIRE ROPE FENCE. FENCE TO BE OFFSET NOM. 1.0m OUTSIDE OF ROAD RESERVE BOUNDARY. LOCALLY ADJUST ALIGNMENT OF FENCE AS NECESSARY TO MINIMISE REMOVAL OF EXISTING VEGETATION.

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CONSTRUCTION ISSUE

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
A	20.11.2018	PRELIMINARY ISSUE	J.N.	R.J.	H.M.	C.B.
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F	02.09.2019	AMENDED NPWS ISSUE - CLIENT COMMENTS	J.N.	R.J.	H.M.	C.B.
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H	17.09.2019	RE ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.

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SCALES: 0 10 20 A1 / A3 1:500 / 1:1000

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email: hunter@adwjohnson.com.au
www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION: SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ

DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 18

PROJECT No.	DISCIPLINE	NUMBER	REV.
11688(13)NPWS	RWAT	020	H

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 - 11:21 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

LEGEND

- PROPOSED ISOLATION VALVE
- PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- EXISTING WATERMAIN
- EXISTING TELECOMMUNICATIONS
- EXISTING UNDERGROUND POWER
- EXISTING OVERHEAD POWER
- PROPOSED PROPERTY BOUNDARY
- EXISTING TREES TO BE RETAINED
- EXISTING TREES TO BE REMOVED

NOTE: EXCAVATION WITHIN 2m OF TREE DRIP LINE TO BE UNDERTAKEN WITH MINIMUM DISTURBANCE AND UNDER THE SUPERVISION OF A TRAINED ECOLOGIST TO ENSURE MAXIMUM SURVIVAL POTENTIAL FOR THE TREE.

- PROPOSED BOLLARD AND WIRE ROPE FENCE (SEE NOTE 9)

PLAN
SCALE 1:500

NOTES:

1. EXISTING SERVICES SHOWN HAVE NOT BEEN LOCATED BY SURVEY AND ARE INDICATIVE ONLY. THE CONTRACTOR IS TO VERIFY THE POSITIONS AND LEVELS OF ALL EXISTING SERVICES, PIPES, CABLES AND CONDUITS.
2. H.D. POLYETHYLENE PIPE SHALL NOT BE BENT TO A RADIUS LESS THAN MANUFACTURERS RECOMMENDATIONS. IF THE PROPOSED ALIGNMENT CAN NOT BE ACHIEVED BY BENDING THE PIPE THE CONTRACTOR IS TO USE ELECTROFUSION FITTINGS TO ACHIEVE REQUIRED DEFLECTIONS.
3. REFER TO DRG-026 FOR SURPLUS RECYCLED WATER MAIN SETOUT DETAILS.
4. SEDIMENT AND EROSION CONTROLS TO BE IN PLACE PRIOR TO CONSTRUCTION WORKS WITHIN AREA. SEDIMENT AND EROSION CONTROLS TO BE PROVIDED IN ACCORDANCE WITH THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION'S RESOURCE GUIDE FOR LOCAL COUNCILS.
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6. LOCATIONS SHOWN FOR SCOUR AND AIR VALVE INSTALLATIONS ARE INDICATIVE ONLY. CONTRACTOR IS TO INSTALL SCOURS AT LOCAL LOW POINTS AND LOW POINT BETWEEN IN LINE STOP VALVES. CONTRACTOR IS TO INSTALL AIR VALVES AT LOCAL HIGH POINTS AND IMMEDIATELY DOWNHILL OF MAJOR ISOLATION VALVES. REFER TO DRG-041 FOR TYPICAL INSTALLATION DETAILS.
7. WHERE NECESSARY, REMOVE EXISTING POST AND WIRE GUARDRAIL FENCE ALONG KANANGRA DRIVE TO ALLOW CONSTRUCTION OF PROPOSED SURPLUS RECYCLED WATERMAIN. FOLLOWING INSTALLATION OF WATERMAIN, REINSTATE/REPLACE FENCING TO MATCH EXISTING.
8. PIPE ALIGNMENT ALONG KANANGRA DRIVE AND SUMMERLAND ROAD IS TO BE NOM. 450mm OFFSET FROM EDGE OF EXISTING BITUMEN U.N.O.
9. PROVIDE H.D. GALV. BOLLARD AND STEEL WIRE ROPE FENCE. FENCE TO BE OFFSET NOM. 1.0m OUTSIDE OF ROAD RESERVE BOUNDARY. LOCALLY ADJUST ALIGNMENT OF FENCE AS NECESSARY TO MINIMISE REMOVAL OF EXISTING VEGETATION.

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H	17.09.2019	RE ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.

SCALES: 0 10 20 A1 / A3 1:500 / 1:1000

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ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED WATER MAIN
CATHERINE HILL BAY.

SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 19

PROJECT No.	DISCIPLINE	NUMBER	REV.
11688(13)NPWS	RWAT	021	H

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 - 11:21 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

LEGEND

- PROPOSED ISOLATION VALVE
- RW — PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EX BWTM — EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- ex w — EXISTING WATERMAIN
- T — T — EXISTING TELECOMMUNICATIONS
- ex e — EXISTING UNDERGROUND POWER
- OHP — OHP — OHP — EXISTING OVERHEAD POWER
- PROPOSED PROPERTY BOUNDARY
- EXISTING TREES TO BE RETAINED
- EXISTING TREES TO BE REMOVED

NOTE: EXCAVATION WITHIN 2m OF TREE DRIP LINE TO BE UNDERTAKEN WITH MINIMUM DISTURBANCE AND UNDER THE SUPERVISION OF A TRAINED ECOLOGIST TO ENSURE MAXIMUM SURVIVAL POTENTIAL FOR THE TREE.

PLAN
SCALE 1:500

NOTES:

1. EXISTING SERVICES SHOWN HAVE NOT BEEN LOCATED BY SURVEY AND ARE INDICATIVE ONLY. THE CONTRACTOR IS TO VERIFY THE POSITIONS AND LEVELS OF ALL EXISTING SERVICES, PIPES, CABLES AND CONDUITS.
2. H.D. POLYETHYLENE PIPE SHALL NOT BE BENT TO A RADIUS LESS THAN MANUFACTURERS RECOMMENDATIONS. IF THE PROPOSED ALIGNMENT CAN NOT BE ACHIEVED BY BENDING THE PIPE THE CONTRACTOR IS TO USE ELECTROFUSION FITTINGS TO ACHIEVE REQUIRED DEFLECTIONS.
3. REFER TO DRG-026 FOR SURPLUS RECYCLED WATER MAIN SETOUT DETAILS.
4. SEDIMENT AND EROSION CONTROLS TO BE IN PLACE PRIOR TO CONSTRUCTION WORKS WITHIN AREA. SEDIMENT AND EROSION CONTROLS TO BE PROVIDED IN ACCORDANCE WITH THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION'S RESOURCE GUIDE FOR LOCAL COUNCILS.
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7. WHERE NECESSARY, REMOVE EXISTING POST AND WIRE GUARDRAIL FENCE ALONG KANANGRA DRIVE TO ALLOW CONSTRUCTION OF PROPOSED SURPLUS RECYCLED WATERMAIN. FOLLOWING INSTALLATION OF WATERMAIN, REINSTATE/REPLACE FENCING TO MATCH EXISTING.
8. PIPE ALIGNMENT ALONG KANANGRA DRIVE AND SUMMERLAND ROAD IS TO BE NOM. 450mm OFFSET FROM EDGE OF EXISTING BITUMEN U.N.O.

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SCALES: 0 10 20 A1 / A3 1:500 / 1:1000

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www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION: SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ

DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 20

PROJECT No. 11688(13)NPWS - DISCIPLINE RWAT - NUMBER 022 - REV. H

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 - 11:21 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

LEGEND

- PROPOSED ISOLATION VALVE
- RW — PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EX BWTM — EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- ex w — EXISTING WATERMAIN
- T — T — EXISTING TELECOMMUNICATIONS
- ex e — EXISTING UNDERGROUND POWER
- OHP — OHP — OHP — EXISTING OVERHEAD POWER
- PROPOSED PROPERTY BOUNDARY
- EXISTING TREES TO BE RETAINED
- EXISTING TREES TO BE REMOVED

NOTE: EXCAVATION WITHIN 2m OF TREE DRIP LINE TO BE UNDERTAKEN WITH MINIMUM DISTURBANCE AND UNDER THE SUPERVISION OF A TRAINED ECOLOGIST TO ENSURE MAXIMUM SURVIVAL POTENTIAL FOR THE TREE.

PLAN
SCALE 1:500

NOTES:

1. EXISTING SERVICES SHOWN HAVE NOT BEEN LOCATED BY SURVEY AND ARE INDICATIVE ONLY. THE CONTRACTOR IS TO VERIFY THE POSITIONS AND LEVELS OF ALL EXISTING SERVICES, PIPES, CABLES AND CONDUITS.
2. H.D. POLYETHYLENE PIPE SHALL NOT BE BENT TO A RADIUS LESS THAN MANUFACTURERS RECOMMENDATIONS. IF THE PROPOSED ALIGNMENT CAN NOT BE ACHIEVED BY BENDING THE PIPE THE CONTRACTOR IS TO USE ELECTROFUSION FITTINGS TO ACHIEVE REQUIRED DEFLECTIONS.
3. REFER TO DRG-026 FOR SURPLUS RECYCLED WATER MAIN SETOUT DETAILS.
4. SEDIMENT AND EROSION CONTROLS TO BE IN PLACE PRIOR TO CONSTRUCTION WORKS WITHIN AREA. SEDIMENT AND EROSION CONTROLS TO BE PROVIDED IN ACCORDANCE WITH THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION'S RESOURCE GUIDE FOR LOCAL COUNCILS.
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6. LOCATIONS SHOWN FOR SCOUR AND AIR VALVE INSTALLATIONS ARE INDICATIVE ONLY. CONTRACTOR IS TO INSTALL SCOURS AT LOCAL LOW POINTS AND LOW POINT BETWEEN IN LINE STOP VALVES. CONTRACTOR IS TO INSTALL AIR VALVES AT LOCAL HIGH POINTS AND IMMEDIATELY DOWNHILL OF MAJOR ISOLATION VALVES. REFER TO DRG-041 FOR TYPICAL INSTALLATION DETAILS.
7. WHERE NECESSARY, REMOVE EXISTING POST AND WIRE GUARDRAIL FENCE ALONG KANANGRA DRIVE TO ALLOW CONSTRUCTION OF PROPOSED SURPLUS RECYCLED WATERMAIN. FOLLOWING INSTALLATION OF WATERMAIN, REINSTATE/REPLACE FENCING TO MATCH EXISTING.
8. PIPE ALIGNMENT ALONG KANANGRA DRIVE AND SUMMERLAND ROAD IS TO BE NOM. 450mm OFFSET FROM EDGE OF EXISTING BITUMEN U.N.O.

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ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION: SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ

DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 21

PROJECT No. 11688(13)NPWS - DISCIPLINE RWAT - NUMBER 023 - REV. H

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 - 11:21 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

LEGEND

- PROPOSED ISOLATION VALVE
- RW — PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
- EX BWTM — EXISTING BULK WATER TRANSFER MAIN
- EXISTING PROPERTY BOUNDARY
- ex w — EXISTING WATERMAIN
- T — T — EXISTING TELECOMMUNICATIONS
- ex e — EXISTING UNDERGROUND POWER
- OHP — OHP — OHP — EXISTING OVERHEAD POWER
- PROPOSED PROPERTY BOUNDARY
- EXISTING TREES TO BE RETAINED
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NOTE: EXCAVATION WITHIN 2m OF TREE DRIP LINE TO BE UNDERTAKEN WITH MINIMUM DISTURBANCE AND UNDER THE SUPERVISION OF A TRAINED ECOLOGIST TO ENSURE MAXIMUM SURVIVAL POTENTIAL FOR THE TREE.

PLAN
SCALE 1:500

NOTES:

1. EXISTING SERVICES SHOWN HAVE NOT BEEN LOCATED BY SURVEY AND ARE INDICATIVE ONLY. THE CONTRACTOR IS TO VERIFY THE POSITIONS AND LEVELS OF ALL EXISTING SERVICES, PIPES, CABLES AND CONDUITS.
2. H.D. POLYETHYLENE PIPE SHALL NOT BE BENT TO A RADIUS LESS THAN MANUFACTURERS RECOMMENDATIONS. IF THE PROPOSED ALIGNMENT CAN NOT BE ACHIEVED BY BENDING THE PIPE THE CONTRACTOR IS TO USE ELECTROFUSION FITTINGS TO ACHIEVE REQUIRED DEFLECTIONS.
3. REFER TO DRG-026 FOR SURPLUS RECYCLED WATER MAIN SETOUT DETAILS.
4. SEDIMENT AND EROSION CONTROLS TO BE IN PLACE PRIOR TO CONSTRUCTION WORKS WITHIN AREA. SEDIMENT AND EROSION CONTROLS TO BE PROVIDED IN ACCORDANCE WITH THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION'S RESOURCE GUIDE FOR LOCAL COUNCILS.
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CONTRACTOR IS TO INSTALL AIR VALVES AT LOCAL HIGH POINTS AND IMMEDIATELY DOWNHILL OF MAJOR ISOLATION VALVES.
REFER TO DRG-041 FOR TYPICAL INSTALLATION DETAILS.
7. WHERE NECESSARY, REMOVE EXISTING POST AND WIRE GUARDRAIL FENCE ALONG KANANGRA DRIVE TO ALLOW CONSTRUCTION OF PROPOSED SURPLUS RECYCLED WATERMAIN. FOLLOWING INSTALLATION OF WATERMAIN, REINSTATE/REPLACE FENCING TO MATCH EXISTING.
8. PIPE ALIGNMENT ALONG KANANGRA DRIVE AND SUMMERLAND ROAD IS TO BE NOM. 450mm OFFSET FROM EDGE OF EXISTING BITUMEN U.N.O.

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SCALES: 0 10 20 A1 / A3 1:500 / 1:1000

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www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED WATER MAIN
CATHERINE HILL BAY.

SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

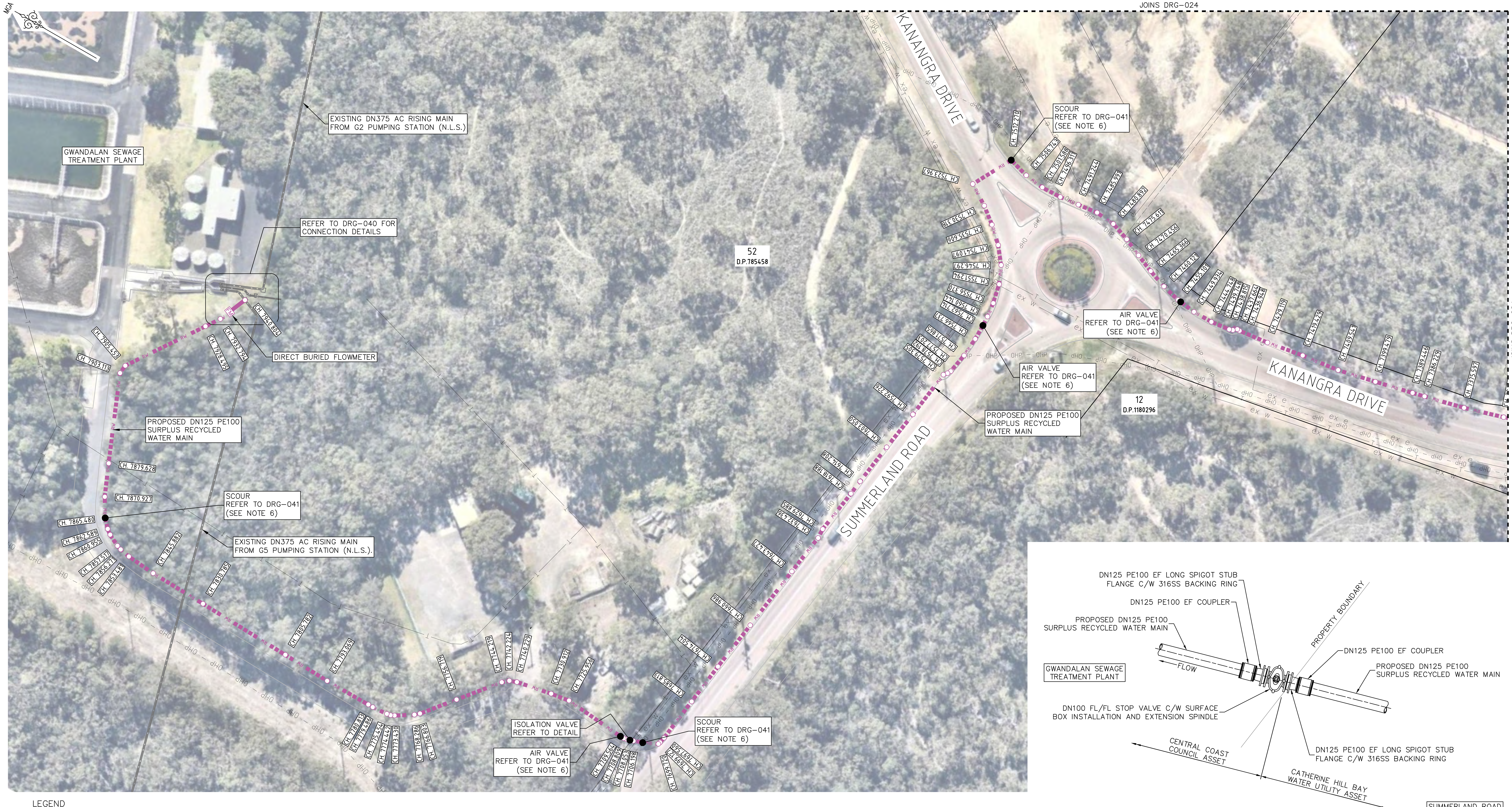
PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 22

PROJECT No.	DISCIPLINE	NUMBER	REV.
11688(13)NPWS	RWAT	024	H

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 – 12:50 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) – Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)



ISOLATION VALVE DETAIL
SCALE 1:20

PLAN
SCALE 1:500

LEGEND

✕	PROPOSED ISOLATION VALVE
▬ ▬ RW ▬	PROPOSED PE100 SURPLUS RECYCLED WATER MAIN
—— EX BWTM ——	EXISTING BULK WATER TRANSFER MAIN
————	EXISTING PROPERTY BOUNDARY
—— ex w ——	EXISTING WATERMAIN
–T—— T ——	EXISTING TELECOMMUNICATIONS
—— ex e ——	EXISTING UNDERGROUND POWER
— OHP — OHP — OHP —	EXISTING OVERHEAD POWER
═══════	EXISTING SEWER RISING MAIN

NOTES:

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4. SEDIMENT AND EROSION CONTROLS TO BE IN PLACE PRIOR TO CONSTRUCTION WORKS WITHIN AREA. SEDIMENT AND EROSION CONTROLS TO BE PROVIDED IN ACCORDANCE WITH THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION'S RESOURCE GUIDE FOR LOCAL COUNCILS.
5. ANY DISTURBANCE TO IMPROVED AREAS TO BE FULLY REINSTATED ON INSTALLATION OF PIPELINE TO PRE-EXISTING CONDITIONS TO THE SATISFACTION OF THE APPROVING AUTHORITY.
6. LOCATIONS SHOWN FOR SCOUR AND AIR VALVE INSTALLATIONS ARE INDICATIVE ONLY. CONTRACTOR IS TO INSTALL SCOURS AT LOCAL LOW POINTS AND LOW POINT BETWEEN IN LINE STOP VALVES. CONTRACTOR IS TO INSTALL AIR VALVES AT LOCAL HIGH POINTS AND IMMEDIATELY DOWNHILL OF MAJOR ISOLATION VALVES. REFER TO DRG-041 FOR TYPICAL INSTALLATION DETAILS.
7. WHERE NECESSARY, REMOVE EXISTING POST AND WIRE GUARDRAIL FENCE ALONG KANANGRA DRIVE TO ALLOW CONSTRUCTION OF PROPOSED SURPLUS RECYCLED WATERMAIN. FOLLOWING INSTALLATION OF WATERMAIN, REINSTATE/REPLACE FENCING TO MATCH EXISTING.
8. PIPE ALIGNMENT ALONG KANANGRA DRIVE AND SUMMERLAND ROAD IS TO BE NOM. 450mm OFFSET FROM EDGE OF EXISTING BITUMEN U.N.O.

DIAL 1100 BEFORE YOU DIG

CONSTRUCTION ISSUE

50mm AT FULL SIZE

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
A	20.11.2018	PRELIMINARY ISSUE	J.N.	R.J.	H.M.	C.B.
B	01.04.2019	AMENDED ISSUE	J.N.	R.J.	H.M.	C.B.
C	03.05.2019	NPWS ISSUE	S.HO.	R.J.	H.M.	C.B.
D	04.07.2019	AMENDED NPWS ISSUE NPWS COMMENTS	J.N.	R.J.	H.M.	C.B.
E	08.07.2019	AMENDED NPWS ISSUE	J.N.	R.J.	H.M.	C.B.
F	02.09.2019	AMENDED NPWS ISSUE – CLIENT COMMENTS	J.N.	R.J.	H.M.	C.B.
G	06.09.2019	ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.
H	17.09.2019	RE ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.

DESIGN FILE S:\190238\Design\12D\WWPS CONCEPT DESIGN

SCALES: 0 10 20 A1 / A3 1:500 / 1:1000

ALL DIMENSIONS ARE IN METRES. DO NOT SCALE

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ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION: SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ | DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 23

PROJECT No.	DISCIPLINE	NUMBER	REV.
11688(13)NPWS –	RWAT –	025	H

Plotted By: jaysonn Plot Date: 18/09/19 – 11:22 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) – Issue H (NPWS)\11688(13)NPWS-RWAT-001 to 026(H).dwg

11688(13)NPWS-RWAT-001 to 026(H)

SURPLUS RECYCLED WATER MAIN SETOUT

CHAINAGE	EASTING	NORTHING	DESCRIPTION
0.000	371670.019	6329850.644	CONNECTION TO EXIST. DN125
15.605	371669.560	6329866.242	80°05' HORIZ. DEFLECTION
24.418	371678.193	6329868.016	INTERMEDIATE CHAINAGE
68.363	371719.939	6329881.741	23°15' HORIZ. DEFLECTION
80.792	371729.256	6329889.969	26°06' HORIZ. DEFLECTION
92.040	371733.552	6329900.364	INTERMEDIATE CHAINAGE
114.114	371740.231	6329921.403	INTERMEDIATE CHAINAGE
128.684	371745.690	6329934.912	INTERMEDIATE CHAINAGE
140.649	371749.210	6329946.347	15°42' HORIZ. DEFLECTION
157.614	371749.630	6329963.307	INTERMEDIATE CHAINAGE
176.526	371748.912	6329982.206	INTERMEDIATE CHAINAGE
217.929	371744.086	6330023.326	8°28' HORIZ. DEFLECTION
230.054	371740.883	6330035.020	10°32' HORIZ. DEFLECTION
241.674	371735.816	6330045.477	8°47' HORIZ. DEFLECTION
258.850	371730.776	6330061.898	5°28' HORIZ. DEFLECTION
276.528	371727.221	6330079.215	INTERMEDIATE CHAINAGE
290.817	371725.317	6330093.376	INTERMEDIATE CHAINAGE
306.233	371722.379	6330108.509	INTERMEDIATE CHAINAGE
316.357	371719.296	6330118.152	8°37' HORIZ. DEFLECTION
329.340	371713.535	6330129.787	33°10' HORIZ. DEFLECTION
348.406	371697.105	6330139.461	17°23' HORIZ. DEFLECTION
355.665	371690.036	6330141.108	INTERMEDIATE CHAINAGE
382.920	371663.274	6330146.269	6°24' HORIZ. DEFLECTION
414.330	371633.287	6330155.617	5°11' HORIZ. DEFLECTION
431.844	371617.106	6330162.320	13°03' HORIZ. DEFLECTION
454.042	371595.211	6330165.968	INTERMEDIATE CHAINAGE
472.980	371576.740	6330170.151	SCOUR – REFER TO DRG–041
497.708	371552.782	6330176.273	INTERMEDIATE CHAINAGE
518.782	371532.042	6330180.011	INTERMEDIATE CHAINAGE
540.116	371511.182	6330184.483	5°54' HORIZ. DEFLECTION
563.192	371488.241	6330186.977	20°40' HORIZ. DEFLECTION
586.667	371467.301	6330197.586	13°57' HORIZ. DEFLECTION
610.930	371443.652	6330203.012	INTERMEDIATE CHAINAGE
647.247	371408.337	6330211.486	INTERMEDIATE CHAINAGE
673.552	371382.391	6330215.813	INTERMEDIATE CHAINAGE
690.331	371365.695	6330217.483	INTERMEDIATE CHAINAGE
715.426	371340.949	6330221.658	INTERMEDIATE CHAINAGE
730.551	371325.976	6330223.788	11°05' HORIZ. DEFLECTION
760.090	371298.075	6330233.491	7°56' HORIZ. DEFLECTION
763.517	371295.025	6330235.053	18°58' HORIZ. DEFLECTION
774.919	371283.737	6330236.668	18°16' HORIZ. DEFLECTION
779.051	371279.670	6330235.942	18°19' HORIZ. DEFLECTION
798.465	371260.455	6330238.712	10°18' HORIZ. DEFLECTION
814.944	371244.828	6330243.941	11°00' HORIZ. DEFLECTION
846.964	371213.082	6330248.123	7°30' HORIZ. DEFLECTION
878.238	371181.808	6330248.125	60°26' HORIZ. DEFLECTION
907.004	371167.615	6330273.146	35°04' HORIZ. DEFLECTION
923.395	371152.806	6330280.171	15°25' HORIZ. DEFLECTION
952.807	371123.837	6330285.257	INTERMEDIATE CHAINAGE
1008.379	371069.675	6330297.694	INTERMEDIATE CHAINAGE
1054.377	371024.739	6330307.527	INTERMEDIATE CHAINAGE
1074.334	371005.461	6330312.684	INTERMEDIATE CHAINAGE
1100.000	370980.272	6330317.619	AIR VALVE – REFER TO DRG–041
1256.731	370826.467	6330347.757	5°13' HORIZ. DEFLECTION
1294.595	370790.126	6330358.388	5°48' HORIZ. DEFLECTION
1345.015	370740.552	6330367.583	INTERMEDIATE CHAINAGE
1350.000	370735.727	6330368.833	SCOUR – REFER TO DRG–041
1390.035	370696.971	6330378.877	8°29' HORIZ. DEFLECTION
1418.703	370668.462	6330381.894	8°31' HORIZ. DEFLECTION
1456.021	370632.342	6330391.274	INTERMEDIATE CHAINAGE
1493.107	370596.045	6330398.882	INTERMEDIATE CHAINAGE
1542.041	370547.705	6330406.482	5°52' HORIZ. DEFLECTION
1550.000	370540.010	6330408.515	AIR VALVE – REFER TO DRG–041
1573.457	370517.331	6330414.507	INTERMEDIATE CHAINAGE
1586.733	370504.552	6330418.101	7°43' HORIZ. DEFLECTION
1588.482	370502.819	6330418.344	9°58' HORIZ. DEFLECTION
1619.220	370472.100	6330417.281	SCOUR – REFER TO DRG–041
1648.140	370443.197	6330416.282	16°27' HORIZ. DEFLECTION
1667.752	370424.207	6330421.183	INTERMEDIATE CHAINAGE
1673.636	370418.513	6330422.664	INTERMEDIATE CHAINAGE
1675.376	370416.804	6330422.995	INTERMEDIATE CHAINAGE
1694.757	370397.804	6330426.817	INTERMEDIATE CHAINAGE
1715.307	370377.464	6330429.745	6°50' HORIZ. DEFLECTION
1735.065	370357.711	6330430.210	92°55' HORIZ. DEFLECTION
1739.565	370357.834	6330425.712	ISOLATION VALVE
1759.046	370358.364	6330406.238	96°57' HORIZ. DEFLECTION
1802.884	370314.720	6330410.352	AIR VALVE – REFER TO DRG–041
1823.554	370294.259	6330413.290	78°50' HORIZ. DEFLECTION
1833.821	370290.860	6330403.601	13°52' HORIZ. DEFLECTION
1846.945	370283.676	6330392.619	33°22' HORIZ. DEFLECTION
1858.125	370283.709	6330381.439	60°09' HORIZ. DEFLECTION
1868.805	370274.462	6330376.097	INTERMEDIATE CHAINAGE
1885.072	370260.632	6330367.530	INTERMEDIATE CHAINAGE
1901.610	370247.147	6330357.957	19°44' HORIZ. DEFLECTION
1904.647	370244.223	6330357.138	42°13' HORIZ. DEFLECTION
1910.639	370238.862	6330359.817	70°13' HORIZ. DEFLECTION
1921.066	370231.317	6330352.620	10°25' HORIZ. DEFLECTION
1931.899	370225.910	6330343.234	30°02' HORIZ. DEFLECTION
1938.048	370220.586	6330340.157	INTERMEDIATE CHAINAGE
1957.874	370203.184	6330330.658	INTERMEDIATE CHAINAGE
1968.031	370193.933	6330326.465	INTERMEDIATE CHAINAGE
1988.744	370175.116	6330317.806	20°05' HORIZ. DEFLECTION
2010.989	370159.331	6330302.133	INTERMEDIATE CHAINAGE
2030.244	370144.690	6330289.627	16°36' HORIZ. DEFLECTION
2069.403	370108.890	6330273.761	INTERMEDIATE CHAINAGE
2084.595	370094.664	6330268.426	12°24' HORIZ. DEFLECTION
2101.719	370080.295	6330259.112	10°48' HORIZ. DEFLECTION
2131.977	370058.439	6330238.187	INTERMEDIATE CHAINAGE
2148.253	370045.832	6330227.892	5°31' HORIZ. DEFLECTION
2164.168	370032.596	6330219.056	7°16' HORIZ. DEFLECTION
2181.550	370017.035	6330211.311	25°15' HORIZ. DEFLECTION

SURPLUS RECYCLED WATER MAIN SETOUT

CHAINAGE	EASTING	NORTHING	DESCRIPTION
2194.677	370008.900	6330201.008	39°28' HORIZ. DEFLECTION
2217.468	369986.627	6330196.180	8°44' HORIZ. DEFLECTION
2221.938	369982.165	6330195.907	INTERMEDIATE CHAINAGE
2241.618	369962.546	6330194.354	11°33' HORIZ. DEFLECTION
2259.426	369945.435	6330189.421	15°42' HORIZ. DEFLECTION
2279.572	369925.290	6330189.288	8°10' HORIZ. DEFLECTION
2291.008	369913.980	6330187.588	6°12' HORIZ. DEFLECTION
2313.497	369892.232	6330181.866	INTERMEDIATE CHAINAGE
2327.967	369878.609	6330176.985	9°10' HORIZ. DEFLECTION
2357.845	369849.236	6330171.517	66°03' HORIZ. DEFLECTION
2382.415	369843.543	6330147.616	6°57' HORIZ. DEFLECTION
2392.839	369839.917	6330137.843	8°27' HORIZ. DEFLECTION
2430.791	369821.631	6330104.586	5°01' HORIZ. DEFLECTION
2464.320	369802.974	6330076.728	INTERMEDIATE CHAINAGE
2516.628	369776.262	6330031.755	INTERMEDIATE CHAINAGE
2569.048	369749.189	6329986.866	17°00' HORIZ. DEFLECTION – SCOUR
2589.951	369733.633	6329972.905	9°48' HORIZ. DEFLECTION
2597.161	369727.526	6329969.073	16°21' HORIZ. DEFLECTION
2611.064	369714.145	6329965.295	9°35' HORIZ. DEFLECTION
2629.912	369695.407	6329963.266	9°26' HORIZ. DEFLECTION
2648.094	369677.254	6329964.296	INTERMEDIATE CHAINAGE
2716.937	369608.412	6329964.358	INTERMEDIATE CHAINAGE
2737.219	369588.132	6329964.079	INTERMEDIATE CHAINAGE
2755.576	369569.778	6329963.692	INTERMEDIATE CHAINAGE
2771.046	369554.356	6329962.476	25°23' HORIZ. DEFLECTION
2787.299	369540.266	6329954.376	AIR VALVE – REFER TO DRG–041
2797.624	369531.043	6329949.734	9°16' HORIZ. DEFLECTION
2827.603	369506.781	6329932.124	INTERMEDIATE CHAINAGE
2863.615	369477.236	6329911.533	INTERMEDIATE CHAINAGE
2914.241	369437.204	6329880.543	INTERMEDIATE CHAINAGE
2949.046	369409.048	6329860.083	INTERMEDIATE CHAINAGE
2966.474	369395.528	6329849.086	39°24' HORIZ. DEFLECTION
2976.365	369393.561	6329839.392	7°02' HORIZ. DEFLECTION
3023.672	369378.547	6329794.531	SCOUR – REFER TO DRG–041
3065.005	369365.220	6329755.405	11°29' HORIZ. DEFLECTION
3091.970	369361.780	6329728.661	19°15' HORIZ. DEFLECTION
3121.389	369348.616	6329702.352	INTERMEDIATE CHAINAGE
3157.446	369331.039	6329670.869	16°50' HORIZ. DEFLECTION
3206.829	369320.486	6329622.627	17°42' HORIZ. DEFLECTION
3214.384	369321.191	6329615.105	INTERMEDIATE CHAINAGE
3232.759	369323.525	6329596.878	12°32' HORIZ. DEFLECTION
3242.418	369322.643	6329587.260	16°57' HORIZ. DEFLECTION
3258.568	369316.541	6329572.307	12°11' HORIZ. DEFLECTION
3303.237	369308.771	6329528.319	INTERMEDIATE CHAINAGE
3332.512	369302.301	6329499.767	INTERMEDIATE CHAINAGE
3343.669	369300.160	6329488.818	45°22' HORIZ. DEFLECTION
3351.466	369304.554	6329482.377	22°03' HORIZ. DEFLECTION
3356.942	369305.716	6329477.026	58°03' HORIZ. DEFLECTION – AV
3376.781	369291.492	6329463.195	INTERMEDIATE CHAINAGE
3396.390	369277.155	6329449.818	35°54' HORIZ. DEFLECTION
3403.594	369270.006	6329448.926	17°13' HORIZ. DEFLECTION
3463.857	369210.679	6329459.506	23°51' HORIZ. DEFLECTION
3477.146	369197.770	6329456.348	35°58' HORIZ. DEFLECTION – SCOUR
3507.841	369177.922	6329432.935	8°42' HORIZ. DEFLECTION
3533.396	369158.636	6329416.168	23°50' HORIZ. DEFLECTION
3550.938	369141.876	6329410.989	11°40' HORIZ. DEFLECTION
3566.429	369126.457	6329409.502	7°02' HORIZ. DEFLECTION
3579.675	369113.215	6329409.855	10°08' HORIZ. DEFLECTION
3604.318	369088.849	6329406.170	9°21' HORIZ. DEFLECTION
3620.183	369073.756	6329401.281	INTERMEDIATE CHAINAGE
3644.958	369050.607	6329392.453	7°40' HORIZ. DEFLECTION
3665.291	369030.813	6329387.806	INTERMEDIATE CHAINAGE
3680.470	369015.984	6329384.564	19°57' HORIZ. DEFLECTION
3719.104	368983.320	6329363.933	26°19' HORIZ. DEFLECTION
3741.516	368961.029	6329361.609	15°24' HORIZ. DEFLECTION
3765.218	368938.954	6329352.978	10°29' HORIZ. DEFLECTION
3798.899	368910.342	6329335.208	9°36' HORIZ. DEFLECTION
3845.247	368875.595	6329304.535	17°06' HORIZ. DEFLECTION
3891.844	368833.140	6329285.332	9°27' HORIZ. DEFLECTION
3941.803	368791.621	6329257.545	5°34' HORIZ. DEFLECTION
3970.464	368766.369	6329243.988	11°21' HORIZ. DEFLECTION
4013.513	368725.176	6329231.484	16°43' HORIZ. DEFLECTION
4041.046	368697.643	6329231.402	19°51' HORIZ. DEFLECTION
4065.157	368674.941	6329239.521	15°17' HORIZ. DEFLECTION
4097.043	368643.149	6329241.967	5°52' HORIZ. DEFLECTION – AV
4139.480	368600.726	6329240.883	SCOUR – REFER TO DRG–041
4177.182	368563.025	6329241.287	14°33' HORIZ. DEFLECTION
4208.408	368532.720	6329233.763	INTERMEDIATE CHAINAGE
4220.278	368521.416	6329230.140	15°29' HORIZ. DEFLECTION
4260.494	368487.785	6329208.087	INTERMEDIATE CHAINAGE
4311.267	368446.030	6329179.201	INTERMEDIATE CHAINAGE
4357.218	368408.027	6329153.371	INTERMEDIATE CHAINAGE
4387.095	368383.935	6329135.701	INTERMEDIATE CHAINAGE
4409.508	368366.434	6329121.698	INTERMEDIATE CHAINAGE
4423.509	368356.056	6329112.300	6°58' HORIZ. DEFLECTION
4433.145	368349.749	6329105.015	19°00' HORIZ. DEFLECTION
4457.642	368340.620	6329082.283	6°36' HORIZ. DEFLECTION
4486.248	368333.076	6329054.689	INTERMEDIATE CHAINAGE
4511.480	368325.799	6329030.530	INTERMEDIATE CHAINAGE
4536.715	368318.605	6329006.341	INTERMEDIATE CHAINAGE
4575.149	368308.088	6328969.374	7°24' HORIZ. DEFLECTION
4603.066	368303.974	6328941.762	INTERMEDIATE CHAINAGE
4617.622	368301.774	6328927.374	30°13' HORIZ. DEFLECTION
4640.595	368287.363	6328909.517	AIR VALVE – REFER TO DRG–041
4643.569	368285.479	6328907.182	49°15' HORIZ. DEFLECTION
4647.259	368281.789	6328907.064	PSV – REFER TO DRG–046
4650.952	368275.400	6328907.009	93°39' HORIZ. DEFLECTION
4653.649	368278.184	6328909.641	AIR VALVE – REFER TO DRG–041
4680.799	368275.618	6328937.040	INTERMEDIATE CHAINAGE
4903.309	368297.629	6329158.337	INTERMEDIATE CHAINAGE
4947.239	368305.627	6329198.136	SCOUR – REFER TO DRG–041

SURPLUS RECYCLED WATER MAIN SETOUT

CHAINAGE	EASTING	NORTHING	DESCRIPTION
4994.594	368315.381	6329247.880	INTERMEDIATE CHAINAGE
5004.817	368317.385	6329257.904	INTERMEDIATE CHAINAGE
5024.933	368321.458	6329277.604	INTERMEDIATE CHAINAGE
5045.171	368325.435	6329297.447	INTERMEDIATE CHAINAGE
5055.536	368327.343	6329307.634	AIR VALVE – REFER TO DRG–041
5068.566	368329.493	6329320.486	INTERMEDIATE CHAINAGE
5071.134	368329.906	6329323.020	INTERMEDIATE CHAINAGE
5075.773	368330.315	6329327.641	INTERMEDIATE CHAINAGE
5086.217	368331.553	6329338.012	INTERMEDIATE CHAINAGE
5096.500	368332.395	6329348.261	INTERMEDIATE CHAINAGE
5106.898	368333.055	6329358.637	INTERMEDIATE CHAINAGE
5117.072	368333.645	6329368.795	INTERMEDIATE CHAINAGE
5147.800	368334.701	6329399.504	INTERMEDIATE CHAINAGE
5178.479	368335.489	6329430.173	INTERMEDIATE CHAINAGE
5209.037	368336.269	6329460.721	INTERMEDIATE CHAINAGE
5229.244	368336.875	6329480.919	INTERMEDIATE CHAINAGE
5231.699	368336.831	6329483.373	INTERMEDIATE CHAINAGE
5244.237	368337.153	6329495.907	12°06' HORIZ. DEFLECTION
5254.501	368339.563	6329505.885	9°00' HORIZ. DEFLECTION
5263.697	368340.297	6329515.052	INTERMEDIATE CHAINAGE
5273.859	368340.635	6329525.207	INTERMEDIATE CHAINAGE
5283.937	368340.683	6329535.285	INTERMEDIATE CHAINAGE
5293.896	368340.749	6329545.245	INTERMEDIATE CHAINAGE
5301.248	368340.319	6329552.583	8°47' HORIZ. DEFLECTION
5309.163	368338.654	6329560.321	13°14' HORIZ. DEFLECTION
5318.498	368338.832	6329569.655	INTERMEDIATE CHAINAGE
5320.929	368338.913	6329572.085	INTERMEDIATE CHAINAGE
5351.235	368339.532	6329602.385	INTERMEDIATE CHAINAGE
5380.765	368340.197	6329631.907	INTERMEDIATE CHAINAGE
5410.873	368340.865	6329662.007	INTERMEDIATE CHAINAGE
5430.750	368341.241	6329681.881	INTERMEDIATE CHAINAGE
5461.152	368341.739	6329712.279	INTERMEDIATE CHAINAGE
5491.485	368342.206	6329742.608	INTERMEDIATE CHAINAGE
5521.496	368342.534	6329772.617	INTERMEDIATE CHAINAGE
5550.424	368343.069	6329801.540	INTERMEDIATE CHAINAGE
5560.901	368343.253	6329812.015	INTERMEDIATE CHAINAGE
5571.021	368343.325	6329822.135	INTERMEDIATE CHAINAGE
5581.097	368343.301	6329832.211	INTERMEDIATE CHAINAGE
5591.338	368343.010	6329842.448	INTERMEDIATE CHAINAGE
5601.325	368342.346	6329852.414	INTERMEDIATE CHAINAGE
5611.299	368341.134	6329862.313	INTERMEDIATE CHAINAGE
5621.420	368339.303	6329872.267	INTERMEDIATE CHAINAGE
5631.480	368336.990	6329882.058	INTERMEDIATE CHAINAGE
5641.454	368334.248	6329891.647	INTERMEDIATE CHAINAGE
5651.506	368331.048	6329901.177	INTERMEDIATE CHAINAGE
5661.570	368327.527	6329910.604	INTERMEDIATE CHAINAGE
5671.296	368323.917	6329919.636	INTERMEDIATE CHAINAGE
5677.997	368321.415	6329925.852	INTERMEDIATE CHAINAGE
5680.253	368320.752	6329928.008	INTERMEDIATE CHAINAGE
5688.688	368317.602	6329935.834	INTERMEDIATE CHAINAGE
5697.708	368314.167	6329944.173	INTERMEDIATE CHAINAGE
5699.907	368313.270	6329946.181	INTERMEDIATE CHAINAGE
5710.414	368309.166	6329955.853	INTERMEDIATE CHAINAGE
5720.384	368304.992	6329964.908	INTERMEDIATE CHAINAGE
5730.628	368300.461	6329974.095	INTERMEDIATE CHAINAGE
5740.772	368295.738	6329983.073	INTERMEDIATE CHAINAGE
5750.728	368290.816	6329991.727	INTERMEDIATE CHAINAGE
5760.657	368285.631	6330000.195	INTERMEDIATE CHAINAGE
5781.081	368274.158	6330017.092	SCOUR – REFER TO DRG–041
5791.566	368267.957	6330025.546	INTERMEDIATE CHAINAGE
5801.737	368261.875	6330033.699	INTERMEDIATE CHAINAGE
5812.200	368255.591	6330042.064	INTERMEDIATE CHAINAGE
5822.394	368249.455	6330050.204	INTERMEDIATE CHAINAGE
5832.893	368243.090	6330058.554	INTERMEDIATE CHAINAGE
5843.048	368236.951	6330066.644	INTERMEDIATE CHAINAGE
5853.034	368230.885	6330074.576	INTERMEDIATE CHAINAGE
5863.199	368224.709	6330082.650	INTERMEDIATE CHAINAGE
5873.291	368218.588	6330090.674	INTERMEDIATE CHAINAGE
5883.198	368212.575	6330098.547	INTERMEDIATE CHAINAGE
5893.293	368206.446	6330106.569	INTERMEDIATE CHAINAGE
5903.452	368200.269	6330114.634	INTERMEDIATE CHAINAGE
5913.465	368194.155	6330122.564	AIR VALVE – REFER TO DRG–041
5924.197	368187.639	6330131.091	INTERMEDIATE CHAINAGE
5934.524	368181.387	6330139.311	INTERMEDIATE CHAINAGE
5944.845	368175.084	6330147.483	INTERMEDIATE CHAINAGE
5954.962	368169.102	6330155.642	INTERMEDIATE CHAINAGE
5965.253	368163.094	6330163.997	INTERMEDIATE CHAINAGE
5975.511	368157.598	6330172.659	INTERMEDIATE CHAINAGE
5985.610	368152.917	6330181.608	INTERMEDIATE CHAINAGE
5995.600	368148.655	6330190.642	INTERMEDIATE CHAINAGE
6005.588	368145.001	6330199.939	INTERMEDIATE CHAINAGE
6015.324	368141.951	6330209.184	INTERMEDIATE CHAINAGE
6025.115	368139.062	6330218.539	INTERMEDIATE CHAINAGE
6035.198	368136.117	6330228.183	INTERMEDIATE CHAINAGE
6045.129	368133.539	6330237.773	INTERMEDIATE CHAINAGE
6055.433	368130.791	6330247.704	INTERMEDIATE CHAINAGE
6065.682	368128.137	6330257.604	INTERMEDIATE CHAINAGE
6075.415	368125.589	6330266.997	INTERMEDIATE CHAINAGE
6085.617	368122.952	6330276.852	SCOUR – REFER TO DRG–041
6095.939	368120.314	6330286.832	INTERMEDIATE CHAINAGE
6106.194	368117.651	6330296.735	INTERMEDIATE CHAINAGE
6115.917	368115.105	6330306.119	INTERMEDIATE CHAINAGE
6126.043	368112.483	6330315.900	INTERMEDIATE CHAINAGE
6135.940	368109.875	6330325.446	INTERMEDIATE CHAINAGE
6145.945	368107.302	6330335.114	INTERMEDIATE CHAINAGE
6157.315	368104.507	6330346.136	INTERMEDIATE CHAINAGE
6173.283	368100.365	6330361.558	INTERMEDIATE CHAINAGE
6184.512	368097.482	6330372.409	INTERMEDIATE CHAINAGE
6187.043	368096.857	6330374.863	INTERMEDIATE CHAINAGE
6197.175	368094.209	6330384.642	INTERMEDIATE CHAINAGE
6207.358	368091.541	6330394.469	INTERMEDIATE CHAINAGE

SURPLUS RECYCLED WATER MAIN SETOUT

CHAINAGE	EASTING	NORTHING	DESCRIPTION
6216.907	368089.021	6330403.680	INTERMEDIATE CHAINAGE
6224.910	368087.007	6330411.425	INTERMEDIATE CHAINAGE
6227.312	368086.402	6330413.750	INTERMEDIATE CHAINAGE
6239.484	368083.184	6330425.489	INTERMEDIATE CHAINAGE
6251.988	368079.972	6330437.574	INTERMEDIATE CHAINAGE
6265.252	368076.557	6330450.390	INTERMEDIATE CHAINAGE
6277.096	368073.542	6330461.844	INTERMEDIATE CHAINAGE
6288.187	368070.667	6330472.556	INTERMEDIATE CHAINAGE
6301.524	368067.177	6330485.428	INTERMEDIATE CHAINAGE
6310.726	368064.736	6330494.300	INTERMEDIATE CHAINAGE
6318.942	368062.447	6330502.191	INTERMEDIATE CHAINAGE
6328.207	368059.816	6330511.075	INTERMEDIATE CHAINAGE
6337.127	368057.040	6330519.552	INTERMEDIATE CHAINAGE
6345.669	368054.288	6330527.638	INTERMEDIATE CHAINAGE
6347.239	368053.730	6330529.105	AIR VALVE – REFER TO DRG–041
6359.927	368049.215	6330540.964	INTERMEDIATE CHAINAGE
6373.434	368044.200	6330553.505	INTERMEDIATE CHAINAGE
6386.317	368039.275	6330565.409	INTERMEDIATE CHAINAGE
6400.615	368033.709	6330578.580	INTERMEDIATE CHAINAGE
6411.119	368029.618	6330588.253	INTERMEDIATE CHAINAGE
6421.332	368025.622	6330597.653	INTERMEDIATE CHAINAGE
6432.497	368021.242	6330607.922	INTERMEDIATE CHAINAGE
6446.927	368015.528	6330621.174	INTERMEDIATE CHAINAGE
6457.145	368011.455	6330630.544	INTERMEDIATE CHAINAGE
6470.910	368005.978	6330643.174	INTERMEDIATE CHAINAGE
6483.674	368000.869	6330654.870	INTERMEDIATE CHAINAGE
6496.039	367995.849	6330666.170	INTERMEDIATE CHAINAGE
6504.547	367992.430	6330673.961	SCOUR – REFER TO DRG–041
6518.714	367986.730	6330686.931	INTERMEDIATE CHAINAGE
6528.812	367982.699	6330696.189	INTERMEDIATE CHAINAGE
6539.078	367978.803	6330705.687	INTERMEDIATE CHAINAGE
6549.225	367974.556	6330714.902	INTERMEDIATE CHAINAGE
6558.921	367970.700	6330723.799	INTERMEDIATE CHAINAGE
6568.952	367966.661	6330732.981	INTERMEDIATE CHAINAGE
6589.957	367958.262	6330752.233	INTERMEDIATE CHAINAGE
6600.200	367954.160	6330761.619	INTERMEDIATE CHAINAGE
6610.914	367949.881	6330771.441	INTERMEDIATE CHAINAGE
6642.948	367937.130	6330800.829	INTERMEDIATE CHAINAGE
6653.741	367932.870	6330810.745	INTERMEDIATE CHAINAGE
6664.103	367928.722	6330820.240	INTERMEDIATE CHAINAGE
6674.968	367924.222	6330830.130	INTERMEDIATE CHAINAGE
6685.620	367919.717	6330839.783	INTERMEDIATE CHAINAGE
6695.990	367915.305	6330849.168	INTERMEDIATE CHAINAGE
6706.256	367910.705	6330858.345	INTERMEDIATE CHAINAGE
6716.017	367906.088	6330866.945	INTERMEDIATE CHAINAGE
6726.037	367900.917	6330875.527	INTERMEDIATE CHAINAGE
6735.877	367895.424	6330883.692	INTERMEDIATE CHAINAGE
6745.649	367889.573	6330891.519	INTERMEDIATE CHAINAGE
6755.799	367883.211	6330899.426	INTERMEDIATE CHAINAGE
6795.284	367857.802	6330929.651	INTERMEDIATE CHAINAGE
6824.927	367838.803	6330952.404	INTERMEDIATE CHAINAGE
6845.375	367825.609	6330968.026	INTERMEDIATE CHAINAGE
6855.728	367818.870	6330975.885	INTERMEDIATE CHAINAGE
6865.658	367812.307	6330983.337	INTERMEDIATE CHAINAGE
6875.587	367805.603	6330990.661	INTERMEDIATE CHAINAGE
6885.387	367798.868	6330997.780	INTERMEDIATE CHAINAGE
6895.003	367792.057	6331004.569	INTERMEDIATE CHAINAGE
6904.801	367784.869	6331011.227	INTERMEDIATE CHAINAGE
6914.505	367777.551	6331017.600	INTERMEDIATE CHAINAGE
6924.327	367769.973	6331023.849	INTERMEDIATE CHAINAGE
6934.390	367762.152	6331030.181	INTERMEDIATE CHAINAGE
6944.223	367754.469	6331036.317	INTERMEDIATE CHAINAGE
6954.206	367746.641	6331042.512	INTERMEDIATE CHAINAGE
6964.061	367738.860	6331048.561	INTERMEDIATE CHAINAGE
6973.983	367731.029	6331054.653	INTERMEDIATE CHAINAGE
6983.878	367723.239	6331060.755	INTERMEDIATE CHAINAGE
6993.905	367715.227	6331066.783	INTERMEDIATE CHAINAGE
7000.809	367709.619	6331070.810	INTERMEDIATE CHAINAGE
7011.600	367700.650	6331076.812	INTERMEDIATE CHAINAGE
7023.051	367690.762	6331082.585	INTERMEDIATE CHAINAGE
7032.711	367682.084	6331086.831	INTERMEDIATE CHAINAGE
7042.624	367672.902	6331090.566	INTERMEDIATE CHAINAGE
7052.143	367663.892	6331093.638	AIR VALVE – REFER TO DRG–041
7063.770	367652.714	6331096.835	INTERMEDIATE CHAINAGE
7074.946	367641.934	6331099.783	INTERMEDIATE CHAINAGE
7085.050	367632.194	6331102.473	INTERMEDIATE CHAINAGE
7095.258	367622.360	6331105.210	INTERMEDIATE CHAINAGE
7106.662	367611.414	6331108.409	INTERMEDIATE CHAINAGE
7114.895	367603.545	6331110.829	INTERMEDIATE CHAINAGE
7124.661	367594.337	6331114.086	INTERMEDIATE CHAINAGE
7134.971	367584.796	6331117.992	INTERMEDIATE CHAINAGE
7143.319	367577.314	6331121.695	INTERMEDIATE CHAINAGE
7147.239	367574.708	6331123.220	SCOUR – REFER TO DRG–041
7152.279	367569.597	6331126.247	INTERMEDIATE CHAINAGE
7177.910	367548.422	6331140.689	INTERMEDIATE CHAINAGE
7198.527	367531.688	6331152.732	INTERMEDIATE CHAINAGE
7218.685	367515.279	6331164.441	13°54' HORIZ. DEFLECTION
7221.342	367512.809	6331165.420	13°57' HORIZ. DEFLECTION
7233.822	367502.657	6331172.680	INTERMEDIATE CHAINAGE
7243.693	367494.646	6331178.445	INTERMEDIATE CHAINAGE
7254.661	367485.784	6331184.908	INTERMEDIATE CHAINAGE
7263.707	367478.542	6331190.328	INTERMEDIATE CHAINAGE
7274.542	367469.955	6331196.935	INTERMEDIATE CHAINAGE
7284.962	367461.704	6331203.300	INTERMEDIATE CHAINAGE
7292.431	367456.023	6331208.149	INTERMEDIATE CHAINAGE
7303.058	367448.170	6331215.309	INTERMEDIATE CHAINAGE
7313.736	367440.361	6331222.591	5°46' HORIZ. DEFLECTION
7323.917	367433.651	6331230.249	INTERMEDIATE CHAINAGE
7334.109	367427.617	6331238.461	5°15' HORIZ. DEFLECTION
7344.535	367422.238	6331247.393	6°04' HORIZ. DEFLECTION
7354.771	367417.914	6331256.671	INTERMEDIATE CHAINAGE

SURPLUS RECYCLED WATER MAIN SETOUT

CHAINAGE	EASTING	NORTHING	DESCRIPTION
7365.143	367414.327	6331266.403	INTERMEDIATE CHAINAGE
7375.597	367411.346	6331276.424	INTERMEDIATE CHAINAGE
7386.229	367408.796	6331286.745	INTERMEDIATE CHAINAGE
7389.446	367408.045	6331289.873	INTERMEDIATE CHAINAGE
7399.479	367405.755	6331299.641	INTERMEDIATE CHAINAGE
7409.541	367403.546	6331309.458	INTERMEDIATE CHAINAGE
7419.429	367402.279	6331319.264	INTERMEDIATE CHAINAGE
7429.119	367400.636	6331328.814	INTERMEDIATE CHAINAGE
7436.948	367399.662	6331336.582	10°52' HORIZ. DEFLECTION
7437.664	367399.709	6331337.297	43°32' HORIZ. DEFLECTION
7438.815	367398.971	6331338.181	18°21' HORIZ. DEFLECTION
7439.748	367398.630	6331339.049	14°41' HORIZ. DEFLECTION
7444.748	367398.039	6331344.014	6°44' HORIZ. DEFLECTION
7449.934	367398.034	6331349.200	7°05' HORIZ. DEFLECTION
7454.239	367398.561	6331353.472	AIR VALVE – REFER TO DRG–041
7455.101	367398.666	6331354.328	5°33' HORIZ. DEFLECTION
7460.121	367399.850	6331359.206	INTERMEDIATE CHAINAGE
7465.366	367401.575	6331364.160	INTERMEDIATE CHAINAGE
7470.456	367403.527	6331368.861	INTERMEDIATE CHAINAGE
7475.611	367405.602	6331373.580	INTERMEDIATE CHAINAGE
7480.892	367407.336	6331378.568	14°41' HORIZ. DEFLECTION
7485.991	367407.736	6331383.651	11°12' HORIZ. DEFLECTION
7491.244	367407.122	6331388.867	INTERMEDIATE CHAINAGE
7496.311	367406.496	6331393.896	5°17' HORIZ. DEFLECTION
7501.588	367406.329	6331399.170	8°48' HORIZ. DEFLECTION
7506.743	367406.956	6331404.287	8°43' HORIZ. DEFLECTION
7512.270	367408.453	6331409.608	77°28' HORIZ. DEFLECTION – SCOUR
7523.967	367398.148	6331415.142	86°02' HORIZ. DEFLECTION
7530.318	367394.763	6331409.769	5°43' HORIZ. DEFLECTION
7535.606	367391.513	6331405.597	5°18' HORIZ. DEFLECTION
7541.097	367387.753	6331401.596	8°39' HORIZ. DEFLECTION
7546.297	367383.662	6331398.385	14°05' HORIZ. DEFLECTION
7551.294	367379.099	6331396.349	11°37' HORIZ. DEFLECTION
7556.370	367374.142	6331395.258	5°08' HORIZ. DEFLECTION
7560.144	367370.398	6331394.779	INTERMEDIATE CHAINAGE
7562.714	367367.831	6331394.670	AIR VALVE – REFER TO DRG–041
7566.737	367363.807	6331394.657	INTERMEDIATE CHAINAGE
7571.865	367358.693	6331395.031	6°12' HORIZ. DEFLECTION
7577.203	367353.442	6331395.994	17°06' HORIZ. DEFLECTION
7578.192	367352.565	6331396.450	13°06' HORIZ. DEFLECTION
7579.305	367351.720	6331397.175	33°56' HORIZ. DEFLECTION
7592.226	367338.914	6331398.892	INTERMEDIATE CHAINAGE
7603.050	367328.219	6331400.559	INTERMEDIATE CHAINAGE
7614.208	367317.167	6331402.099	INTERMEDIATE CHAINAGE
7618.188	367313.215	6331402.560	INTERMEDIATE CHAINAGE
7629.885	367301.653	6331404.337	11°24' HORIZ. DEFLECTION
7632.436	367299.105	6331404.219	10°43' HORIZ. DEFLECTION
7643.427	367288.222	6331405.759	INTERMEDIATE CHAINAGE
7660.986	367270.828	6331408.159	INTERMEDIATE CHAINAGE
7674.504	367257.447	6331410.079	INTERMEDIATE CHAINAGE
7685.813	367246.223	6331411.462	INTERMEDIATE CHAINAGE
7697.560	367234.574	6331412.974	INTERMEDIATE CHAINAGE
7699.127	367233.034	6331413.270	7°48' HORIZ. DEFLECTION
7699.720	367232.473	6331413.460	48°04' HORIZ. DEFLECTION
7706.198	367229.915	6331419.411	7°41' HORIZ. DEFLECTION
7707.126	367229.666	6331420.305	ISOLATION VALVE
7708.053	367229.417	6331421.198	5°06' HORIZ. DEFLECTION
7708.809	367229.280	6331421.941	10°13' HORIZ. DEFLECTION
7709.564	367229.277	6331422.697	5°06' HORIZ. DEFLECTION
7725.956	367230.662	6331439.030	13°36' HORIZ. DEFLECTION
7730.912	367229.908	6331443.929	INTERMEDIATE CHAINAGE
7740.229	367228.127	6331453.074	9°58' HORIZ. DEFLECTION
7742.224	367227.412	6331454.936	19°57' HORIZ. DEFLECTION
7744.219	367226.105	6331456.443	9°58' HORIZ. DEFLECTION
7756.719	367216.404	6331464.326	INTERMEDIATE CHAINAGE
7766.803	367208.578	6331470.684	9°30' HORIZ. DEFLECTION
7768.286	367207.597	6331471.797	9°30' HORIZ. DEFLECTION
7773.430	367204.877	6331476.164	6°51' HORIZ. DEFLECTION
7774.442	367204.448	6331477.080	13°42' HORIZ. DEFLECTION
7775.454	367204.249	6331478.072	6°51' HORIZ. DEFLECTION
7779.486	367203.930	6331482.091	INTERMEDIATE CHAINAGE
7780.813	367203.933	6331483.419	INTERMEDIATE CHAINAGE
7793.069	367203.955	6331495.674	INTERMEDIATE CHAINAGE
7805.782	367204.379	6331508.380	INTERMEDIATE CHAINAGE
7830.785	367205.213	6331533.369	INTERMEDIATE CHAINAGE
7845.882	367205.612	6331548.461	INTERMEDIATE CHAINAGE
7853.481	367206.244	6331556.034	5°45' HORIZ. DEFLECTION
7856.271	367206.754	6331558.777	8°06' HORIZ. DEFLECTION
7857.517	367207.152	6331559.958	7°58' HORIZ. DEFLECTION
7860.955	367208.691	6331563.032	10°30' HORIZ. DEFLECTION
7862.589	367209.677	6331564.335	10°56' HORIZ. DEFLECTION
7865.480	367211.826	6331566.268	10°39' HORIZ. DEFLECTION – SCOUR
7870.927	367216.480	6331569.099	8°00' HORIZ. DEFLECTION
7879.628	367224.471	6331572.543	INTERMEDIATE CHAINAGE
7903.112	367246.135	6331581.608	28°22' HORIZ. DEFLECTION
7905.452	367248.463	6331581.377	28°18' HORIZ. DEFLECTION
7928.495	367267.574	6331568.505	INTERMEDIATE CHAINAGE
7932.794	367271.140	6331566.103	11°30' HORIZ. DEFLECTION
7935.804	367273.921	6331564.954	DIRECT BURIED FLOWMETER
7938.304	367276.183	6331564.018	NON–RETURN VALVE
7940.804	367278.542	6331563.043	CONNECTION TO GSTP INLET WORKS

DIAL 1100
BEFORE YOU DIG

NOTES:

1. ALL COORDINATES ARE MGA ZONE 56.
2. CHAINAGES SHOWN AS INTERMEDIATE ARE THOSE WITH LESS THAN 5 DEGREES HORIZONTAL DEFLECTION.

CONSTRUCTION ISSUE

50mm AT FULL SIZE

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
A	20.11.2018	PRELIMINARY ISSUE	J.N.	R.J.	H.M.	C.B.
B	01.04.2019	AMENDED ISSUE	J.N.	R.J.	H.M.	C.B.
C	03.05.2019	NPWS ISSUE	S.HO.	R.J.	H.M.	C.B.
D	04.07.2019	AMENDED NPWS ISSUE NPWS COMMENTS	J.N.	R.J.	H.M.	C.B.
E	08.07.2019	AMENDED NPWS ISSUE	J.N.	R.J.	H.M.	C.B.
F	02.09.2019	AMENDED NPWS ISSUE – CLIENT COMMENTS	J.N.	R.J.	H.M.	C.B.
G	06.09.2019	ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.
H	17.09.2019	RE ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.

SCALES

DESIGN FILE S:\190238\Design\12D\WWPS CONCEPT DESIGN

ALL DIMENSIONS ARE IN METRES. DO NOT SCALE

adw johnson
Hunter Office
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email: hunter@adwjohnson.com.au
www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT
ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

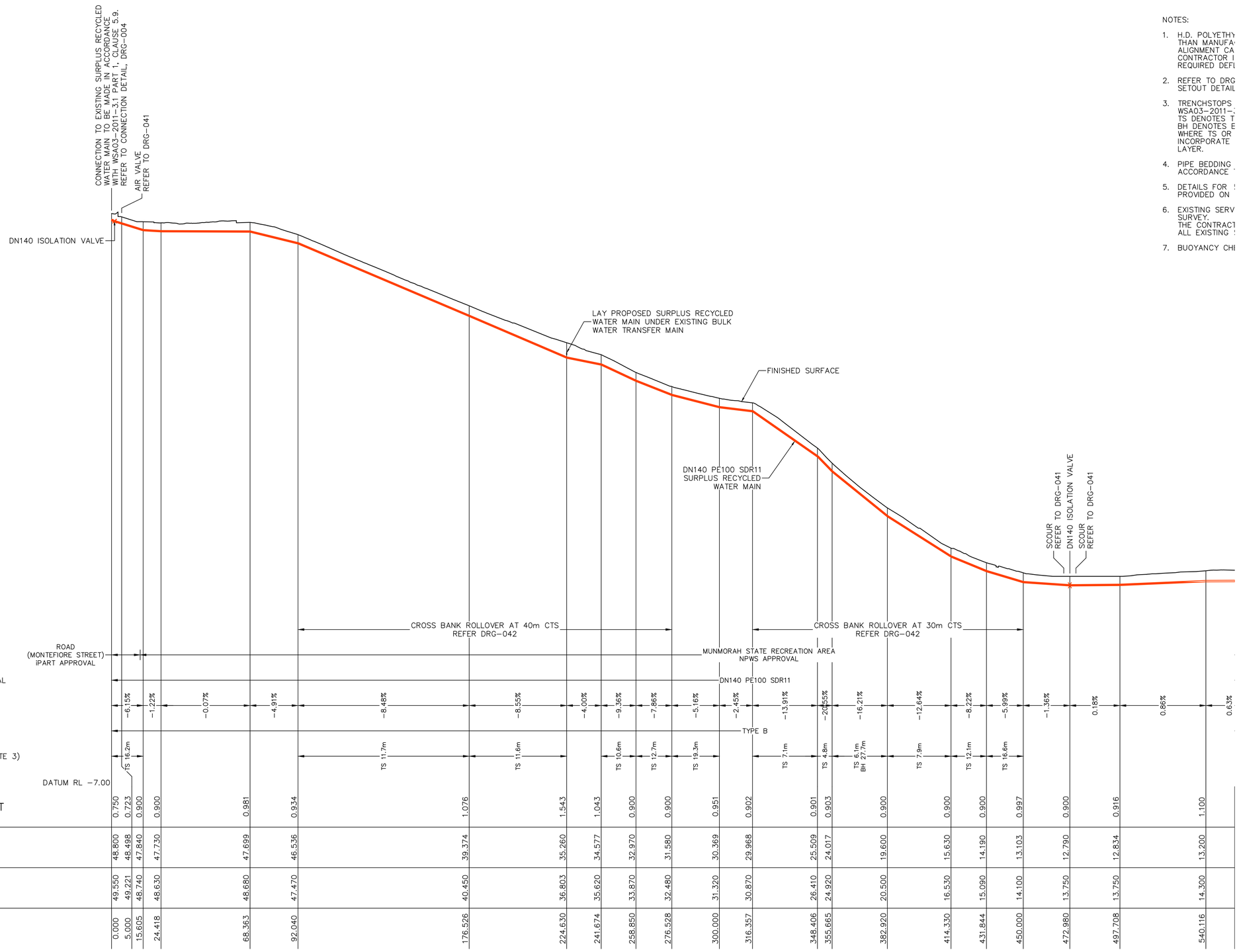
SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT: SURPLUS RECYCLED WATER MAIN

PLAN TITLE: SURPLUS RECYCLED WATER MAIN SETOUT TABLE

PROJECT No.	DISCIPLINE	NUMBER	REV.
11688(13)NPWS –	RWAT –	026	H

11688(13)NPWS-RWAT-027 to 039(H)



LONGITUDINAL SECTION – SURPLUS RECYCLED WATER MAIN (CH. 0.000 TO CH. 635.000)

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200

NOTES:

1. H.D. POLYETHY THAN MANUFA ALIGNMENT CA CONTRACTOR I REQUIRED DEFI
2. REFER TO DRG SETOUT DETAIL
3. TRENCHSTOPS WSA03-2011-. TS DENOTES T BH DENOTES E WHERE TS OR INCORPORATE LAYER.
4. PIPE BEDDING ACCORDANCE
5. DETAILS FOR PROVIDED ON
6. EXISTING SERV SURVEY. THE CONTRACT ALL EXISTING
7. BUOYANCY CH

50mm AT FULL SIZE

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
A	20.11.2018	PRELIMINARY ISSUE	J.N.	R.J.	H.M.	C.B.
B	01.04.2019	AMENDED ISSUE	J.N.	R.J.	H.M.	C.B.
C	03.05.2019	NPWS ISSUE	S.HO.	R.J.	H.M.	C.B.
D	04.07.2019	AMENDED NPWS ISSUE NPWS COMMENTS	J.N.	R.J.	H.M.	C.B.
E	08.07.2019	AMENDED NPWS ISSUE	J.N.	R.J.	H.M.	C.B.
F	02.09.2019	AMENDED NPWS ISSUE – CLIENT COMMENTS	J.N.	R.J.	H.M.	C.B.
G	06.09.2019	ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.
H	17.09.2019	RE ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.

DESIGN FILE S:\190238\Design\12D\WWPS CONCEPT DESIGN

SCALES

ALL DIMENSIONS ARE IN METRES. DO NOT SCALE

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www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT

ROSE

PROPERTY DESCRIPTION

SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED ADWJ

DATUM A.H.D.

PROJECT

PLAN TITLE

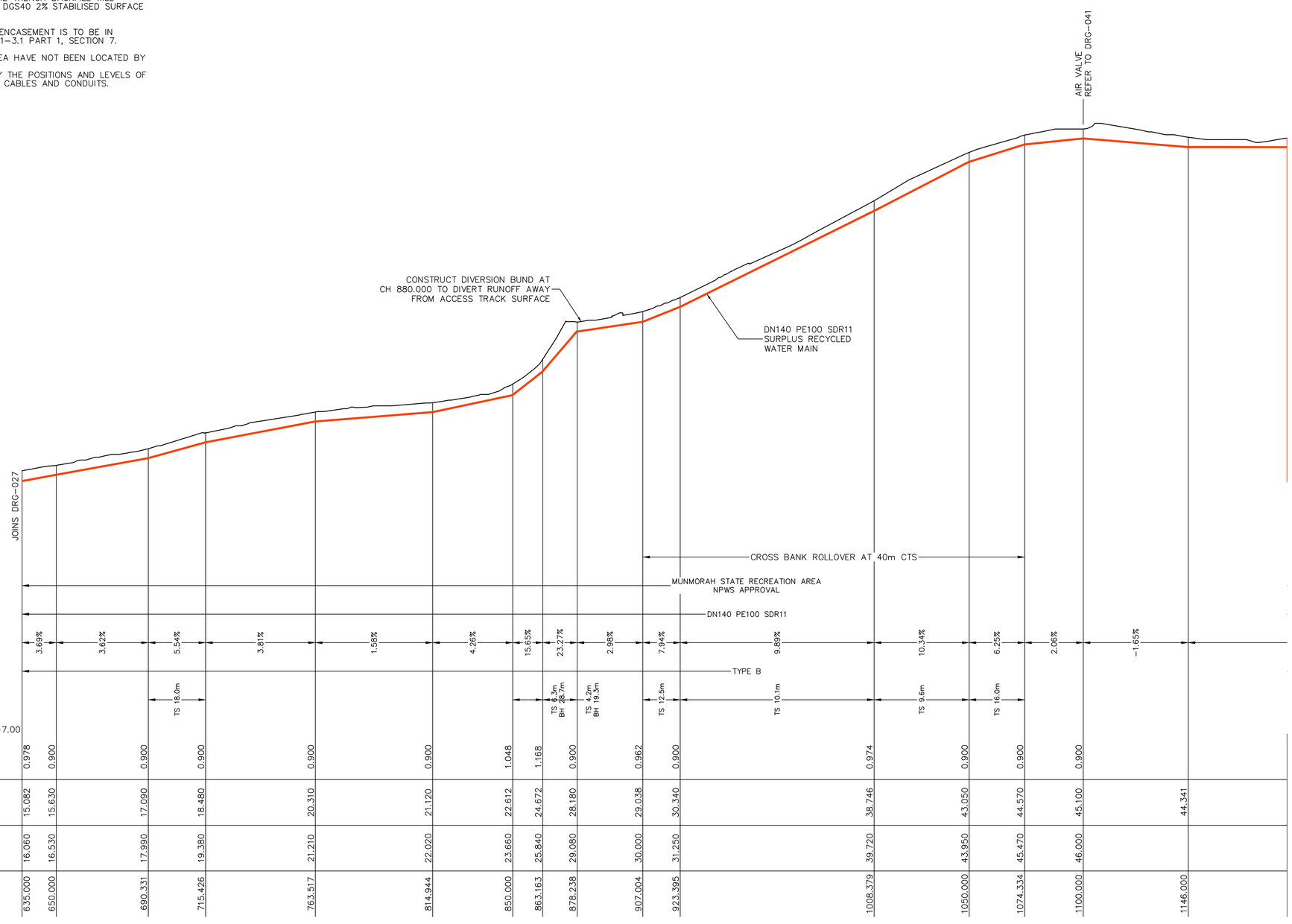
PROJECT No. 11688(13

Plotted By: jaysonn Plot Date: 18/09/19 – 10:26 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) – Issue H (NPWS)\11688(13)NPWS-RWAT-027 to 039(H).dwg

11688(13)NPWS-RWAT-027 to 039(H)

NOTES:

1. H.D. POLYETHYLENE PIPE SHALL NOT BE BENT TO A RADIUS LESS THAN MANUFACTURERS RECOMMENDATIONS. IF THE PROPOSED ALIGNMENT CAN NOT BE ACHIEVED BY BENDING THE PIPE THE CONTRACTOR IS TO USE ELECTROFUSION FITTINGS TO ACHIEVE REQUIRED DEFLECTIONS.
2. REFER TO DRG-026 FOR SURPLUS RECYCLED WATER MAIN SETOUT DETAILS.
3. TRENCHSTOPS AND BULKHEADS ARE TO BE IN ACCORDANCE WITH WSA03-2011-3.1 PART 1, CLAUSE 7.10.
   TS DENOTES TRENCH STOPS.
   BH DENOTES BULKHEADS.
   WHERE TS OR BH SPECIFIED THE TRENCH BACKFILL WILL INCORPORATE A 150mm THICK DGS40 2% STABILISED SURFACE LAYER.
4. PIPE BEDDING AND CONCRETE ENCASEMENT IS TO BE IN ACCORDANCE WITH WSA03-2011-3.1 PART 1, SECTION 7.
6. EXISTING SERVICES IN THIS AREA HAVE NOT BEEN LOCATED BY SURVEY.
   THE CONTRACTOR IS TO VERIFY THE POSITIONS AND LEVELS OF ALL EXISTING SERVICES, PIPES, CABLES AND CONDUITS.



LONGITUDINAL SECTION – SURPLUS RECYCLED WATER MAIN (CH. 635.000 TO CH. 1270.000)

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200

50mm AT FULL SIZE

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
A	20.11.2018	PRELIMINARY ISSUE	J.N.	R.J.	H.M.	C.B.
B	01.04.2019	AMENDED ISSUE	J.N.	R.J.	H.M.	C.B.
C	03.05.2019	NPWS ISSUE	S.HO.	R.J.	H.M.	C.B.
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H	17.09.2019	RE ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.

SCALES

ALL DIMENSIONS ARE IN METRES. DO NOT SCALE

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ABN 62 129 445 398

CLIENT

ROSE

PROPERTY DESCRIPTION

SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED ADWJ

DATUM A.H.D.

PROJECT

PLAN TITLE

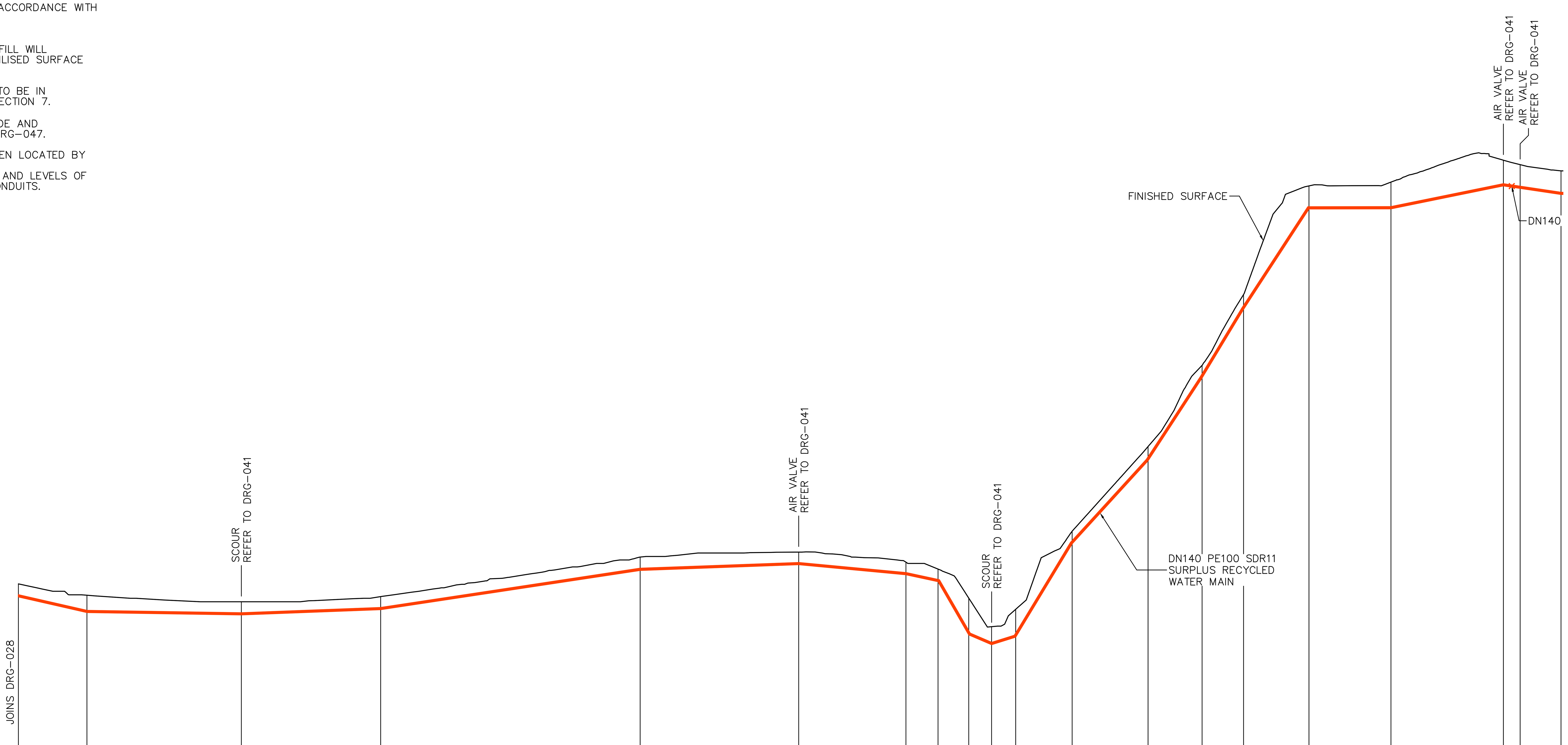
PROJECT No. 11688(13

Plotted By: jaysonn Plot Date: 18/09/19 – 10:26 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) – Issue H (NPWS)\11688(13)NPWS-RWAT-027 to 039(H).dwg

11688(13)NPWS-RWAT-027 to 039(H)

NOTES:

1. H.D. POLYETHYLENE PIPE SHALL NOT BE BENT TO A RADIUS LESS THAN MANUFACTURERS RECOMMENDATIONS. IF THE PROPOSED ALIGNMENT CAN NOT BE ACHIEVED BY BENDING THE PIPE THE CONTRACTOR IS TO USE ELECTROFUSION FITTINGS TO ACHIEVE REQUIRED DEFLECTIONS.
2. REFER TO DRG-026 FOR SURPLUS RECYCLED WATER MAIN SETOUT DETAILS.
3. TRENCHSTOPS AND BULKHEADS ARE TO BE IN ACCORDANCE WITH WSA03-2011-3.1 PART 1, CLAUSE 7.10.
   TS DENOTES TRENCH STOPS.
   BH DENOTES BULKHEADS.
   WHERE TS OR BH SPECIFIED THE TRENCH BACKFILL WILL INCORPORATE A 150mm THICK DGS40 2% STABILISED SURFACE LAYER.
4. PIPE BEDDING AND CONCRETE ENCASEMENT IS TO BE IN ACCORDANCE WITH WSA03-2011-3.1 PART 1, SECTION 7.
5. CONCRETE ENCASEMENT TO BE 'KEYED' INTO SIDE AND BASE OF TRENCH. REFER TO TYPICAL DETAIL, DRG-047.
6. EXISTING SERVICES IN THIS AREA HAVE NOT BEEN LOCATED BY SURVEY.
   THE CONTRACTOR IS TO VERIFY THE POSITIONS AND LEVELS OF ALL EXISTING SERVICES, PIPES, CABLES AND CONDUITS.



TENURE/APPROVAL: MUNMORAH STATE RECREATION AREA NPWS APPROVAL — ROAD (PACIFIC HIGHWAY) NPWS APPROVAL — LA

PIPE SIZE AND MATERIAL: DN140 PE100 SDR11

PIPELINE GRADE: -4.72% | -0.31% | 0.76% | 3.02% | 0.72% | -1.87% | -4.28% | -34.66% | -8.59% | 6.25% | 33.09% | 21.90% | 30.65% | 33.09% | 30.71% | 0.02% | 4.08% | -2.97%

BEDDING (SEE NOTE 4): TYPE B | TYPE J NOTE 5 | TYPE B | TYPE J NOTE 5 | TYPE B | TYPE J REFER NOTE 5 | TYPE B | DIRECTIONAL DRILLING

TRENCHSTOPS (SEE NOTE 3): TS 11.6m | TS 11.6m | TS 4.5m BH 20.5m | TO RMS REQUIREMENTS REFER SPECIFICATION

DATUM RL 18.00

CHAINAGE	DESIGN SURFACE	INVERT LEVEL	DEPTH TO INVERT
1270.000	44.030	43.098	0.932
1294.595	43.220	41.977	1.243
1350.000	42.750	41.807	0.943
1400.000	43.120	42.186	0.934
1493.107	45.960	45.002	0.958
1550.000	46.310	45.410	0.900
1588.482	45.590	44.690	0.900
1600.000	45.100	44.197	0.903
1611.027	43.010	40.375	2.635
1619.220	40.960	39.671	1.289
1627.888	42.210	40.213	1.997
1648.140	47.820	46.915	0.905
1675.376	53.890	52.879	1.011
1694.757	59.720	58.820	0.900
1709.644	64.810	63.746	1.064
1733.120	72.607	70.956	1.651
1762.548	72.880	70.963	1.917
1802.884	74.450	72.608	1.842
1808.884	74.133	72.430	1.703
1823.554	73.690	71.995	1.695

LONGITUDINAL SECTION – SURPLUS RECYCLED WATER MAIN (CH. 1270.000 TO CH. 1905.000)

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200

50mm AT FULL SIZE

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
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SCALES

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www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT
ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT
PLAN TITLE
PROJECT No. 11688(13

Plotted By: jaysonn Plot Date: 18/09/19 – 10:26 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) – Issue H (NPWS)\11688(13)NPWS-RWAT-027 to 039(H).dwg

11688(13)NPWS-RWAT-027 to 039(H)

NOTES:

1. H.D. POLYETHYLI
   THAN MANUFAC
   ALIGNMENT CAN
   CONTRACTOR IS
   REQUIRED DEFLE
2. REFER TO DRG–
   SETOUT DETAILS
3. TRENCHSTOPS A
   WSA03–2011–3.
   TS DENOTES TRI
   BH DENOTES BU
   WHERE TS OR B
   INCORPORATE A
   LAYER.
4. PIPE BEDDING A
   ACCORDANCE WI
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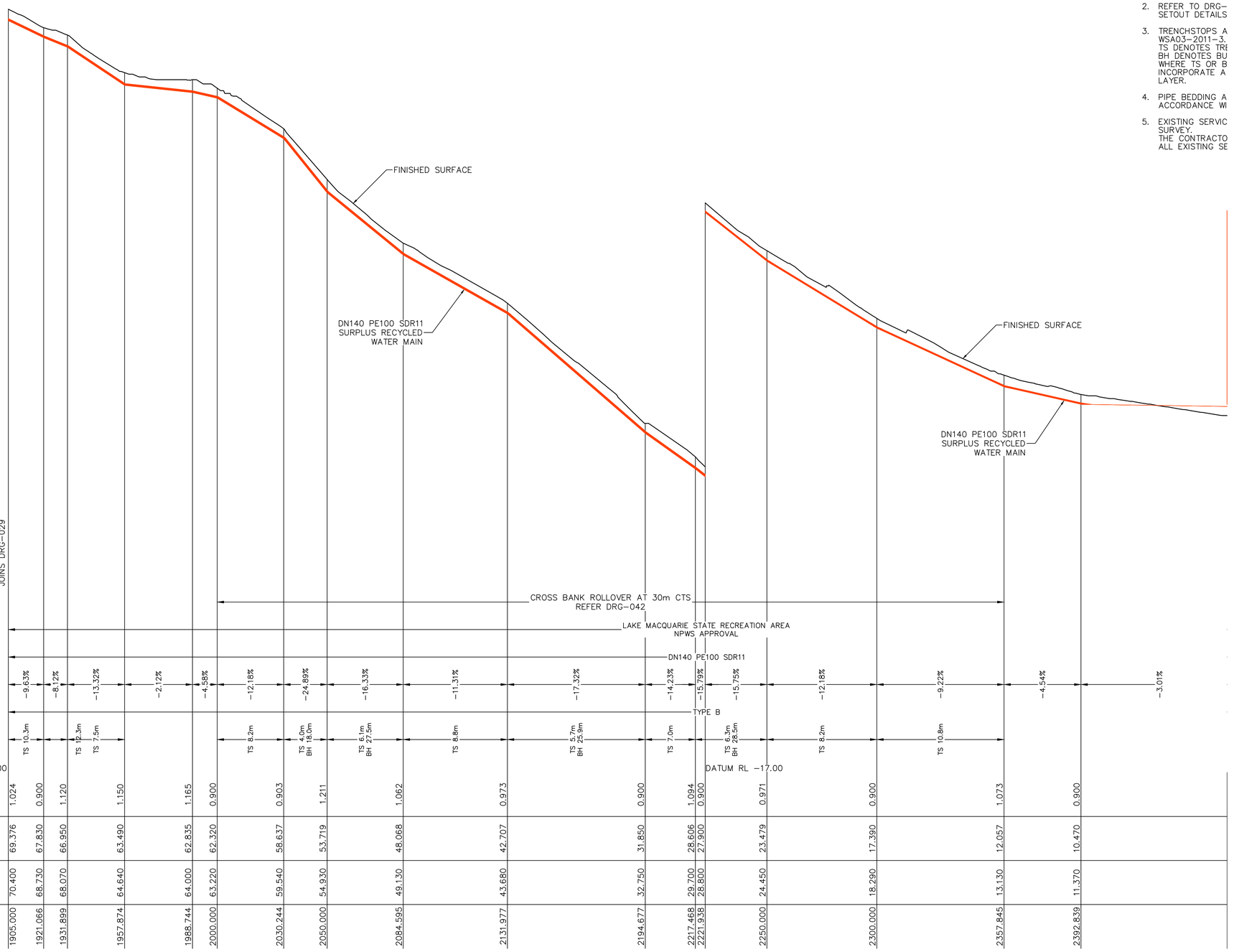

LONGITUDINAL SECTION – SURPLUS RECYCLED WATER MAIN (CH. 1905.000 TO CH. 2540.000)

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200

50mm AT FULL SIZE

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
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ABN 62 129 445 398

CLIENT

ROSE

PROPERTY DESCRIPTION

SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED ADWJ

DATUM A.H.D.

PROJECT

PLAN TITLE

PROJECT No. 11688(13

Plotted By: jaysonn Plot Date: 18/09/19 – 10:26 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) – Issue H (NPWS)\11688(13)NPWS–RWAT–027 to 039(H).dwg

11688(13)NPWS-RWAT-027 to 039(H)

NOTES:

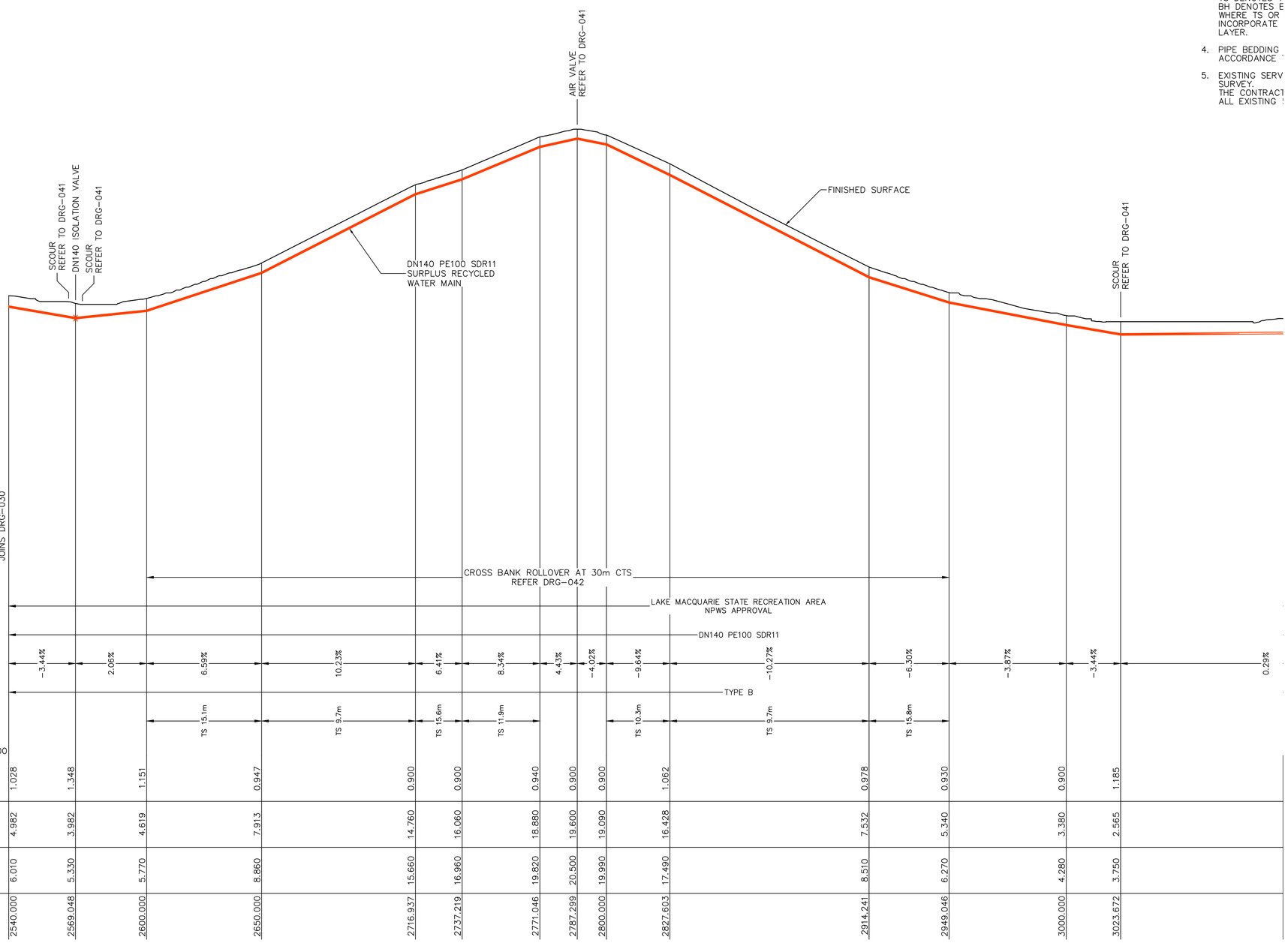
1. H.D. POLYETHY
THAN MANUFA
ALIGNMENT CA
CONTRACTOR I
REQUIRED DEFI

2. REFER TO DRG
SETOUT DETAIL

3. TRENCHSTOPS
WSA03–2011–.
TS DENOTES T
BH DENOTES E
WHERE TS OR
INCORPORATE
LAYER.

4. PIPE BEDDING
ACCORDANCE

5. EXISTING SERV
SURVEY.
THE CONTRACT
ALL EXISTING



LONGITUDINAL SECTION – SURPLUS RECYCLED WATER MAIN (CH. 2540.000 TO CH. 3175.000)

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200

50mm AT FULL SIZE

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
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CLIENT

ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED
WATER MAIN
CATHERINE HILL BAY.

SURVEYED ADWJ
DATUM A.H.D.

PROJECT

PLAN TITLE

PROJECT No. 11688(13

Plotted By: jaysonn Plot Date: 18/09/19 – 10:26 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) – Issue H (NPWS)\11688(13)NPWS–RWAT–027 to 039(H).dwg

11688(13)NPWS-RWAT-027 to 039(H)

NOTES:

1. H.D. POLYETHYL
THAN MANUFA
ALIGNMENT CAT
CONTRACTOR I
REQUIRED DEFL

2. REFER TO DRG-
SETOUT DETAIL

3. TRENCHSTOPS
WSA03–2011–3
TS DENOTES TF
BH DENOTES BU
WHERE TS OR
INCORPORATE A
LAYER.

4. PIPE BEDDING
ACCORDANCE W

5. BETWEEN CH 3
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- PLACE 150r
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6. EXISTING SERVI
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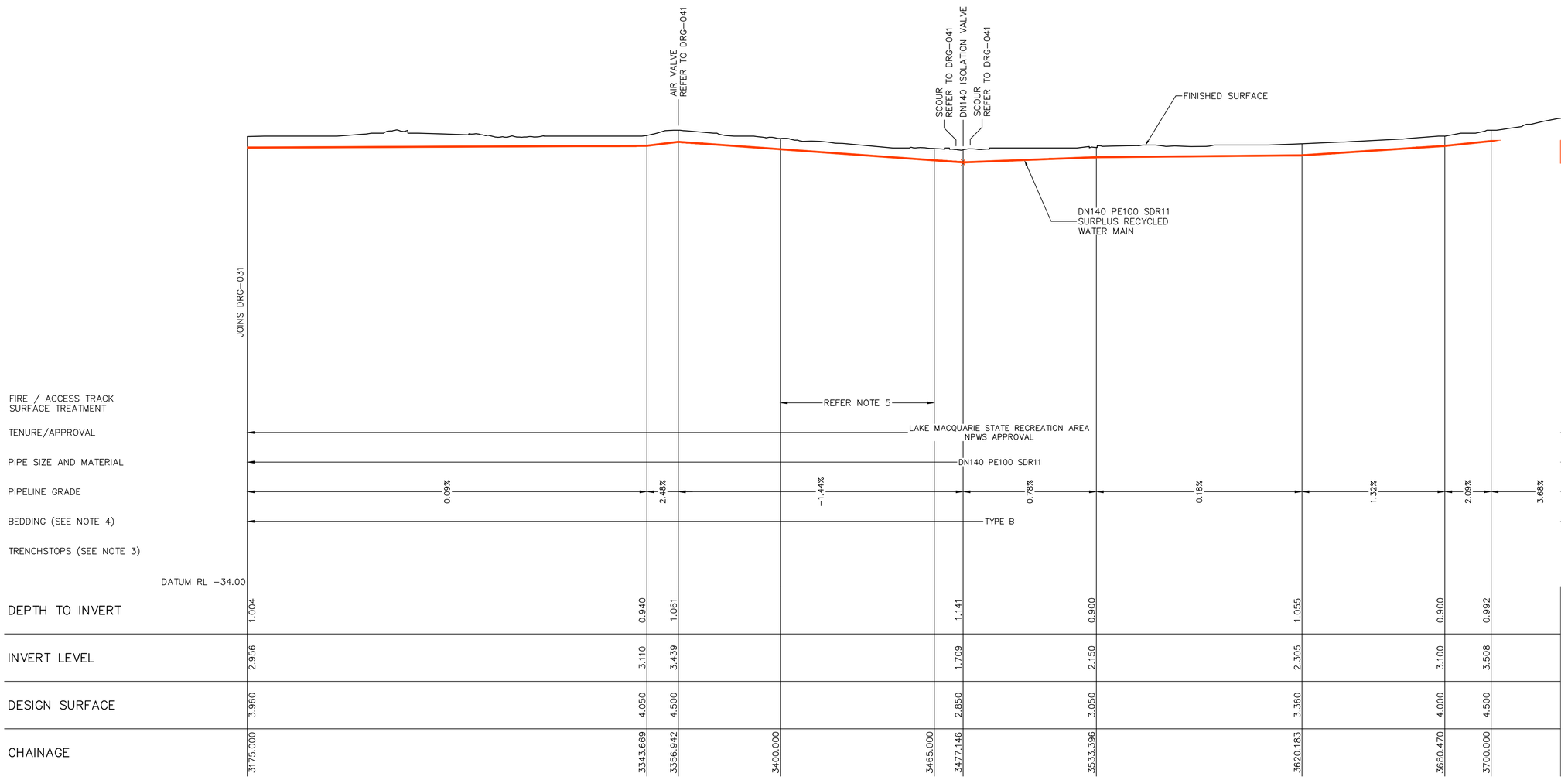

LONGITUDINAL SECTION – SURPLUS RECYCLED WATER MAIN (CH. 3175.000 TO CH. 3810.000)

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200

50mm AT FULL SIZE

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
A	20.11.2018	PRELIMINARY ISSUE	J.N.	R.J.	H.M.	C.B.
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CLIENT

ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED
WATER MAIN
CATHERINE HILL BAY.

SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT

PLAN TITLE

PROJECT No. 11688(13

Plotted By: jaysonn Plot Date: 18/09/19 – 10:26 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) – Issue H (NPWS)\11688(13)NPWS–RWAT–027 to 039(H).dwg

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NOTES:

1. H.D. POLYETHY
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REQUIRED DEFI

2. REFER TO DRG
SETOUT DETAIL

3. TRENCHSTOPS
WSA03–2011–.
TS DENOTES T
BH DENOTES E
WHERE TS OR
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4. PIPE BEDDING
ACCORDANCE

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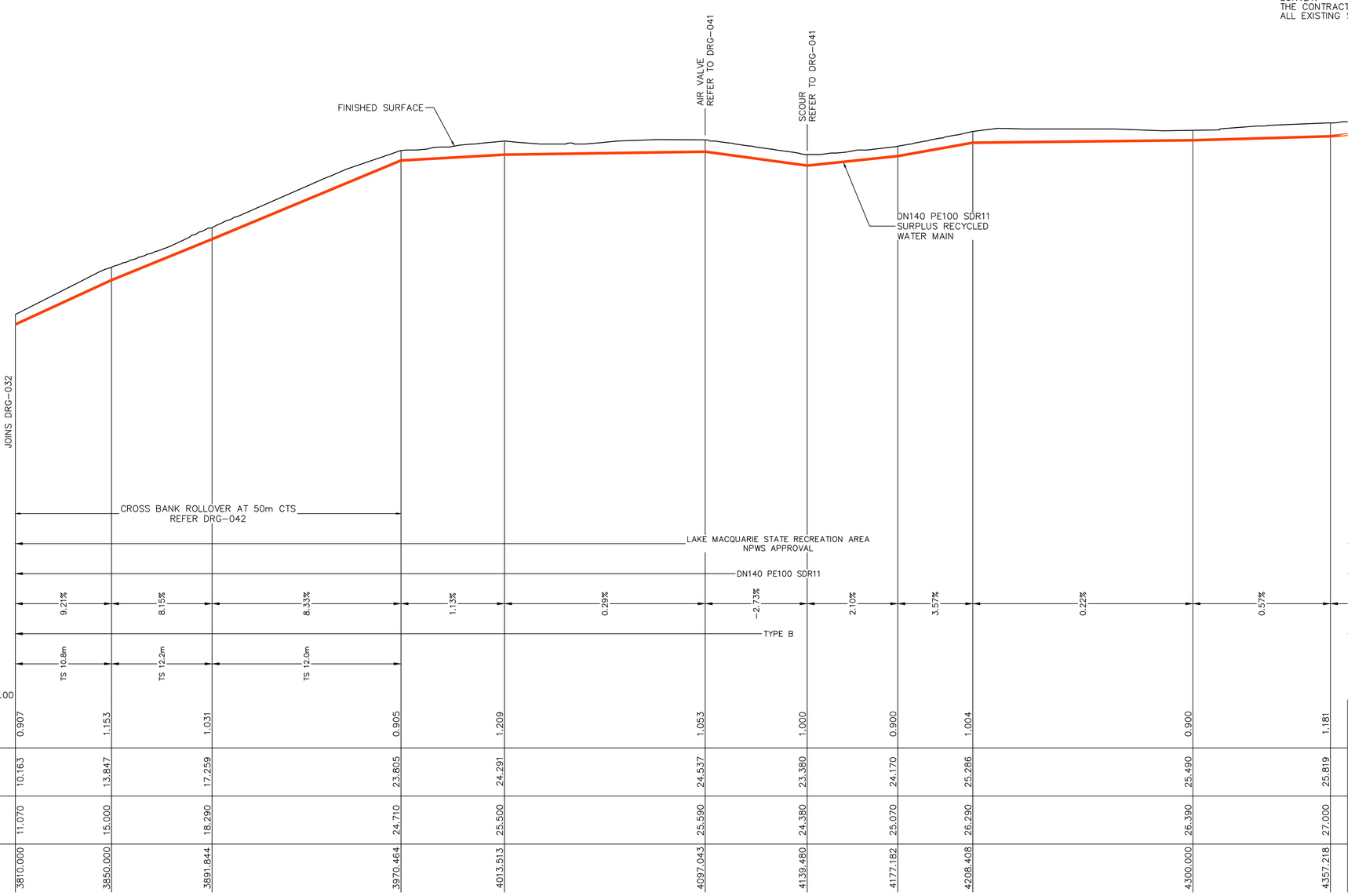

LONGITUDINAL SECTION – SURPLUS RECYCLED WATER MAIN (CH. 3810.000 TO CH. 4445.000)

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200

50mm AT FULL SIZE

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
A	20.11.2018	PRELIMINARY ISSUE	J.N.	R.J.	H.M.	C.B.
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CLIENT

ROSE

PROPERTY DESCRIPTION

SURPLUS RECYCLED
WATER MAIN
CATHERINE HILL BAY.

SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT

PLAN TITLE

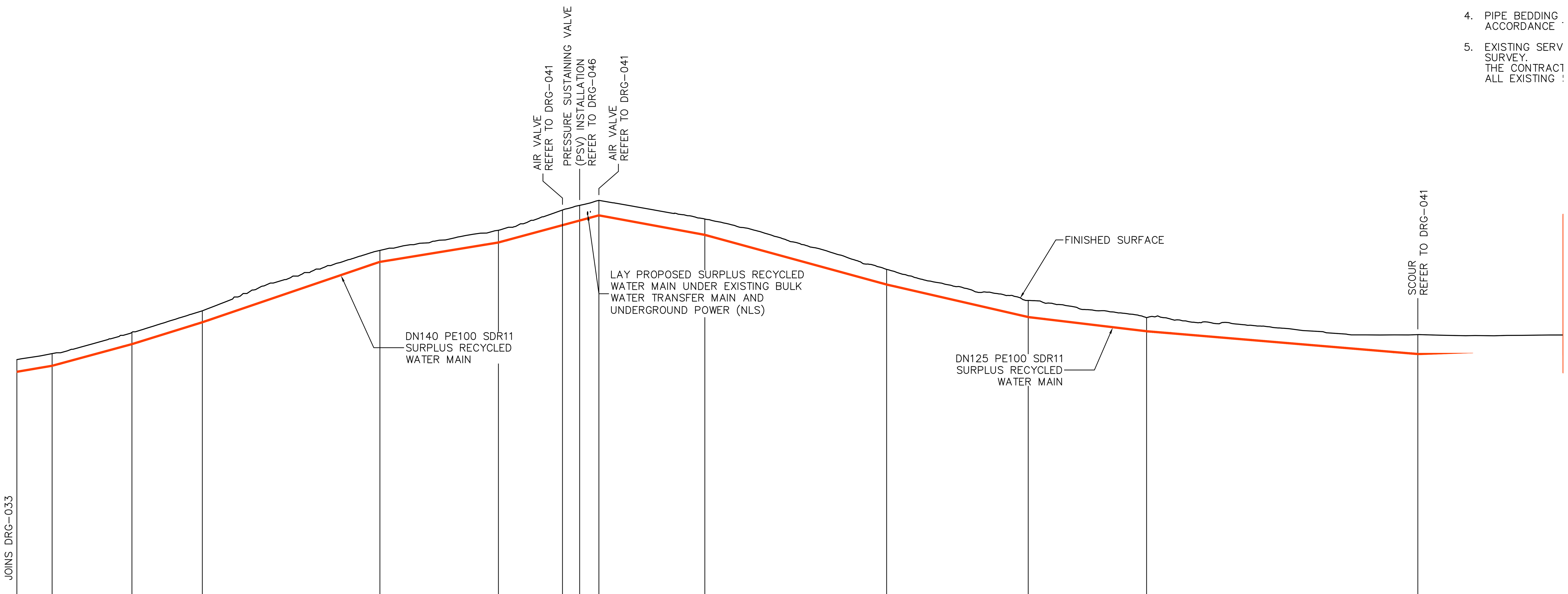
PROJECT No. 11688(13

Plotted By: jaysonn Plot Date: 18/09/19 – 10:26 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) – Issue H (NPWS)\11688(13)NPWS–RWAT–027 to 039(H).dwg

11688(13)NPWS-RWAT-027 to 039(H)

NOTES:

1. H.D. POLYETHY THAN MANUFA ALIGNMENT CA CONTRACTOR I REQUIRED DEFL
2. REFER TO DRG SETOUT DETAIL
3. TRENCHSTOPS WSA03–2011–: TS DENOTES T BH DENOTES E WHERE TS OR INCORPORATE LAYER.
4. PIPE BEDDING ACCORDANCE
5. EXISTING SERV SURVEY. THE CONTRACT ALL EXISTING



TENURE/APPROVAL: LAKE MACQUARIE STATE RECREATION AREA NPWS APPROVAL | ROAD (KANANGRA DRIVE) CCC APPROVAL

PIPE SIZE AND MATERIAL: DN140 PE100 SDR11 | DN125 PE100 SDR11

PIPELINE GRADE: 3.41% | 5.42% | 6.22% | 6.80% | 3.28% | 5.41% | –3.69% | –5.47% | –4.59% | –2.40% | –1.63%

BEDDING (SEE NOTE 4): TYPE B

TRENCHSTOPS (SEE NOTE 3): TS 18.4m | TS 16.0m | TS 14.7m | TS 18.4m | TS 18.2m

DATUM RL –7.00

CHAINAGE	**DESIGN SURFACE**	**INVERT LEVEL**	**DEPTH TO INVERT**
4445.000	29.760	28.809	0.951
4457.642	30.190	29.240	0.950
4486.248	31.710	30.790	0.920
4511.480	33.260	32.360	0.900
4575.149	37.590	36.690	0.900
4617.622	39.030	38.081	0.949
4640.595	40.485	39.323	1.162
4646.760	40.821	39.656	1.165
4653.649	41.180	40.028	1.152
4691.623	39.840	38.628	1.212
4756.791	36.230	35.066	1.164
4807.555	34.000	32.736	1.264
4850.000	32.770	31.717	1.053
4947.239	31.550	30.084	1.466

LONGITUDINAL SECTION – SURPLUS RECYCLED WATER MAIN (CH. 4445.000 TO CH. 5080.000)

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200

50mm AT FULL SIZE

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F	02.09.2019	AMENDED NPWS ISSUE – CLIENT COMMENTS	J.N.	R.J.	H.M.	C.B.
G	06.09.2019	ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.
H	17.09.2019	RE ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.

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SCALES

ALL DIMENSIONS ARE IN METRES. DO NOT SCALE

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www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT
ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT

PLAN TITLE

PROJECT No. 11688(13

Plotted By: jaysonn Plot Date: 18/09/19 – 10:26 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) – Issue H (NPWS)\11688(13)NPWS–RWAT–027 to 039(H).dwg

11688(13)NPWS-RWAT-027 to 039(H)

NOTES:

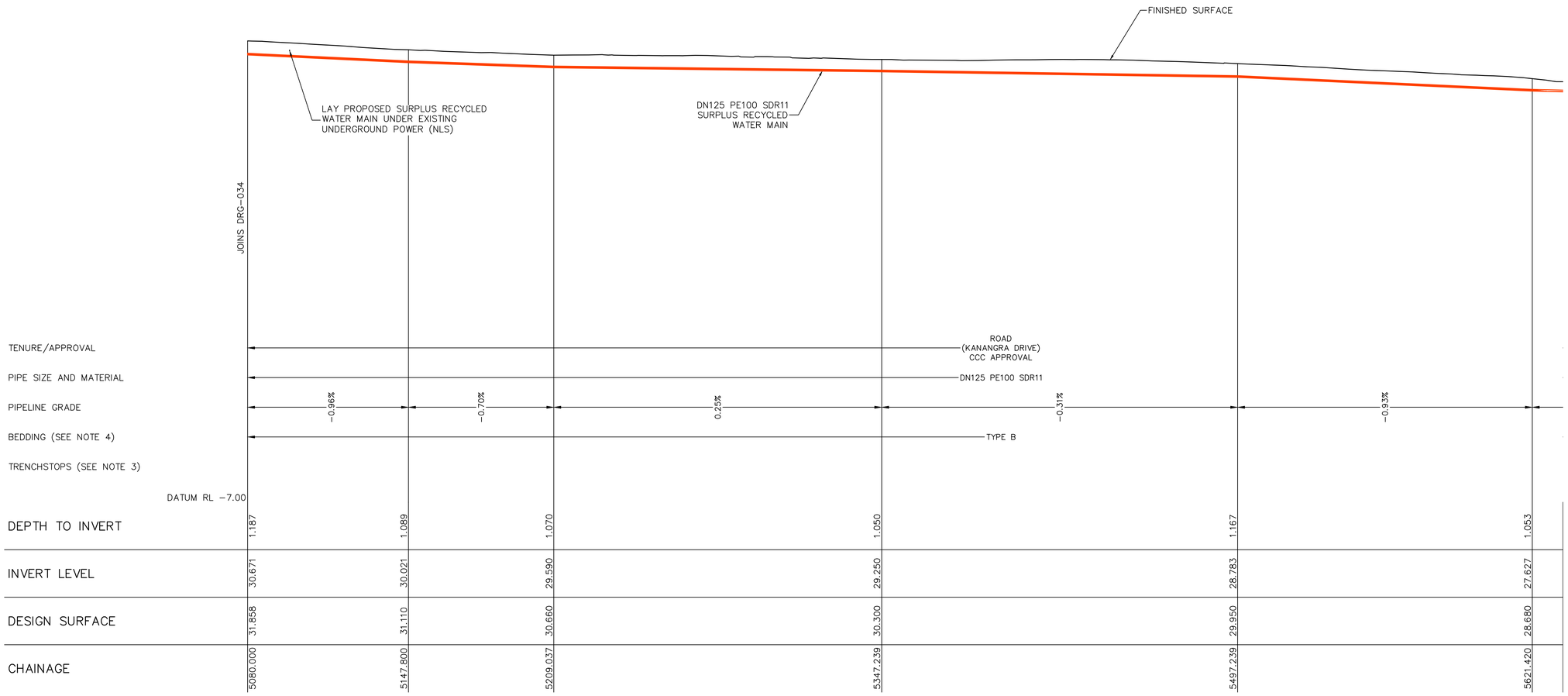
1. H.D. POLYETHY
THAN MANUFA
ALIGNMENT CA
CONTRACTOR I
REQUIRED DEFI

2. REFER TO DRG
SETOUT DETAIL

3. TRENCHSTOPS
WSA03–2011–.
TS DENOTES T
BH DENOTES E
WHERE TS OR
INCORPORATE
LAYER.

4. PIPE BEDDING
ACCORDANCE

5. EXISTING SERV
SURVEY.
THE CONTRACT
ALL EXISTING



LONGITUDINAL SECTION – SURPLUS RECYCLED WATER MAIN (CH. 5080.000 TO CH. 5715.000)

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200

50mm AT FULL SIZE

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
A	20.11.2018	PRELIMINARY ISSUE	J.N.	R.J.	H.M.	C.B.
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CLIENT

ROSE

PROPERTY DESCRIPTION

SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED ADWJ

DATUM A.H.D.

PROJECT

PLAN TITLE

PROJECT No. 11688(13

Plotted By: jaysonn Plot Date: 18/09/19 – 10:26 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) – Issue H (NPWS)\11688(13)NPWS–RWAT–027 to 039(H).dwg

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3. TRENCHSTOPS
WSA03–2011–
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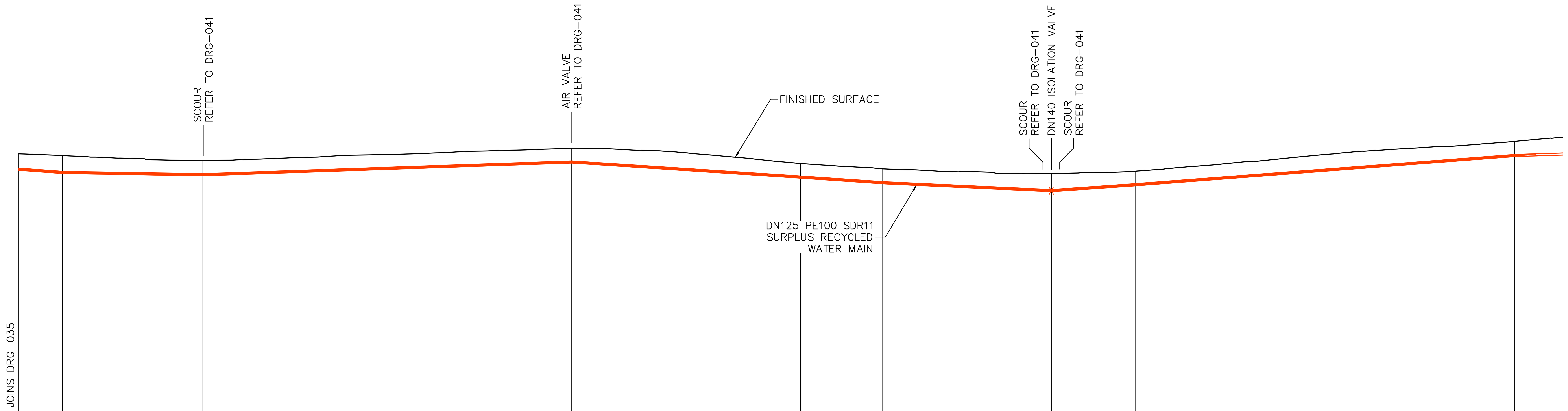
BH DENOTES E
WHERE TS OR
INCORPORATE
LAYER.

4. PIPE BEDDING
ACCORDANCE

5. EXISTING SERV
SURVEY.
THE CONTRACT
ALL EXISTING



TENURE/APPROVAL — ROAD (KANANGRA DRIVE) CCC APPROVAL

PIPE SIZE AND MATERIAL — DN125 PE100 SDR11

PIPELINE GRADE — −1.49% / −0.33% / 0.69% / −1.32% / −1.37% / −0.94% / 1.39% / 1.54%

BEDDING (SEE NOTE 4) — TYPE B

TRENCHSTOPS (SEE NOTE 3)

DATUM RL −12.00

DEPTH TO INVERT	1.176	1.287	1.101	1.050	1.052	1.065	1.301	1.050	1.084
INVERT LEVEL	25.935	25.703	25.539	26.450	25.368	24.965	24.399	24.820	26.916
DESIGN SURFACE	27.111	26.990	26.640	27.500	26.420	26.030	25.700	25.870	28.000
CHAINAGE	5715.000	5730.628	5781.081	5913.465	5995.600	6025.115	6085.617	6115.917	6251.988

LONGITUDINAL SECTION – SURPLUS RECYCLED WATER MAIN (CH. 5715.000 TO CH. 6330.000)

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200

50mm AT FULL SIZE

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
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ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION: SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ

DATUM: A.H.D.

PROJECT

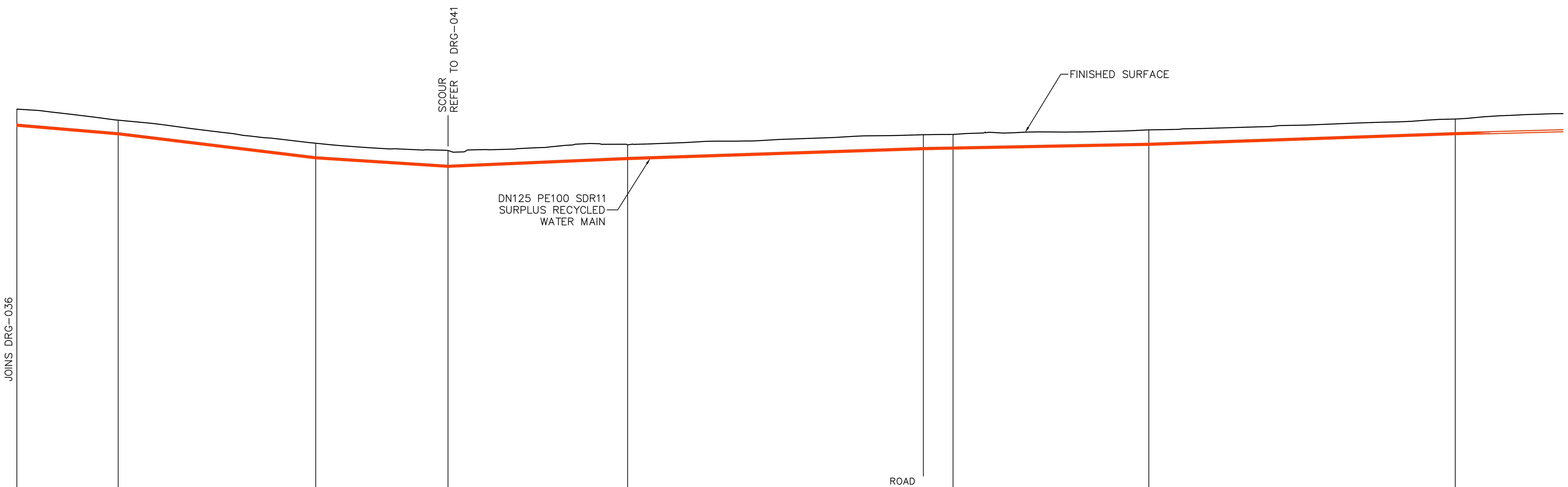
PLAN TITLE

PROJECT No. 11688(13

Plotted By: jaysonn Plot Date: 18/09/19 – 10:26 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) – Issue H (NPWS)\11688(13)NPWS–RWAT–027 to 039(H).dwg

NOTES:

1. H.D. POLYETHY THAN MANUFA ALIGNMENT CA CONTRACTOR I REQUIRED DEFL
2. REFER TO DRG SETOUT DETAIL
3. TRENCHSTOPS WSA03–2011– TS DENOTES T BH DENOTES E TRENCH BACKF STABILISED SU
4. PIPE BEDDING ACCORDANCE
5. EXISTING SERV SURVEY. THE CONTRACT ALL EXISTING



TENURE/APPROVAL: ROAD (KANANGRA DRIVE) CCC APPROVAL

PIPE SIZE AND MATERIAL: DN125 PE100 SDR11

PIPELINE GRADE: –1.70% | –2.43% | –1.28% | 0.86% | 0.67% | 0.35% | 0.39% | 0.70%

BEDDING (SEE NOTE 4): TYPE B

TRENCHSTOPS (SEE NOTE 3)

DATUM RL –11.00

DEPTH TO INVERT	1.226	1.054	1.116	1.205	1.050	1.067	1.050	1.109	1.124
INVERT LEVEL	28.252	27.636	25.914	25.305	25.860	26.573	26.610	26.881	27.646
DESIGN SURFACE	29.478	28.690	27.030	26.510	26.910	27.640	27.660	27.990	28.770
CHAINAGE	6350.000	6386.317	6457.145	6504.547	6568.952	6674.968	6685.620	6755.799	6865.658

LONGITUDINAL SECTION – SURPLUS RECYCLED WATER MAIN (CH. 6330.000 TO CH. 6985.000)

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200

50mm AT FULL SIZE

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ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION: SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ | DATUM: A.H.D.

PROJECT

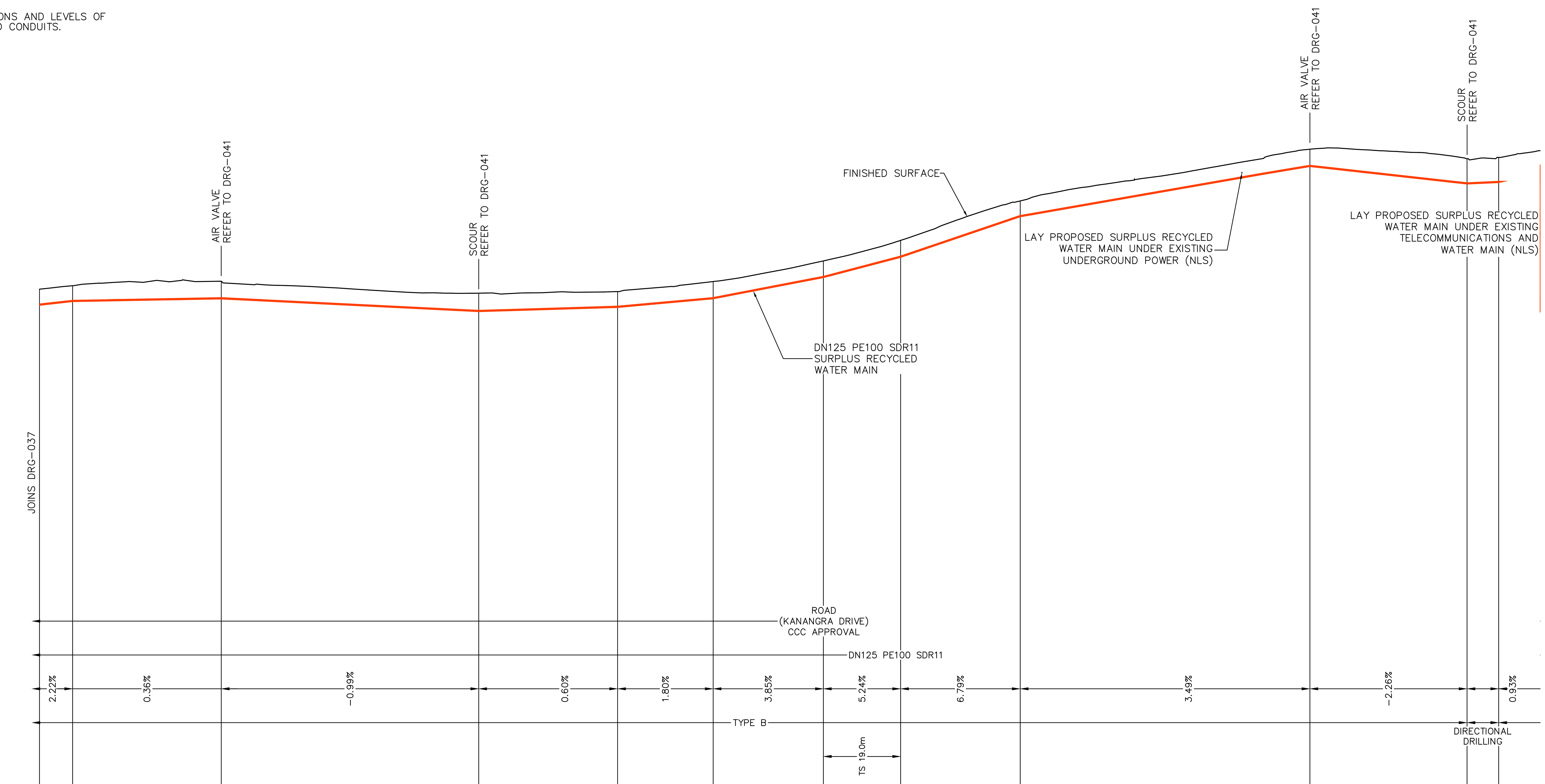
PLAN TITLE

PROJECT No. 11688(13

Plotted By: jaysonn Plot Date: 18/09/19 – 10:26 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) – Issue H (NPWS)\11688(13)NPWS–RWAT–027 to 039(H).dwg

NOTES:

1. H.D. POLYETHYLENE PIPE SHALL NOT BE BENT TO A RADIUS LESS THAN MANUFACTURERS RECOMMENDATIONS. IF THE PROPOSED ALIGNMENT CAN NOT BE ACHIEVED BY BENDING THE PIPE THE CONTRACTOR IS TO USE ELECTROFUSION FITTINGS TO ACHIEVE REQUIRED DEFLECTIONS.
2. REFER TO DRG–026 FOR SURPLUS RECYCLED WATER MAIN SETOUT DETAILS.
3. TRENCHSTOPS AND BULKHEADS ARE TO BE IN ACCORDANCE WITH WSA03–2011–3.1 PART 1, CLAUSE 7.10.
   TS DENOTES TRENCH STOPS.
   BH DENOTES BULKHEADS.
   WHERE TS OR BH SPECIFIED THE TRENCH BACKFILL WILL INCORPORATE A 150mm THICK DGS40 2% STABILISED SURFACE LAYER.
4. PIPE BEDDING AND CONCRETE ENCASEMENT IS TO BE IN ACCORDANCE WITH WSA03–2011–3.1 PART 1, SECTION 7.
5. EXISTING SERVICES IN THIS AREA HAVE NOT BEEN LOCATED BY SURVEY.
   THE CONTRACTOR IS TO VERIFY THE POSITIONS AND LEVELS OF ALL EXISTING SERVICES, PIPES, CABLES AND CONDUITS.



DATUM RL –7.00

DEPTH TO INVERT	0.921	1.050	1.190	1.245	1.050	1.154	1.116	1.131	1.052	1.140	1.741	1.742
INVERT LEVEL	29.549	29.730	29.930	28.990	29.300	29.936	31.504	32.999	35.998	39.730	38.419	38.528
DESIGN SURFACE	30.470	30.780	31.120	30.235	30.350	31.090	32.620	34.130	37.050	40.870	40.160	40.270
CHAINAGE	6985.000	6997.239	7052.143	7147.239	7198.527	7233.822	7274.542	7303.058	7347.239	7454.239	7512.270	7523.967

LONGITUDINAL SECTION – SURPLUS RECYCLED WATER MAIN (CH. 6985.000 TO CH. 7620.000)

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200

50mm AT FULL SIZE

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
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CLIENT
ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED ADWJ
DATUM A.H.D.

PROJECT

PLAN TITLE

PROJECT No.
11688(13

Plotted By: jaysonn Plot Date: 18/09/19 – 10:26 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) – Issue H (NPWS)\11688(13)NPWS–RWAT–027 to 039(H).dwg

NOTES:

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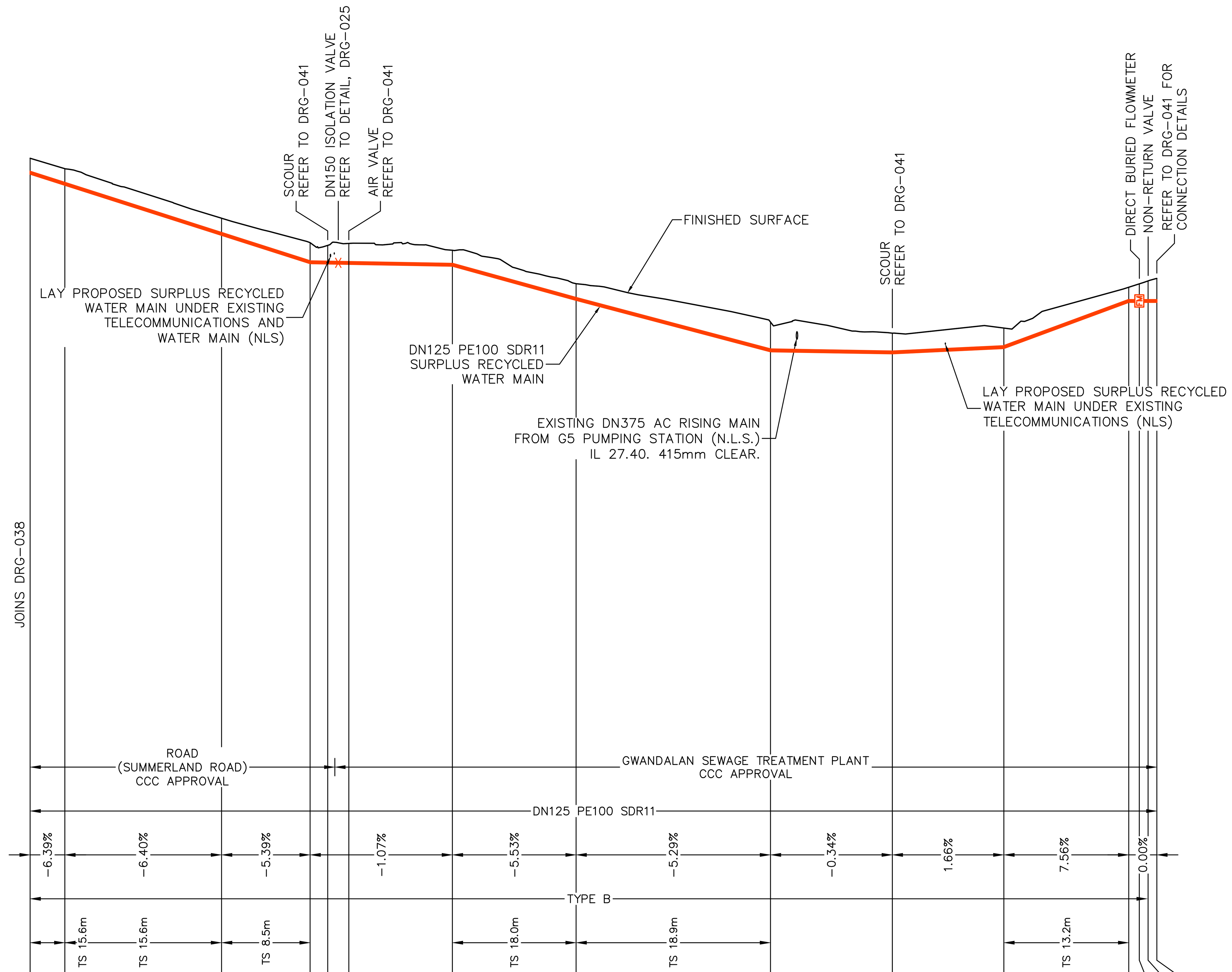

TENURE/APPROVAL: ROAD (SUMMERLAND ROAD) CCC APPROVAL | GWANDALAN SEWAGE TREATMENT PLANT CCC APPROVAL

PIPE SIZE AND MATERIAL: DN125 PE100 SDR11

PIPELINE GRADE: –6.39% | –6.40% | –5.39% | –1.07% | –5.53% | –5.29% | –0.34% | 1.66% | 7.56% | 0.00%

BEDDING (SEE NOTE 4): TYPE B

TRENCHSTOPS (SEE NOTE 3): TS 15.6m | TS 15.6m | TS 8.5m | TS 18.0m | TS 18.9m | TS 13.2m

DATUM RL 10.00

DEPTH TO INVERT	0.908	0.900	0.936	0.905	1.057	1.185	0.900	0.947	1.684	1.170	1.160	0.856	1.050	1.218	1.359
INVERT LEVEL	36.775	36.190	33.334	31.975	31.667	31.646	31.540	29.593	26.666	26.550	26.850	29.480	29.480	29.480	29.480
NATURAL SURFACE	37.683	37.090	34.270	32.880	32.724	32.831	32.440	30.540	28.350	27.720	28.010	30.336	30.530	30.698	30.839
CHAINAGE	7620.000	7629.885	7674.504	7699.720	7704.737	7710.737	7740.229	7775.454	7830.785	7865.480	7897.239	7928.495	7932.794	7938.304	7940.804

LONGITUDINAL SECTION – SURPLUS RECYCLED WATER MAIN (CH. 7620.000 TO CH. 7940.804)

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200

50mm AT FULL SIZE

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CLIENT
ROSE

PROPERTY DESCRIPTION
SURPLUS RECYCLED
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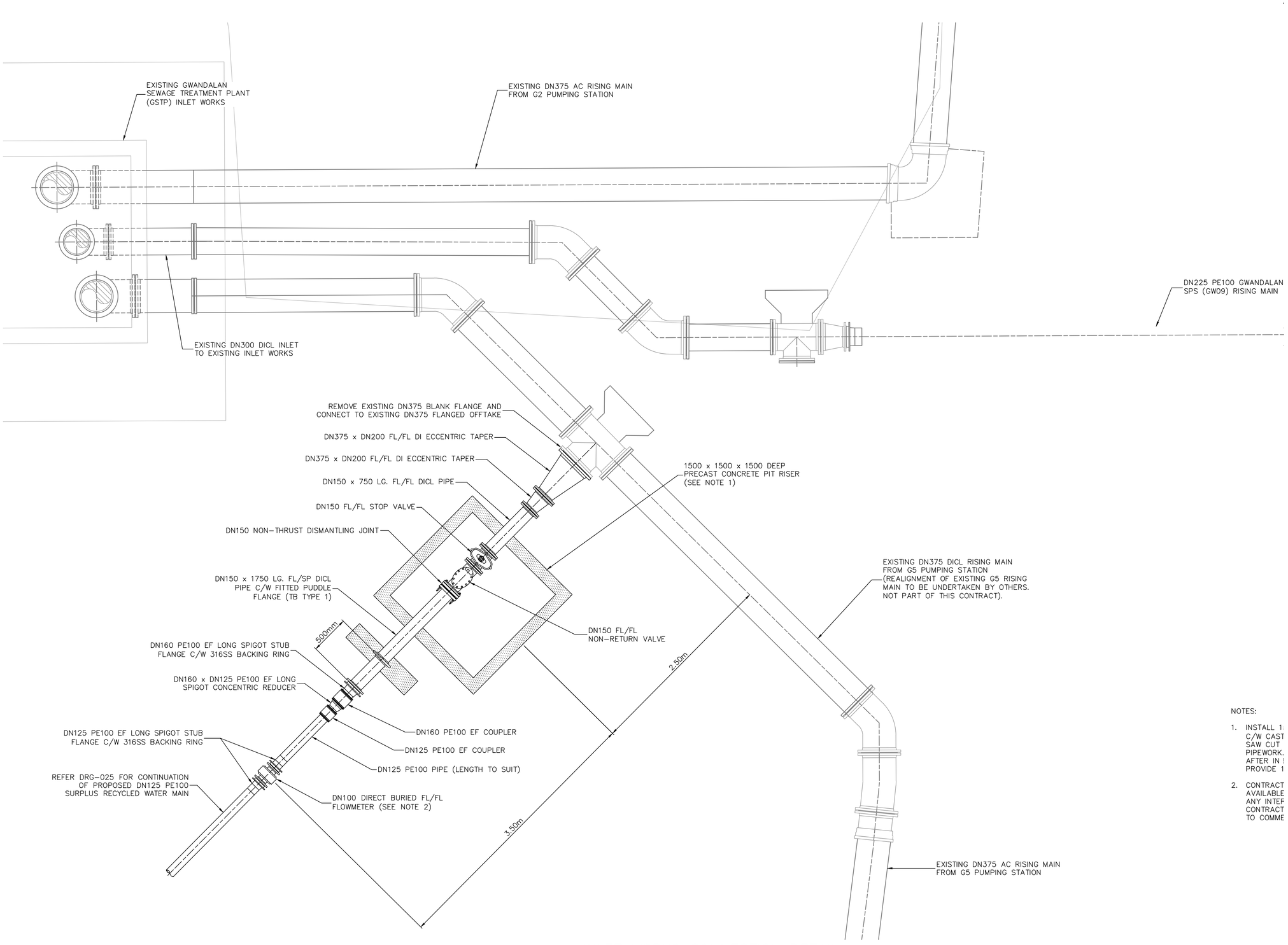
CATHERINE HILL BAY.

SURVEYED ADWJ
DATUM A.H.D.

PROJECT

PLAN TITLE

PROJECT No.
11688(13



NOTES:

1. INSTALL 1
   C/W CAST
   SAW CUT
   PIPEWORK.
   AFTER IN
   PROVIDE 1
2. CONTRACT
   AVAILABLE
   ANY INTEF
   CONTRACT
   TO COMME

INLET WORKS CONNECTION DETAIL

SCALE 1:25

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CLIENT

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PROPERTY DESCRIPTION

SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ

DATUM: A.H.D.

PROJECT

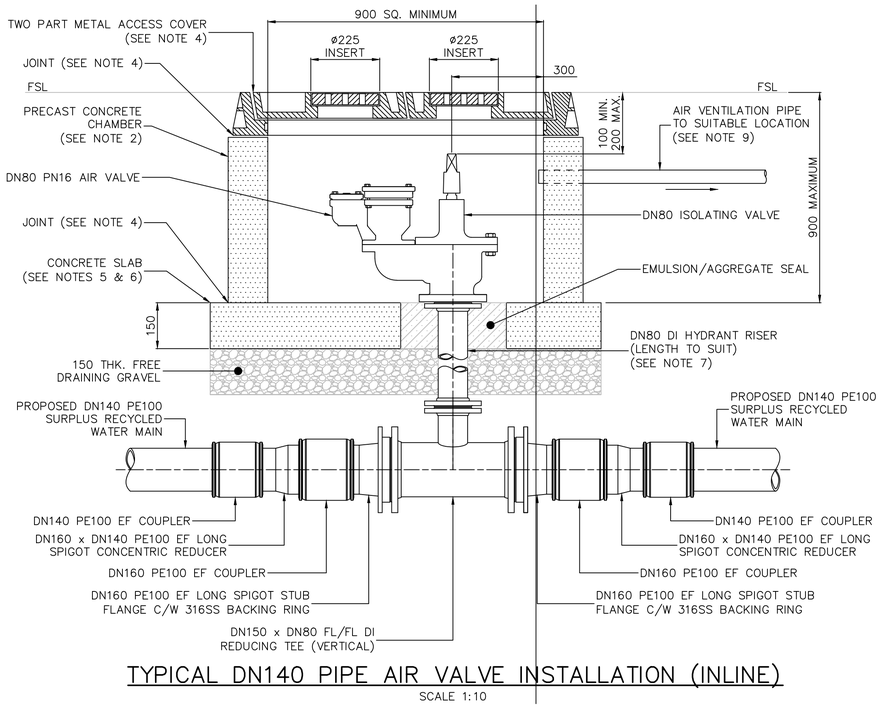
PLAN TITLE

PROJECT No. 11688(13

50mm AT FULL SIZE

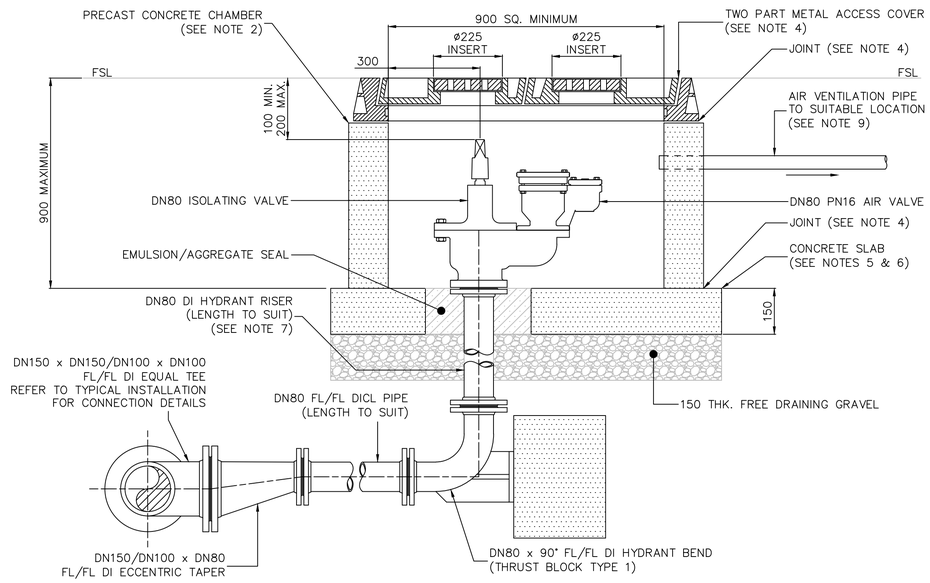
Plotted By: jaysonn Plot Date: 18/09/19 - 10:26 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue H (NPWS)\11688(13)NPWS-RWAT-040 to 041(H).dwg

11688(13)NPWS-RWAT-040 to 041(H)



TYPICAL DN140 PIPE AIR VALVE INSTALLATION (INLINE)

SCALE 1:10

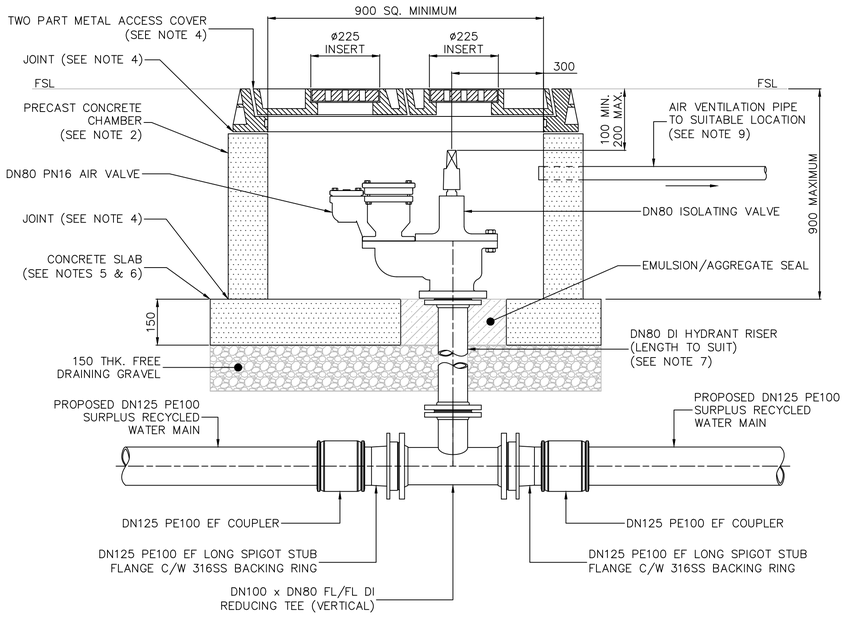


ALTERNATE AIR VALVE INSTALLATION (OFFLINE)

SCALE 1:10

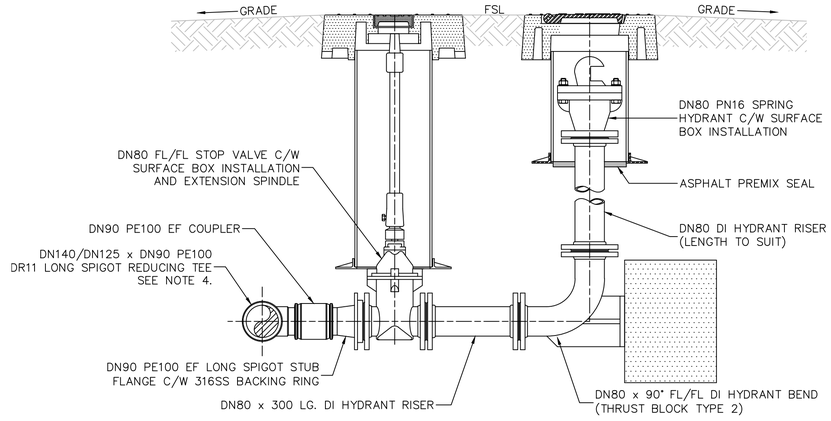
AIR VALVE NC

1. ALL DIMENSION
2. AN ALTERNATI LOCATION MAY
3. METAL ACCESS CLASS "D" FOR ACCESS COVER
4. JOINTS TO BE ALTERNATIVELY,
5. CONCRETE FOR PROVIDE 4/ø2C
6. REINFORCING F EQUIVALENT RE OF REINFORCIN
7. ENSURE HYDRA FLOOR OF CHA MINIMUM OF OT
8. PROTECT ALL D
9. PROVIDE AIR V PIPE OR VENTE ENSURE PIPE/
10. ALL VALVES AR ACCORDANCE W



TYPICAL DN125 PIPE AIR VALVE INSTALLATION (INLINE)

SCALE 1:10



TYPICAL PUMP OUT SCOUR INSTALLATION

SCALE 1:10

SCOUR NOTES

1. ALL DIMENSION
2. THIS DRAWING WAT-1303-V/1 TYPICAL SURFA WAT-1301-V: TYPICAL VALVE ASSEMBLY.
3. PAINT PLASTIC AN APPROVED
4. WHERE SURPLU DN140 PE100 E DN160 x DN110
5. ALL VALVES AR ACCORDANCE W

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SCALES

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ABN 62 129 445 398

CLIENT

ROSE

PROPERTY DESCRIPTION

SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED: ADWJ

DATUM: A.H.D.

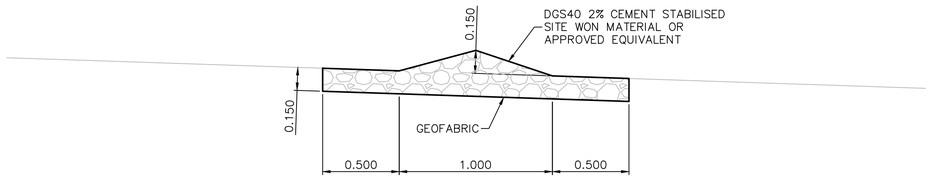
PROJECT

PLAN TITLE

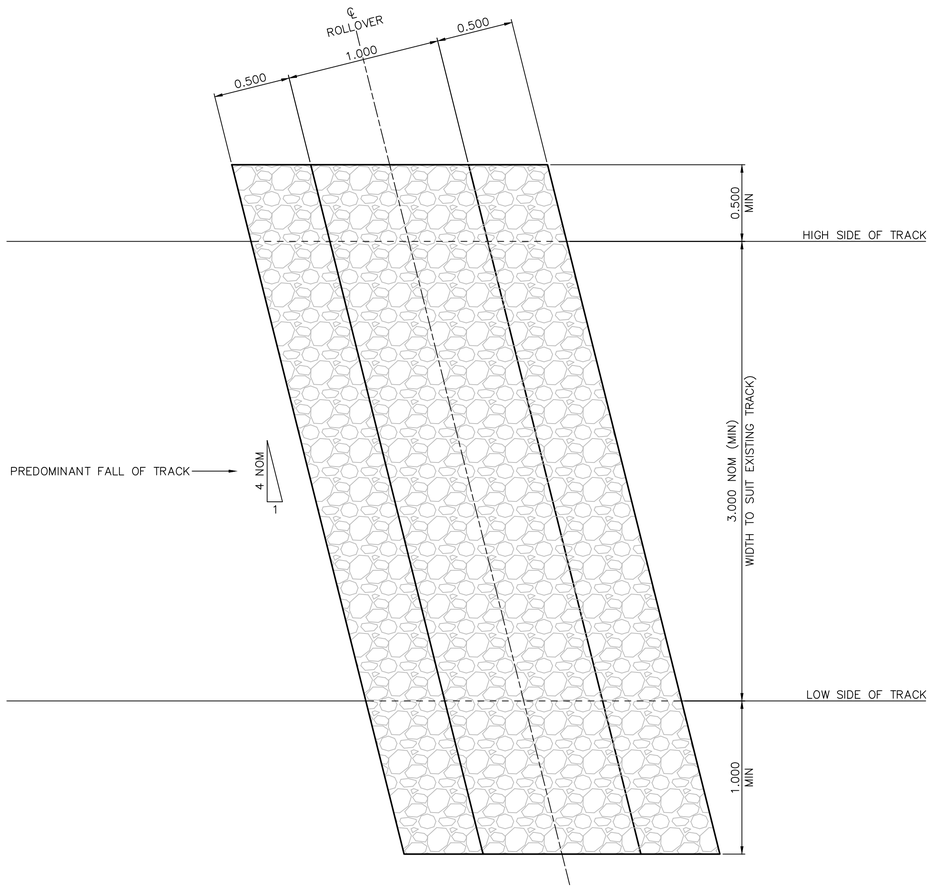
PROJECT No. 11688(13

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 – 10:26 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) – Issue H (NPWS)\11688(13)NPWS–RWAT–040 to 041(H).dwg



TYPICAL CROSS BANK ROLLOVER SECTION



TYPICAL CROSS BANK ROLLOVER PLAN

50mm AT FULL SIZE

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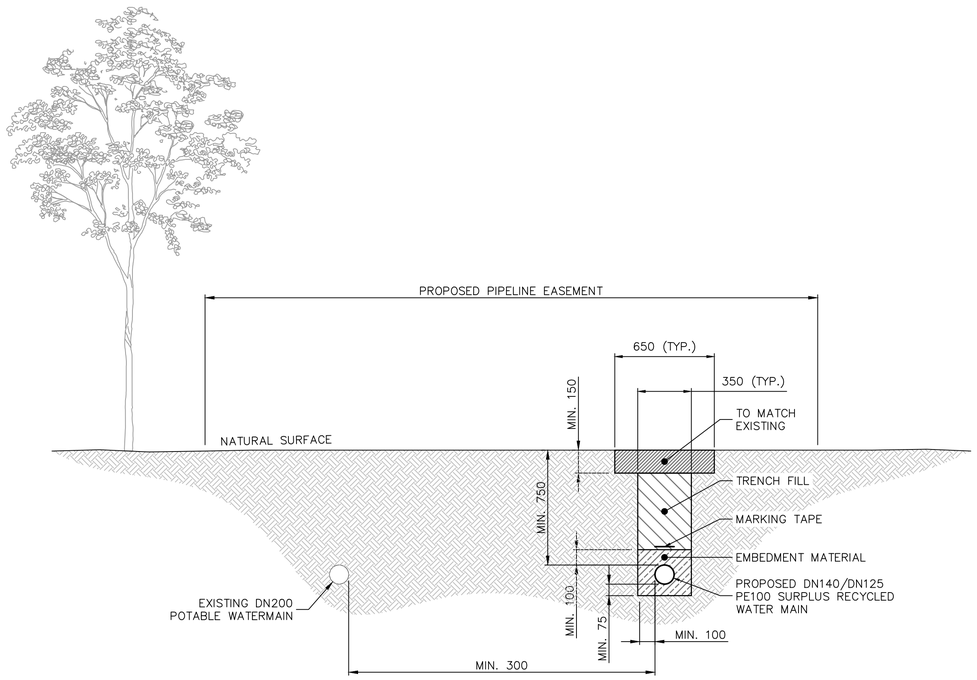
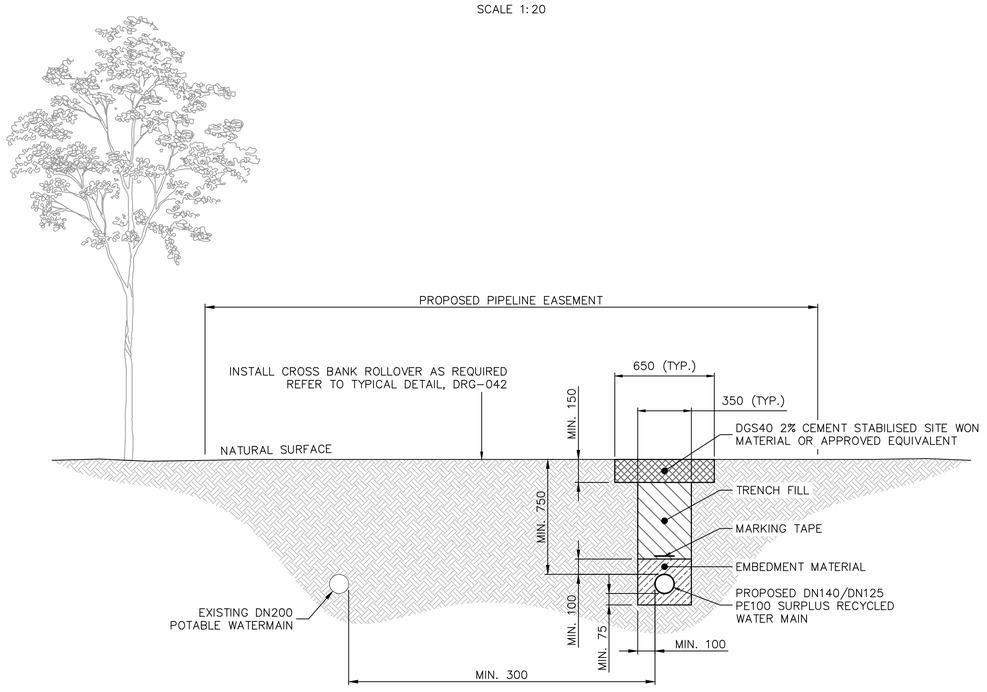


GRADE < 5%

SCALE 1:20



GRADE > 5%

SCALE 1:20

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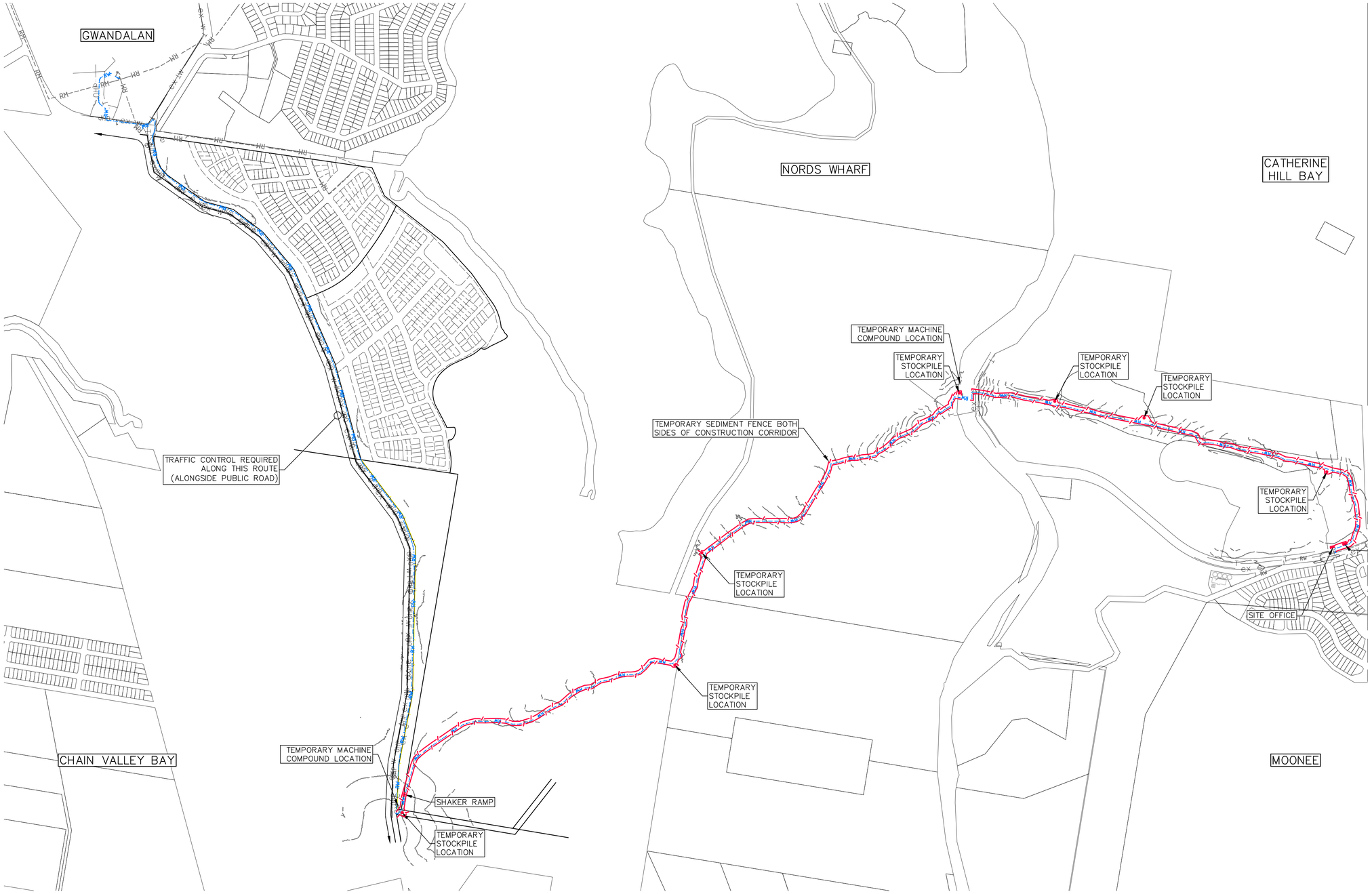
TYPI

PROJECT No. 11688(13

50mm AT FULL SIZE

11688(13)NPWS-RWAT-042 to 045(H)



PLAN
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SCALES
0 150 300 375m
SCALE: 1:7500 (FULL)

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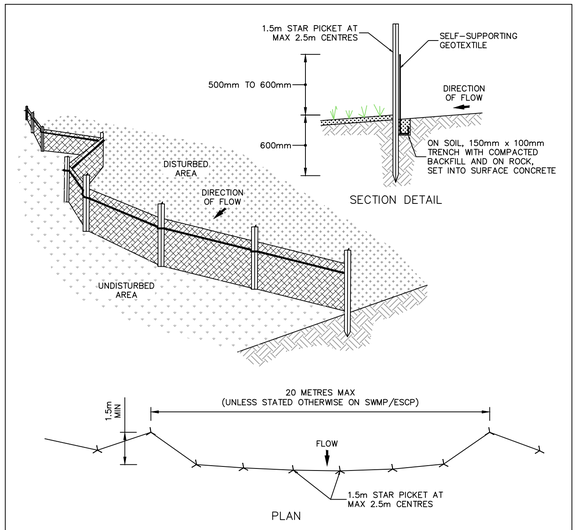
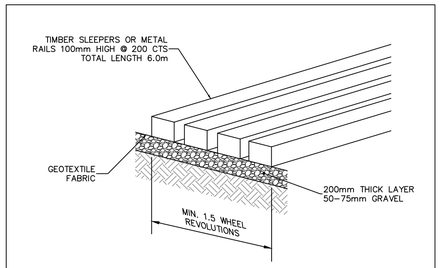


SEDIMENT FENCE (SD6-8)

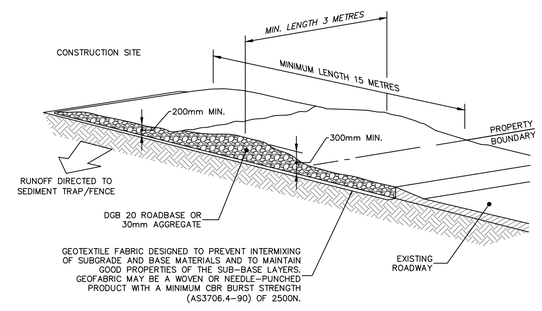
N.T.S.

CONSTRUCTION NOTES:

1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50 LITRES PER SECOND IN THE DESIGN STORM EVENT, USUALLY THE 10-YEAR EVENT.
2. CUT A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 1.5m LONG STAR PICKETS INTO GROUND AT 2.5 METRE INTERVALS (MAX) AT DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. FIX SELF-SUPPORTING GEOTEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH. FIX THE GEOTEXTILE WITH WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.
5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.
6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.



SHAKER RAMP

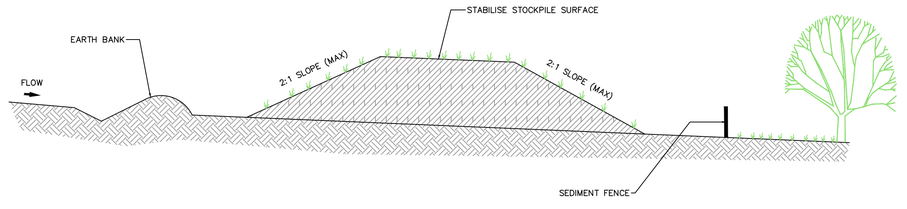


STABILISED SITE ACCESS (SD6-14)

N.T.S.

CONSTRUCTION NOTES:

1. STRIP THE TOPSOIL, LEVEL THE SITE AND COMPACT THE SUBGRADE.
2. COVER THE AREA WITH NEEDLE-PUNCHED GEOTEXTILE.
3. CONSTRUCT A 200mm THICK PAD OVER THE GEOTEXTILE USING ROAD BASE OR 30mm AGGREGATE.
4. ENSURE THE STRUCTURE IS AT LEAST 15 METRES LONG OR TO BUILDING ALIGNMENT AND AT LEAST 3 METRES WIDE.
5. WHERE A SEDIMENT FENCE JOINS ONTO THE STABILISED ACCESS, CONSTRUCT A HUMP IN THE STABILISED ACCESS TO DIVERT WATER TO THE SEDIMENT FENCE.



STOCKPILES (SD4-1)

N.T.S.

CONSTRUCTION NOTES:

1. PLACE STOCKPILES MORE THAN 2 (PREFERABLY 5) METRES FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2 METRES IN HEIGHT.
4. WHERE THEY ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED ESCP OR SWMP TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS (STANDARD DRAWING 5-5) ON THE UPSLOP SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES (STANDARD DRAWING 6-8) 1 TO 2 METRES DOWNSLOPE.

NOTES: -

1. SEDIMENT AND EROSION CONTF URBAN STORMWATER - SOILS SPECIFICATIONS.
2. ALL TOPSOIL TO BE REMOVED TO STOCKPILE LOCATION.
3. STOCKPILE AREA TO BE FULLY TIMES.
4. IMPORTED MATERIAL TO BE PL; IMPORTED MATERIAL IS NOT TC
5. STOCKPILES ARE TO BE REMOV REINSTATED IMMEDIATELY.
6. ALL AREAS DISTURBED DURING SEEDED WITHIN 14 DAYS.
7. SILT FENCES AND HAY BALING ENGINEER AND MAINTAINED AT
8. WHERE PRACTICAL CATCH DRAI TO MINIMISE EXTERNAL RUNOFF
9. CONTROL CLEAN WATER FROM AROUND THE SITE.
10. MAINTAIN ALL EROSION AND SE REHABILITATION IS ACHIEVED.
11. OBTAIN COUNCIL'S PERMISSION
12. CONTRACTOR IS TO UNDERTAKE
13. GRAVEL DIVERSION BAGS TO BI AND @ 20m - 30m INTERVAL! SYSTEM AND TO ACT AS VELO
14. LOCATION OF SILT FENCE DIAG IS TO BE POSITIONED APPROXI
15. KERB INLET CONTROLS TO BE
16. ENSURE SEDIMENT FENCING IS AREAS TO BE REGRADED AND
17. SEDIMENT FENCES TO BE REINF STRAW BALES OR STEEL WIRE
18. GRAVEL FILLED GROYNES ARE TO DIRECT STORMWATER FLOW! ALSO TO BE POSITIONED DOWN OUTLET OR OVERLAND FLOW P.

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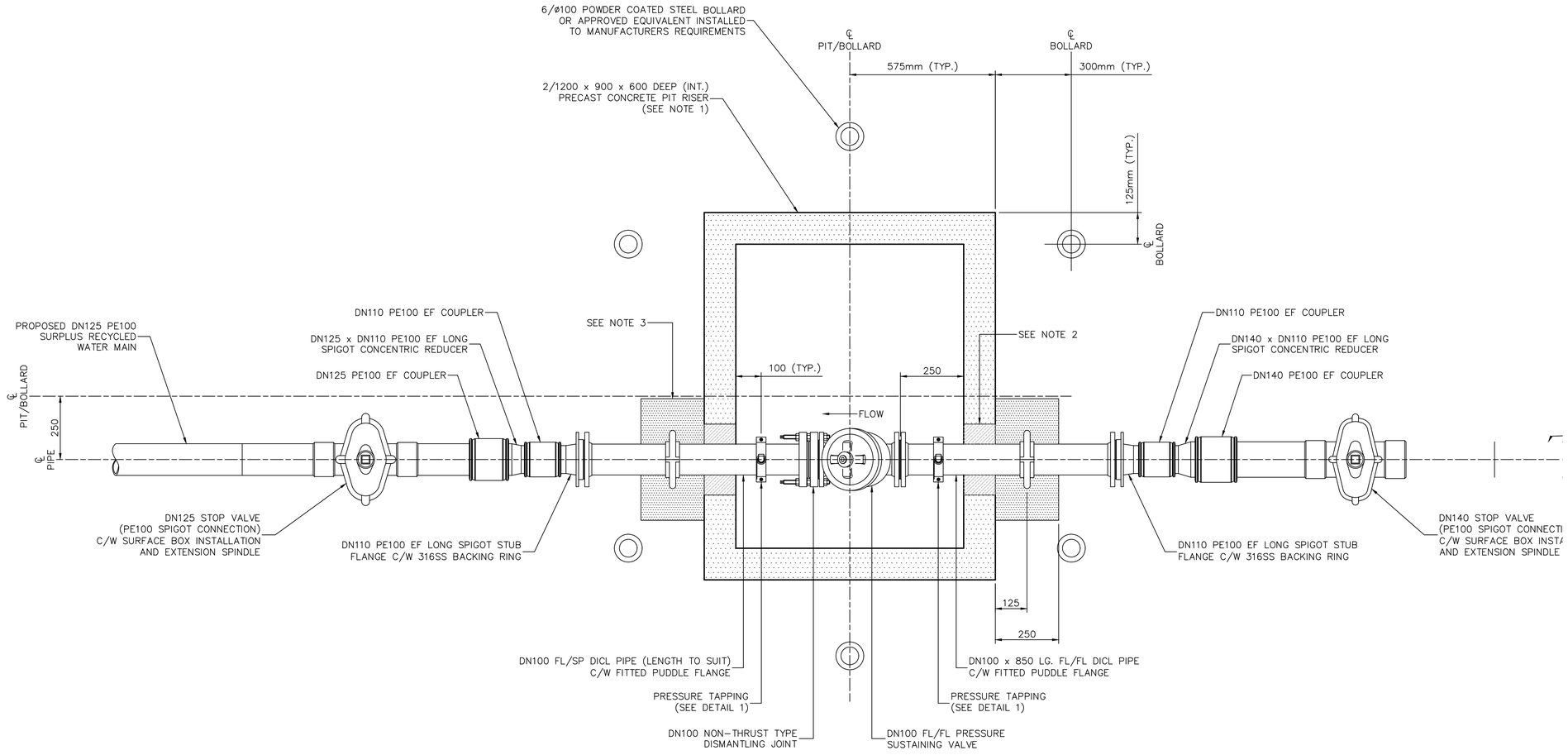
PROJECT No. 11688(13

50mm AT FULL SIZE

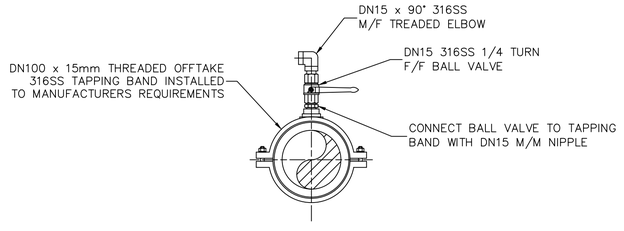


PRESSURE SUSTAINING VALVE (PSV) INSTALLATION DETAILS

SCALE 1:10

NOTES:

1. INSTALL 2/1200 x 900 x 600 DEEP (INT.) PRECAST CONCRETE PIT RISER (125mm WALL THICKNESS) C/W CLASS D TRAFFICABLE CAST IRON COVER. PROVIDE 150mm THICK FREE DRAINING GRAVEL IN BASE OF RISER.
2. BREAKOUT ø280 HOLE IN SIDE WALLS OF PIT TO ALLOW INSTALLATION OF PROPOSED PIPEWORK. AFTER INSTALLATION, FILL VOID AROUND PIPES WITH EPOXY MORTAR.
3. PROVIDE 480 x 480 x 250 THK. N20 CONCRETE BACKING BLOCK, CENTRALLY LOCATED AROUND PIPEWORK ON OUTSIDE WALL OF PRECAST PIT. CLEAN ADJACENT SURFACES AND APPLY EPOXY MORTAR BINDER PRIOR TO PLACEMENT OF BACKING BLOCK.



TYPICAL TAPPING BAND DETAIL

SCALE 1:5

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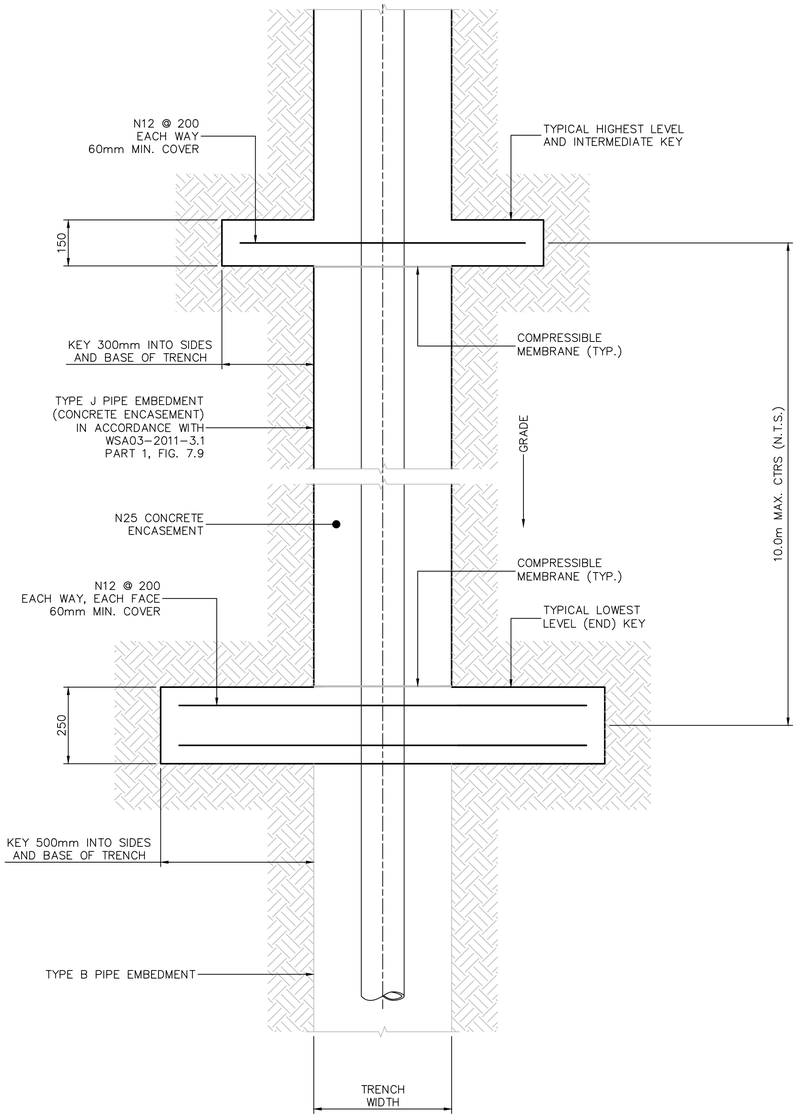
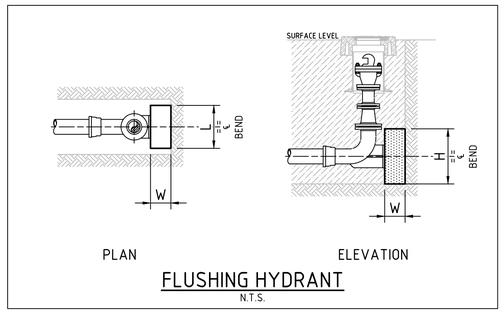


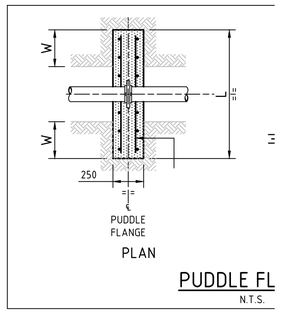
TYPICAL CONCRETE ENCASEMENT KEYING DETAILS

SCALE 1:10



FLUSHING HYDRANT

N.T.S.



PUDDLE FL

N.T.S.

TYPE	FITTING	SOIL STP (Kpa)	DESIGN STP (Kpa)	THRUST	TA (m^2)	LENGTH (L)	HEIGHT (H)	WI (
1	DN150 PUDDLE FLANGE	200	1000	25.00	0.13	1.05	0.70	0.
2	DN80 FLUSHING HYDRANT	200	1000	5.00	0.05	0.40	0.35	0.

SYSTEM TEST PRESSURE (STP) = 1150kPa

THRUST BLOCK NOTES:

1. CONCRETE THRUST BLOCKS ARE TO BE PROVIDED FOR ALL FITTINGS IN ACCORDANCE WITH TABLE.
2. THRUST BLOCK DIMENSIONS ARE BASED ON THE MINIMUM ALLOWABLE HORIZONTAL BEARING PRESSURES OF THE SOIL AS SHOWN. IF GROUND CONDITIONS ENCOUNTERED INDICATE THAT THESE BEARING PRESSURES MAY NOT BE ACHIEVED, THRUST BLOCK DESIGN IS TO BE REVISED.
3. THRUST BLOCKS ARE TO BE CONSTRUCTED SUCH THAT THEY TRANSFER THE THRUST ONTO UNDISTURBED GROUND. THRUST BLOCKS ARE NOT TO INTERFERE WITH OTHER SERVICES.
4. FINISH THRUST BLOCKS APPROXIMATELY 100mm ABOVE THE TOP OF THE FITTING OR BEARING PAD AND EXTEND TO THE FLOOR OF THE TRENCH OR DEEPER IF NECESSARY TO ACHIEVE THE REQUIRED THRUST AREA. MAXIMUM ENCASEMENT TO BE 180°.
5. CONCRETE FOR THE THRUST BLOCKS TO BE GRADE S25 USING CEMENT TYPE "SR" TO AS3972. CONCRETE TO BE MECHANICALLY VIBRATED.
6. CONCRETE THRUST BLOCKS ARE TO BE CURED FOR A MINIMUM OF 7 DAYS BEFORE BEING SUBJECTED TO ANY THRUST LOAD.
7. REFER TO WAT-1205 FOR GENERAL FITTING THRUST BLOCK ARRANGEMENTS.

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H	17.09.2019	RE ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.

SCALES

DESIGN FILE S:\190238\Design\12D\WWPS CONCEPT DESIGN

ALL DIMENSIONS ARE IN METRES. DO NOT SCALE

adw johnson
Hunter Office
Unit 7/335 Hillsborough Rd
Warners Bay N.S.W. 2282
Phone: (02) 4978 5100
Fax: (02) 4978 5199
email: hunter@adwjohnson.com.au
www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT

ROSE

PROPERTY DESCRIPTION

SURPLUS RECYCLED
WATER MAIN
CATHERINE HILL BAY.

SURVEYED ADWJ

DATUM A.H.D.

PROJECT

PLAN TITLE T

PROJECT No. 11688(13

50mm AT FULL SIZE

11688(13)NPWS-RWAT-048(H)

PLAN
SCALE 1: 7500

IPART Part 5 REF APPROVAL

NPWS Part 5 REF APPROVAL

CCC Part 4 DA APPROVAL

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
A	20.11.2018	PRELIMINARY ISSUE	J.N.	R.J.	H.M.	C.B.
B	01.04.2019	AMENDED ISSUE	J.N.	R.J.	H.M.	C.B.
C	03.05.2019	NPWS ISSUE	S.HO.	R.J.	H.M.	C.B.
D	04.07.2019	AMENDED NPWS ISSUE NPWS COMMENTS	J.N.	R.J.	H.M.	C.B.
E	08.07.2019	AMENDED NPWS ISSUE	J.N.	R.J.	H.M.	C.B.
F	02.09.2019	AMENDED NPWS ISSUE – CLIENT COMMENTS	J.N.	R.J.	H.M.	C.B.
G	06.09.2019	ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.
H	17.09.2019	RE ISSUED FOR CONSTRUCTION	J.N.	R.J.	H.M.	C.B.

DESIGN FILE S:\190238\Design\12D\WWPS CONCEPT DESIGN

SCALES

0 150 300 375m

SCALE: 1:7500 (FULL)

ALL DIMENSIONS ARE IN METRES. DO NOT SCALE

adw johnson

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ABN 62 129 445 398

CLIENT

ROSE

PROPERTY DESCRIPTION

SURPLUS RECYCLED WATER MAIN CATHERINE HILL BAY.

SURVEYED ADWJ

DATUM A.H.D.

PROJECT

PLAN TITLE

PROJECT No. 11688(13

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 18/09/19 – 10:26 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) – Issue H (NPWS)\11688(13)NPWS–RWAT–048(H).dwg

LEGEND

- RWTP SITE BOUNDARY
- LOT BOUNDARIES
- MAJOR CONTOURS (NATURAL)
- MINOR CONTOURS (NATURAL)

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
B	12.09.19	COUNCIL COMMENTS	JJ	IB	DATUM: N/A CONTOUR INTERVAL: 0.5m	A1 1:500 (0, 12.5, 25.0m) A3 1:1000	

drawing title:

EXISTING SITE PLAN

location: CATHERINE HILL BAY

council: LAKE MACQUARIE

dwg ref: 211688(61)-ESK-001

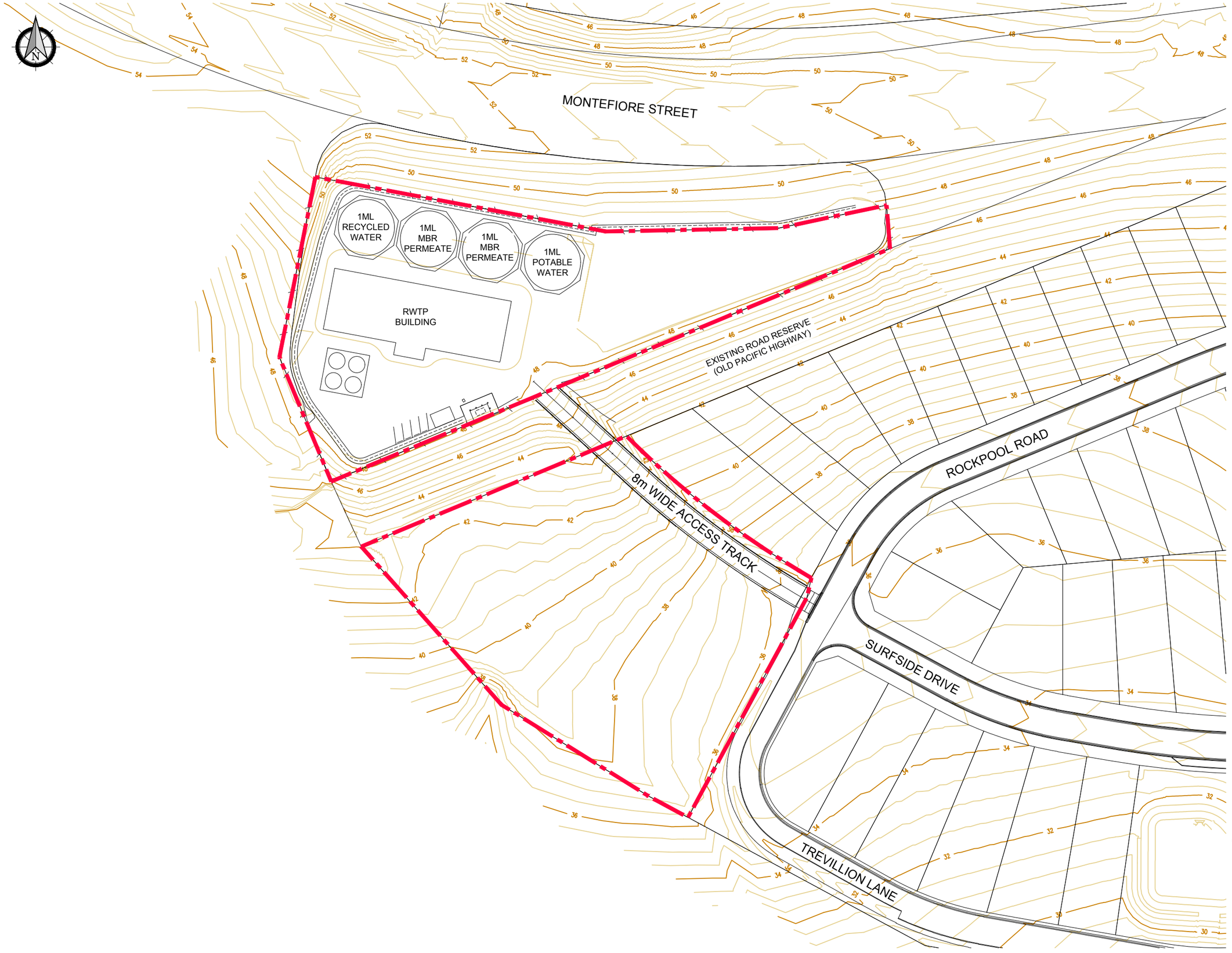
client: SOLO Water Water Utility Solutions

adw johnson
central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
www.adwjohnson.com.au

working beyond expectations

211688(61)-ESK-001-A
Plotted By: Jacob Jackson Plot Date: 12/09/19 1:14:39PM Cad File:S:\211688\211688(61)\DWGS\PLANNING\SKETCHES\211688(61)-ESK-001-A.DWG

This plan includes coloured information. If you have a black and white copy you do not have all of the information. This note is coloured RED.



LEGEND

- RWTP SITE BOUNDARY
- LOT BOUNDARIES
- MAJOR CONTOURS (DESIGN)
- MINOR CONTOURS (DESIGN)

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
B	12.09.19	COUNCIL COMMENTS	JJ	IB	DATUM: N/A CONTOUR INTERVAL: 0.5m	A1 1:500 (0, 12.5, 25.0m) A3 1:1000	

drawing title:

PROPOSED SITE PLAN

location: CATHERINE HILL BAY

council: LAKE MACQUARIE

dwg ref: 211688(61)-ESK-002

client: SOLO Water Water Utility Solutions

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MONTEFIORE STREET

1ML RECYCLED WATER

1ML MBR PERMEATE

1ML MBR PERMEATE

1ML POTABLE WATER

RWTP BUILDING

RWTP PROCESS TANKS

AREA TO BE GRADED TOWARDS SWALE DRAIN AND STABILISED

EXISTING ROAD RESERVE (OLD PACIFIC HIGHWAY)

8m WIDE ACCESS TRACK

LEGEND

- RWTP SITE BOUNDARY
- LOT BOUNDARIES
- MAJOR CONTOURS (DESIGN)
- MINOR CONTOURS (DESIGN)
- SW — PROPOSED STORMWATER
- ex sw — EXISTING STORMWATER
- TURF LINED SWALE
- PROPOSED SW PIT

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
A	14.08.19	PRELIMINARY ISSUE	JJ	IB	DATUM: N/A CONTOUR INTERVAL: 0.5m	A1 1:250 — 0 5.0 10.0 12.5m — A3 1:500	

drawing title:
GENERAL ARRANGEMENT PLAN 1

location: CATHERINE HILL BAY

council: LAKE MACQUARIE

dwg ref: 211688(61)-ESK-003

client: SOLO Water — Water Utility Solutions

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hunter office ph: (02) 4978 5100
www.adwjohnson.com.au

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211688(61)-ESK-003-4-A

RWTP PROCESS TANKS

8m WIDE ACCESS TRACK

8m WIDE ACCESS TRACK

EXISTING PONDS TO BE STRIPPED, FILLED AND STABILISED

ROCKPOOL ROAD

SURFSIDE DRIVE

TREVILLION LANE

ex sw

LEGEND

- RWTP SITE BOUNDARY
- LOT BOUNDARIES
- MAJOR CONTOURS (DESIGN)
- MINOR CONTOURS (DESIGN)
- TURF LINED SWALE

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
B	12.09.19	COUNCIL COMMENTS	JJ	IB	DATUM: N/A CONTOUR INTERVAL: 0.5m	A1 1:250 0 5.0 10.0 12.5m A3 1:500	

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drawing title:
GENERAL ARRANGEMENT PLAN 2

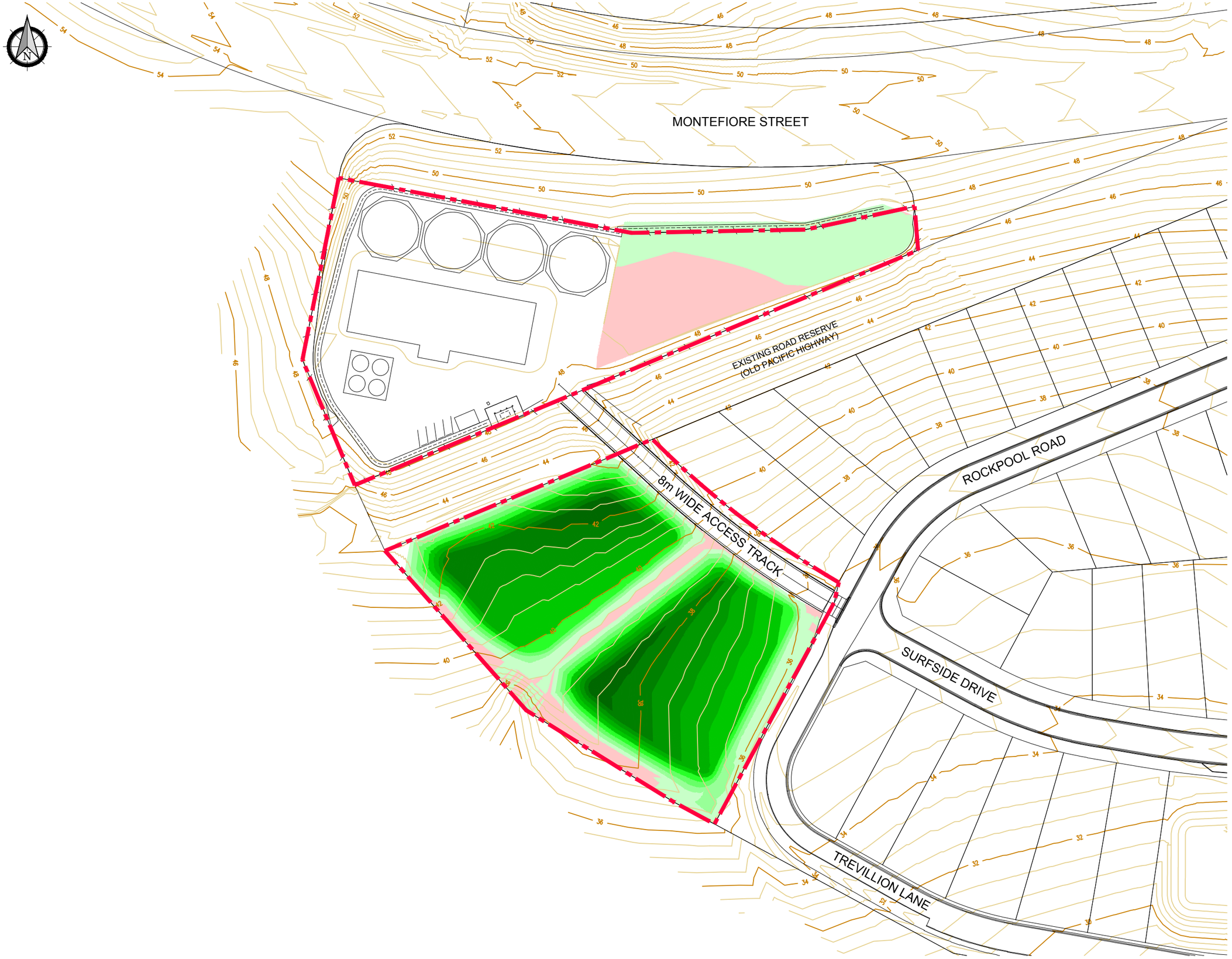
location: CATHERINE HILL BAY

council: LAKE MACQUARIE

dwg ref: 211688(61)-ESK-004

client: SOLO Water Water Utility Solutions

adw johnson
central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
www.adwjohnson.com.au



LEGEND

- RWTP SITE BOUNDARY
- LOT BOUNDARIES

LEGEND (+ FILL - CUT)

Lower value		Upper value		Colour
-1	to	-0.5	m	
-0.5	to	0	m	
0	to	0.5	m	
0.500	to	1	m	
1	to	1.5	m	
1.5	to	2	m	
2	to	2.5	m	
2.5	to	3	m	
3	to	3.5	m	
3.5	to	4	m	
4	to	5	m	

NOTE:
EARTHWORKS EXTENTS HAVE BEEN CALCULATED BASED ON EXISTING APPROVED DESIGN TO NEW DESIGN SURFACE

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
B	12.09.19	COUNCIL COMMENTS	JJ	IB	DATUM: N/A CONTOUR INTERVAL: 0.5m	A1 1:500 — 0 12.5 25.0m — A3 1:1000	

drawing title:

CUT/FILL PLAN

location: CATHERINE HILL BAY

council: LAKE MACQUARIE

dwg ref: 211688(61)-ESK-005

client: SOLO Water — Water Utility Solutions

adw johnson
central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
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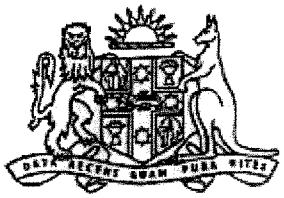


New South Wales

Water Industry Competition Act 2006 (NSW)

Grant of network operator's licence
Licence no. 16_035

I, The Hon. Niall Blair MLC, Minister for Lands and Water, under section 10 of the *Water Industry Competition Act 2006* (NSW), grant a network operator's licence to:

Catherine Hill Bay Water Utility Pty Ltd (ACN 163 381 922)

to construct, maintain and operate water industry infrastructure, subject to:

(i) the conditions imposed by the *Water Industry Competition Act 2006* (NSW);

(ii) the conditions imposed by clause 9 and set out in Parts 1, 2 and 3 of Schedule 1 to the Water Industry Competition (General) Regulation 2008 (NSW);

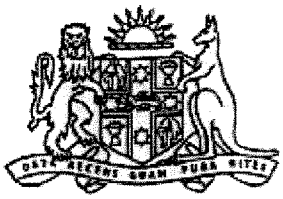
(iii) the conditions imposed by the Minister in the attached Schedule A, being special Ministerially-imposed licence conditions for Catherine Hill Bay Water Utility Pty Ltd's network operator's licence; and

(iv) the conditions imposed by the Minister in the attached Schedule B, being standard Ministerially-imposed licence conditions for all licensed network operators.

.....

Minister for Lands and Water

Dated this 22nd day of March 2016



NEW SOUTH WALES GOVERNMENT

WATER INDUSTRY COMPETITION ACT 2006
(NSW)

NETWORK OPERATOR'S LICENCE

Catherine Hill Bay Water Utility Pty Ltd

(ACN 163 381 922)

LICENCE SCOPE

ACTIVITIES AUTHORISED UNDER THE LICENCE AND AREA OF OPERATIONS

S1 Activities authorised - non-potable water

S1.1 This Licence authorises the Licensee and any authorised persons specified in Table 1.1 to construct, maintain and operate the water industry infrastructure which is specified in Table 1.2, and is substantially consistent with the water industry infrastructure described in the Review of Environmental Factors:

a) for one or more of the authorised purposes specified in Table 1.3; and

b) within the area of operations specified in Table 1.4,

subject to the conditions imposed by or under the Act, the Regulation and this Licence.

Table 1.1 Authorised persons

Solo Water Pty Ltd (ACN 160 013 614)

Table 1.2 Water industry infrastructure

1) A treatment plant for non-potable water and other water infrastructure used, or to be used, in connection with the treatment plant, where components of the treatment plant or the other water infrastructure may also be used for one or more of the following:

   a) production of non-potable water;

   b) treatment of non-potable water;

   c) filtration of non-potable water;

   d) storage of non-potable water; and

   e) conveyance of non-potable water.

2) A reticulation network for non-potable water and other water infrastructure used, or to be used, in connection with the reticulation network, where components of the reticulation network or the other water infrastructure may also be used for one or more of the following:

   a) storage of non-potable water;

   b) conveyance of non-potable water; and

   c) treatment of non-potable water.

Table 1.3 Authorised purposes

Toilet flushing, laundry machine cold water connection, irrigation of private lots and footpaths, outdoor cleaning and washdown (including car and bin washing).

Table 1.4 Area of operations

Lot 100 DP1129872, Lot 101 DP1129872, Lot 106 DP1129872, Lot 1 DP1141989, Lot 1 DP1129299, Lot 103 DP1194707, Lot 101 DP1194707, Lot 102 DP1194707, Lot 213 DP883941, Lot 1 Section I DP163, Lot 1 Section K DP163, Flowers Drive Road Reserve, and Montefiore Street Road Reserve, Catherine Hill Bay.

S2 Activities authorised – drinking water

S2.1 This Licence authorises the Licensee and any authorised persons specified in Table 2.1 to construct, maintain and operate the water industry infrastructure which is specified in Table 2.2, and is substantially consistent with the water industry infrastructure described in the Review of Environmental Factors:

a) for the authorised purposes specified in Table 2.3; and

b) within the area of operations specified in Table 2.4,

subject to the conditions imposed by or under the Act, the Regulation and this Licence.

Table 2.1 Authorised persons

Solo Water Pty Ltd (ACN 160 013 614)

Table 2.2 Water industry infrastructure

A reticulation network for drinking water and other water infrastructure used, or to be used, in connection with the reticulation network, where components of the reticulation network or the other water infrastructure may also be used for one or more of the following:

a) storage of drinking water;
b) conveyance of drinking water; and
c) treatment of drinking water.

Table 2.3 Authorised purposes

Drinking water and fire water

Table 2.4 Area of operations

(a) The area of the transfer pump station on Lot 12 DP598580 and Lot 13 DP598580.

(b) The area of the transfer pipeline on Lot 649 DP1027231, Lot 204 DP1164883, Lot 12 DP1180296, Lot 145 DP755266, Lot 105 DP1129872, Lot 100 DP1129872, Lot 101 DP1129872, Kanangra Drive, Pacific Highway Road Reserve, Montefiore Street Road Reserve, Catherine Hill Bay.

(c) Lot 100 DP1129872, Lot101 DP1129872, Lot 106 DP1129872, Lot 1 DP1141989, Lot 1 DP1129299, Lot 103 DP1194707, Lot 101 DP1194707, Lot 102 DP1194707, Lot 213 DP883941, Lot 1 Section I DP163, Lot 1 Section K DP163, Flowers Drive Road Reserve, and Montefiore Street Road Reserve, Catherine Hill Bay.

S3 Activities authorised – sewerage services

S3.1 This Licence authorises the Licensee and any authorised persons specified in Table 3.1 to construct, maintain and operate the water industry infrastructure which is specified in Table 3.2, and is substantially consistent with the water industry infrastructure described in the Review of Environmental Factors:

a) for one or more of the authorised purposes specified in Table 3.3; and

b) within the area of operations specified in Table 3.4,

subject to the conditions imposed by or under the Act, the Regulation and this Licence.

Table 3.1 Authorised persons

Solo Water Pty Ltd (ACN 160 013 614)

Table 3.2 Water industry infrastructure

1) A treatment plant for sewage and other sewerage infrastructure used, or to be used, in connection with the treatment plant, where components of the treatment plant or the other sewerage infrastructure may also be used for one or more of the following:

   a) production of treated non-potable water from sewage;

   b) treatment of sewage;

   c) filtration of sewage;

   d) storage of sewage; and

   e) conveyance of sewage.

2) A reticulation network for sewage and other sewerage infrastructure used, or to be used, in connection with the reticulation network, where components of the reticulation network or the other sewerage infrastructure may also be used for one or more of the following:

   a) storage of sewage; and

   b) conveyance of sewage.

Table 3.3 Authorised purposes

Sewage collection, transport, treatment, effluent transfer to non-potable water system

Table 3.4 Area of operations

Lot 100 DP1129872, Lot 101 DP1129872, Lot 106 DP1129872, Lot 1 DP1141989, Lot 1 DP1129299, Lot 103 DP1194707, Lot 101 DP1194707, Lot 102 DP1194707, Lot 213 DP883941, Lot 1 Section I DP163, Lot 1 Section K DP 163, Flowers Drive Road Reserve, and Montefiore Street Road Reserve, Catherine Hill Bay.

INTERPRETATION AND DEFINITIONS

Interpretation

In this Licence, unless the context requires otherwise:

(i) the singular includes the plural and vice versa;
(ii) headings are used for convenience only and do not affect the interpretation of this Schedule A;
(iii) a reference to a document includes the document as modified from time to time and any document replacing it;
(iv) a reference to a person includes a natural person and any body or entity whether incorporated or not;
(v) a reference to a clause is to a clause in this Schedule A;
(vi) a reference to a schedule is to a schedule to this Licence;
(vii) a reference to a law or statute includes regulations, rules, codes and other instruments under it, and consolidations, amendments, re-enactments or replacements of them; and
(viii) explanatory notes do not form part of this Licence, but in the case of uncertainty may be relied on for interpretation purposes.

Definitions

Expressions used in this Licence that are defined in the Act or the Regulation have the meanings set out in the Act or the Regulation.

In this Licence:

Act	means the *Water Industry Competition Act 2006* (NSW).
Agreement	means any agreement or deed provided to IPART in connection with the Licensee's application for this Licence.
Appropriate Facilities	means a facility or facilities with the capacity to accept excess recycled water or excess sewage from the Water Industry Infrastructure specified in clause S1 and Table 1.2 and clause S3 and Table 3.2, including during wet weather periods.
Construction Environmental Management Plan (**CEMP**)	means a site or project specific plan which, in relation to construction works: (a) complies with the basic structure detailed in the "Guideline for the Preparation of Environmental Management Plans", Department of Infrastructure, Planning and Natural Resources (2004); and (b) identifies the environmental risks associated with the licensed activities and the mitigation measures to be implemented.
IPART	means the Independent Pricing and Regulatory Tribunal of New South Wales established under the *Independent Pricing and Regulatory Tribunal Act 1992* (NSW).
Licence	means this network operator's licence granted under section 10 of the Act.

Licensee	means Catherine Hill Bay Water Utility Pty Ltd (ACN 163 381 922)
Minister	means the Minister responsible for Part 2 of the Act.
Operational Environmental Management Plan (**OEMP**)	means a site or project specific plan which, in relation to the operational phase: (a) complies with the basic structure detailed in the "Guideline for the Preparation of Environmental Management Plans", Department of Infrastructure, Planning and Natural Resources (2004); and (b) identifies the environmental risks associated with the licensed activities and the mitigation measures to be implemented.
Review of Environmental Factors (**REF**)	means the Review of Environmental Factors for the proposed sewage treatment plant and sewage and recycled water reticulation systems (prepared for IPART by Planit Consulting Pty Ltd, August 2015).
Reporting Manual	means the document entitled "Network Operator's Reporting Manual" which is prepared by IPART and is available on IPART's website at www.ipart.nsw.gov.au.
Regulation	means the *Water Industry Competition (General) Regulation 2008* (NSW).

SCHEDULE A - SPECIAL MINISTERIALLY-IMPOSED LICENCE CONDITIONS FOR CATHERINE HILL BAY WATER UTILITY PTY LTD'S NETWORK OPERATOR'S LICENCE

This schedule sets out the conditions which the Minister imposes pursuant to section 13(1)(b) of the Act. In addition to these special Ministerially-imposed conditions, the Licence is subject to conditions imposed by the Act, the Regulation and the standard Ministerially-imposed licence conditions set out in Schedule B. The Minister may vary the conditions in this schedule or impose new conditions, provided there is no inconsistency with the conditions imposed by the Act or the Regulation.

A1 If a party to an Agreement proposes to:

a) terminate the Agreement;
b) novate the Agreement;
c) assign or transfer any of its rights or obligations under the Agreement to any other person; or
d) alter the Agreement in any way that materially reduces the Licensee's technical, financial or organisational capacity to carry out the activities authorised by this Licence,

the Licensee must provide IPART with written notice as soon as practicable, but no later than 3 months, before the time when the proposed action is to occur. The written notice must include details of how the service provided under the Agreement will be provided subsequent to the proposed termination, novation, assignment, transfer or alteration.

A2 The Licensee is to implement environmental mitigation measures substantially consistent with the environmental risk mitigation measures identified in:

a) the Review of Environmental Factors (**REF**) in carrying out any activities authorised under clause S1 and S3 of this Licence.

A3 The Licensee must not commence, or authorise the commencement of, construction of any water industry infrastructure which is:

a) described in Clause S1 and Table 1.2; and
b) described in Clause S3 and Table 3.2.

(**Relevant Recycling Infrastructure**)

until after the Licensee has provided IPART with a Construction Environmental Management Plan (**CEMP**), and IPART has provided written approval of the CEMP to the Licensee.

A4 In addition to any requirements imposed by or under the Act or the Regulation, the Licensee must not commence commercial operation of, or authorise commercial operation of, the Relevant Recycling Infrastructure until the Licensee has provided:

a) a report addressing how the environmental mitigation measures identified in the CEMP have been implemented during the design and construction of the Relevant Recycling Infrastructure (**Report**); and
b) an Operational Environmental Management Plan (**OEMP**),

to IPART, and IPART has provided written approval of the Report and the OEMP to the Licensee.

A5 The Licensee must operate and maintain the Relevant Recycling Infrastructure consistently with the OEMP.

A6 If the Licensee proposes to vary its environmental mitigation measures referred to in clause A2, it must first notify IPART in accordance with the Reporting Manual. The Licensee must not vary its environmental mitigation measures without the prior written approval of IPART.

A7 As at the date of this Licence, the Licensee must have an unconditional bank guarantee executed in its favour which is:

a) for a value of $2.5 million (two million and five hundred thousand dollars); and
b) for a term of at least five years from the day of the grant of this Licence (and such further term as directed in writing by the Minister),

and provide a certified copy of the bank guarantee to the Minister or IPART on request.

A8 The Licensee must not commence, or authorise the commencement of, construction of any water industry infrastructure described in clause S1.1 and Table 1.2 paragraph (1) until:

(a) the Licensee has provided IPART a report prepared by a suitably qualified environmental consultant on the Licensee's proposed strategy of tankering out excess non-potable water as set out in its REF. The report should include:
    i) modelling of truck movements during significant wet weather events or periods in the 10 year period prior to the grant of this Licence at times when irrigation would not have been undertaken;
    ii) an estimation of the costs of trucking during those wet weather events or periods;
    iii) identification of Appropriate Facilities that have the capacity to accept excess recycled water (including during wet weather periods);
    iv) evidence of agreements with the Appropriate Facilities setting out the arrangements for accepting excess non-potable water; and
    v) confirmation that the configuration and size of the non-potable water storage tanks (as described in the REF) is adequate for the activities authorised by the Licence or, if the configuration or size of the non-potable water storage tanks is not considered adequate, advice as to any changes required to the configuration or size of the non-potable water storage tanks; and
(b) IPART has provided written approval of the report.

A9 Before the Licensee brings the Water Industry Infrastructure described in Table 3.2 into commercial operation, the Licensee must provide written evidence of the following to IPART:

a) details of Appropriate Facilities that have the capacity to accept excess sewage; and
b) evidence of agreements with the Appropriate Facilities setting out the arrangements for accepting excess sewage,

and the Licensee must obtain IPART's written approval.

SCHEDULE B - STANDARD MINISTERIALLY-IMPOSED LICENCE CONDITIONS FOR ALL LICENSED NETWORK OPERATORS UNDER THE ACT

This schedule sets out the standard conditions which the Minister imposes on the Licensee and all other licensed network operators pursuant to section 13(1)(b) of the Act. In addition to these standard Ministerially-imposed conditions, the Licensee is subject to obligations imposed by the Act, the Regulation and the special Ministerially-imposed licence conditions set out in Schedule A. The Minister may vary the conditions in this schedule or impose new conditions, provided there is no inconsistency with the conditions imposed on the Licensee by the Act or the Regulation.

B1 Ongoing capacity to operate

B1.1 The Licensee must have the technical, financial and organisational capacity to carry out the activities authorised by this Licence. If the Licensee ceases to have this capacity, it must report this to IPART immediately in accordance with the Reporting Manual.

B2 Obtaining appropriate insurance

B2.1 Before commencing to commercially operate the Specified Water Industry Infrastructure under this Licence, the Licensee must:

a) obtain insurance that is appropriate for the size and nature of the activities authorised under this Licence;

b) provide a copy of each certificate of currency of the insurance obtained to IPART; and

c) demonstrate that the insurance obtained is appropriate for the size and nature of the activities authorised under this Licence by providing a report to IPART from an Insurance Expert that:

i) certifies that in the Insurance Expert's opinion, the type and level of the insurance obtained by the Licensee is appropriate for the size and nature of the activities authorised under the Licence; and

ii) is in the form prescribed by the Reporting Manual.

B2.2 [Not applicable]

B3 Maintaining appropriate insurance

B3.1 The Licensee must maintain insurance that is appropriate for the size and nature of the activities authorised under this Licence.

B3.2 The Licensee must provide a copy of each certificate of currency of the insurance maintained by the Licensee to IPART in accordance with the Reporting Manual.

B3.3 If there is to be a change in:

a) the insurer or underwriting panel in respect of an insurance policy held by the Licensee; or

b) the type, scope or limit on the amount of insurance held by the Licensee,

in relation to the activities authorised under this Licence, the Licensee must provide a report to IPART in accordance with the Reporting Manual.

B3.4 From time to time when requested in writing by IPART, the Licensee must provide a report to IPART, in the manner, form and time specified by IPART, from an Insurance Expert certifying that in the Insurance Expert's opinion the type, scope or limit on the amount of the insurance held by the Licensee is appropriate for the size and nature of the activities authorised under this Licence.

[Note: The circumstances in which IPART may request a report under clause B3.4 include (but are not limited to) the following:

- *where IPART has reason to believe that there may be a change in the type, scope or limit on the amount of insurance held by the Licensee in relation to activities authorised under this Licence;*
- *where there is a change in the type or extent of activities authorised under this Licence; or*
- *where IPART or an approved auditor has reason to believe that the type, scope or limit on the amount of insurance held by the Licensee may not be appropriate for the size and nature of the activities authorised under this Licence.]*

B3.5 The Licensee must maintain professional indemnity insurance during the Design Phase and for a minimum period of 6 years from the date of the completion of the Design Phase.

B4 Complying with NSW Health requirements

B4.1 The Licensee must carry out the activities authorised by this Licence in compliance with any requirements of NSW Health that:

a) IPART has agreed to; and

b) are notified from time to time to the Licensee by IPART in writing.

B5 Complying with Audit Guidelines from IPART

B5.1 The Licensee must comply with any Audit Guidelines issued by IPART.

B6 Reporting in accordance with the Reporting Manual

B6.1 The Licensee must prepare and submit reports in accordance with the Reporting Manual.

B7 Reporting information in relation to the Register of Licences

B7.1 Within 14 days of any change in relation to the following, the Licensee must notify IPART, and provide details, of the change in accordance with the Reporting Manual:

a) any source from which the water handled by the Specified Water Industry Infrastructure is derived;

b) the Authorised Purposes of the water handled by the Specified Water Industry Infrastructure;

c) the identity of each licensed retail supplier or public water utility that has access to the infrastructure services provided by the Specified Water Industry Infrastructure for the purpose of supplying water to its customers;

d) any other water infrastructure to which the Specified Water Industry Infrastructure is connected;

e) the identity of each licensed retail supplier or public water utility that has access to infrastructure services provided by the Specified Water Industry Infrastructure for the purpose of providing sewerage services to its customers;

f) any other sewerage infrastructure to which the Specified Water Industry Infrastructure is connected;

g) the arrangements for the disposal of waste from the Specified Water Industry Infrastructure.

B8 Monitoring

B8.1 The Licensee must undertake any monitoring that is required for the purposes of this Licence, any Plan, the Act or the Regulation in accordance with this clause B8.

B8.2 The Licensee must keep the following records of any samples taken for monitoring purposes specified in the Water Quality Plan:

a) the date on which the sample was taken;
b) the time at which the sample was collected;
c) the point or location at which the sample was taken; and
d) the chain of custody of the sample (if applicable).

B8.3 The Licensee must ensure that analyses of all samples taken for the purposes of Verification Monitoring are carried out by a laboratory accredited for the specified tests by an independent body that is acceptable to NSW Health, such as the National Association of Testing Authorities or an equivalent body.

B9 Provision of copy of Plan

B9.1 Whenever the Licensee makes a significant amendment to a Plan, the Licensee must provide a copy of the amended Plan to IPART at the same time that it provides a copy to the approved auditor engaged to prepare a report as to the adequacy of the amended Plan, as required under the Regulation.

B10 Delineating responsibilities – interconnections

B10.1 If a code of conduct has not been established under reg 25 of the Regulation, the Licensee must (by a date specified by IPART) establish a code of conduct (**Licensee's Code of Conduct)** in accordance with this clause B10.

B10.2 The Licensee's Code of Conduct must set out the respective responsibilities of:

a) the Licensee; and
b) each licensed network operator, licensed retail supplier and/or public water utility that:
   (i) supplies water or provides sewerage services by means of, or
   (ii) constructs, maintains or operates any water industry infrastructure that is connected to the Specified Water Industry Infrastructure,

by, at a minimum, providing for:

c) who is responsible for repairing, replacing or maintaining any pipes, pumps, valves, storages or other infrastructure connecting the Specified Water Industry Infrastructure to the other water industry infrastructure;
d) who is responsible for water quality;
e) who is liable in the event of the unavailability of water;
f) who is liable in the event of failure of the Specified Water Industry Infrastructure;
g) the fees and charges payable in respect of the use of the Specified Water Industry Infrastructure; and
h) who is responsible for handling customer complaints.

B10.3 Before the Licensee brings the Specified Water Industry Infrastructure into commercial operation or by a later date specified by IPART (if any), the Licensee's Code of Conduct must be agreed in writing between the Licensee and the other licensed network operators, licensed retail suppliers and/or public water utilities referred to in clause B10.2.

B10.4 [Not applicable]

B10.5 The Licensee must not contravene the Licensee's Code of Conduct to the extent that it makes the Licensee responsible or liable for the matters set out in it.

B11 Notification of changes to end-use

B11.1 If the Licensee proposes to operate the Specified Water Industry Infrastructure to supply water for an end-use which is not set out in the most recent Water Quality Plan provided to IPART, the Licensee must notify IPART in writing at least 3 months before commencing such operation.

B12 Notification of changes to Authorised Person

B12.1 If an Authorised Person ceases, proposes to cease, or receives notification to cease providing any of the services relating to the activities authorised by this Licence, the Licensee must provide IPART with written notice as soon as practicable but no later than 28 days before the date of cessation of the services. The written notice must include details of how the services previously undertaken by the Authorised Person will continue to be undertaken.

B13 Notification of commercial operation

B13.1 This clause B13 applies each time the Licensee has brought any of the Specified Water Industry Infrastructure into commercial operation.

B13.2 The Licensee must:

a) notify IPART in accordance with the Reporting Manual that it has brought the relevant Specified Water Industry Infrastructure into commercial operation; and

b) provide such notification within 10 days after it has brought the relevant Specified Water Industry Infrastructure into commercial operation.

INTERPRETATION AND DEFINITIONS

Interpretation

In this Schedule B, unless the context requires otherwise:

(i) the singular includes the plural and vice versa;
(ii) headings are used for convenience only and do not affect the interpretation of this Schedule B;
(iii) a reference to a document includes the document as modified from time to time and any document replacing it;
(iv) a reference to a "person" includes a natural person and any body or entity whether incorporated or not;
(v) a reference to a clause is to a clause in this Schedule B;
(vi) a reference to a schedule is to a schedule to this Licence;

(vii) a reference to a law or statute includes regulations, rules, codes and other instruments under it, and consolidations, amendments, re-enactments or replacements of them; and

(viii) explanatory notes do not form part of this Licence, but in the case of uncertainty may be relied on for interpretation purposes.

Definitions

Expressions used in this Schedule B that are defined in the Act or the Regulation have the meanings set out in the Act or the Regulation.

In this Schedule B:

Audit Guidelines	means the document entitled "Audit Guideline – Water Industry Competition Act 2006" which is prepared by IPART and is available on IPART's website at www.ipart.nsw.gov.au, and any other guidelines issued by IPART in relation to audits under the Act.
Authorised Person	means the authorised persons specified in, as applicable: (i) Licence Scope, clause S1, Table 1.1; (ii) Licence Scope, clause S2, Table 2.1; and (iii) Licence Scope, clause S3, Table 3.1.
Authorised Purposes	means the authorised purposes specified in, as applicable: (i) Licence Scope, clause S1, Table 1.3; (ii) Licence Scope, clause S2, Table 2.3; and (iii) Licence Scope, clause S3, Table 3.3.
Design Phase	means the period during which any design works are carried out in relation to the water industry infrastructure that the Licensee is authorised to construct, maintain and operate under this Licence.
Insurance Expert	means an insurance broker which holds an Australian financial services licence under Part 7.6 of the *Corporations Act 2001* (Cth) that authorises the broker to provide financial product advice for, and deal in, contracts of insurance within the meaning of Chapter 7 of that Act.
Licensee's Code of Conduct	has the meaning given in clause B10.1.
NSW Health	means the Water Unit of NSW Ministry of Health and any of the local health districts as defined by the NSW Ministry of Health.
Plan	means any infrastructure operating plan, water quality plan or sewage management plan that the Licensee is required to prepare under the Regulation.
Specified Area of Operations	means the area of operations specified in, as applicable: (i) Licence Scope, clause S1, Table 1.4; (ii) Licence Scope, clause S2, Table 2.4; and (iii) Licence Scope, clause S3, Table 3.4.
Specified Water Industry	means the water industry infrastructure specified in, as applicable: (i) Licence Scope, clause S1, Table 1.2;

Infrastructure	(ii) Licence Scope, clause S2, Table 2.2; and (iii) Licence Scope, clause S3, Table 3.2.
Verification Monitoring	means verification monitoring as described in the document entitled "Australian Drinking Water Guidelines" or the document entitled "Australian Guidelines for Water Recycling" as the case may be.
Water Quality Plan	means the water quality plan that the Licensee is required to prepare under the Regulation.

NSW GOVERNMENT

New South Wales

Water Industry Competition Act 2006 (NSW)

Notice of approval to bring new infrastructure into commercial operation

I, The Hon. Don Harwin, MLC, Minister for Energy and Utilities, under clause 2 of Schedule 1 to the *Water Industry Competition (General) Regulation 2008* (NSW) (**Regulation**), approve Catherine Hill Bay Water Utility Pty Ltd (ACN 163 381 922) (**CHBWU**) to bring into commercial operation, all new infrastructure which:

a) is infrastructure to which CHBWU's network operator's licence (licence no. 16_035) (**Licence**) applies;
b) existed as at 25 November 2018; and
c) is of the kind described in Tables 1.2 and 3.2 of the Licence.

I have considered the request from CHBWU for this approval, as well as the following report, which was prepared by an 'approved auditor' within the meaning of the Regulation.

a) "Catherine Hill Bay Water Utility: New Infrastructure Audit Report (Stage 2 Scheme), dated 25 November 2018, (included as **Attachment A**).

I am satisfied that the report indicates that the new infrastructure:

a) complies with the requirements of the Regulation and the conditions of the Licence; and
b) is capable of operating safely and in accordance with CHBWU's infrastructure operating plan and water (non-potable) quality plan.

.....

The Hon. Don Harwin, MLC
Minister for Energy and Utilities

Dated this 13th day of December 2018

New South Wales

Water Industry Competition Act 2006 (NSW)

Notice of approval to bring new infrastructure into commercial operation

I, The Hon. Don Harwin, MLC, Minister for Energy and Utilities, under clause 2 of Schedule 1 to the *Water Industry Competition (General) Regulation 2008* (NSW) (**Regulation**), approve Catherine Hill Bay Water Utility Pty Ltd (ACN 163 381 922) (**CHBWU**) to bring into commercial operation, all new infrastructure which:

a) is infrastructure to which CHBWU's network operator's licence (licence no. 16_035) (**Licence**) applies;
b) existed as at 25 November 2018; and
c) is of the kind described in Table 2.2 of the Licence.

I have considered the request from CHBWU for this approval, as well as the following report, which was prepared by an 'approved auditor' within the meaning of the Regulation.

a) "Catherine Hill Bay Water Utility: New Infrastructure Audit Report (Stage 2 Scheme), dated 25 November 2018, (included as **Attachment A**).

I am satisfied that the report indicates that the new infrastructure:

a) complies with the requirements of the Regulation and the conditions of the Licence; and
b) is capable of operating safely and in accordance with CHBWU's infrastructure operating plan and water quality plan (drinking water).

The Hon. Don Harwin, MLC
Minister for Energy and Utilities

Dated this 18th day of January 2019

NSW GOVERNMENT

New South Wales

Water Industry Competition Act 2006 (NSW)

Notice of approval to bring new infrastructure into commercial operation

I, The Hon. Donald Harwin, MLC, Minister for Energy and Utilities, under clause 2 of Schedule 1 to the *Water Industry Competition (General) Regulation 2008* (NSW) (**Regulation**), approve Catherine Hill Bay Water Utility Pty Ltd (ACN 163 381 922) (**CHBWU**) to bring into commercial operation, all new infrastructure which:

a) is infrastructure to which CHBWU's network operator's licence (licence no. 16_035) (Licence) applies;
b) existed as at 4 July 2017; and
c) is of the kind described in each of Table 1.2, Table 2.2 and Table 3.2 of the Licence.

I have considered the request from CHBWU for this approval, as well as the following report, which was prepared by an 'approved auditor' within the meaning of the Regulation.

a) "Catherine Hill Bay Water Utility – New Infrastructure Audit", dated August 2017 (included as **Attachment A**).

I am satisfied that the report indicates that the new infrastructure:
a) complies with the requirements of the Regulation and the conditions of the Licence; and
b) is capable of operating safely and in accordance with CHBWU's infrastructure operating plan, water quality plan and sewage management plan.

.....
The Hon. Donald Harwin, MLC
Minister for Energy and Utilities

Dated this 27th day of October 2017

211688(61)-ESK-010

GWANDALAN WWTP

PROPOSED EXTENSION TO AREA OF OPERATIONS

NORDS WHARF

CATHERINE HILL BAY

CHAIN VALLEY BAY

MOONEE

MGA

LEGEND

EXISTING AREA OF OPERATIONS

PROPOSED AREA OF OPERATIONS

PLAN
SCALE 1:10000

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
A	27.11.19	INITIAL ISSUE	DPT	IB	DATUM: N/A CONTOUR INTERVAL: N/A	0 250 500m SCALE: 1:10,000 (FULL)	

drawing title:

AREA OF OPERATIONS

location: SURPLUS RECYCLED WATER MAIN, CATHERINE HILL BAY

council: LAKE MACQUARIE CITY COUNCIL

dwg ref: 211688(61)-ESK-010

client:

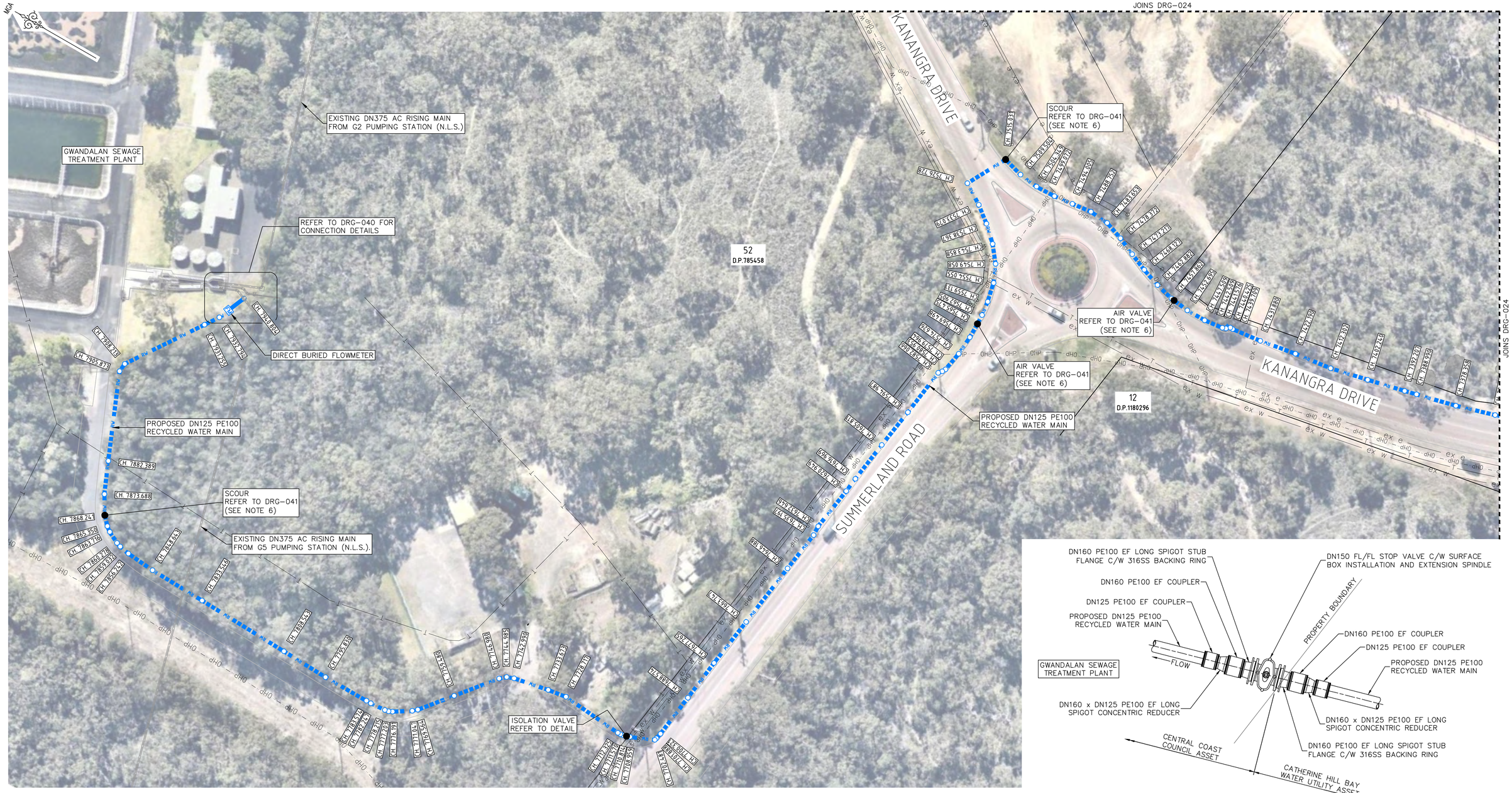
adw johnson

central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
sydney office ph: (02) 8046 7411

www.adwjohnson.com.au

working beyond expectations

11688(13)NPWS-RWAT-001 to 026(E)



ISOLATION VALVE DETAIL
SCALE 1:20

LEGEND

- PROPOSED ISOLATION VALVE
- RW — PROPOSED PE100 RECYCLED WATER MAIN
- EXISTING PROPERTY BOUNDARY
- ex w — EXISTING WATERMAIN
- T — T — EXISTING TELECOMMUNICATIONS
- ex e — EXISTING UNDERGROUND POWER
- OHP — OHP — OHP — EXISTING OVERHEAD POWER

PLAN
SCALE 1:500

NOTES:

1. EXISTING SERVICES SHOWN HAVE NOT BEEN LOCATED BY SURVEY AND ARE INDICATIVE ONLY. THE CONTRACTOR IS TO VERIFY THE POSITIONS AND LEVELS OF ALL EXISTING SERVICES, PIPES, CABLES AND CONDUITS.
2. H.D. POLYETHYLENE PIPE SHALL NOT BE BENT TO A RADIUS LESS THAN MANUFACTURERS RECOMMENDATIONS. IF THE PROPOSED ALIGNMENT CAN NOT BE ACHIEVED BY BENDING THE PIPE THE CONTRACTOR IS TO USE ELECTROFUSION FITTINGS TO ACHIEVE REQUIRED DEFLECTIONS.
3. REFER TO DRG-026 FOR RECYCLED WATER MAIN SETOUT DETAILS.
4. SEDIMENT AND EROSION CONTROLS TO BE IN PLACE PRIOR TO CONSTRUCTION WORKS WITHIN AREA. SEDIMENT AND EROSION CONTROLS TO BE PROVIDED IN ACCORDANCE WITH THE DEPARTMENT OF ENVIRONMENT AND CONSERVATION'S RESOURCE GUIDE FOR LOCAL COUNCILS.
5. ANY DISTURBANCE TO IMPROVED AREAS TO BE FULLY REINSTATED ON INSTALLATION OF PIPELINE TO PRE-EXISTING CONDITIONS TO THE SATISFACTION OF THE APPROVING AUTHORITY.
6. LOCATIONS SHOWN FOR SCOUR AND AIR VALVE INSTALLATIONS ARE INDICATIVE ONLY. CONTRACTOR IS TO INSTALL SCOURS AT LOCAL LOW POINTS AND AIR VALVES AT LOCAL HIGH POINTS. REFER TO DRG-041 FOR TYPICAL INSTALLATION DETAILS.
7. WHERE NECESSARY, REMOVE EXISTING POST AND WIRE GUARDRAIL FENCE ALONG KANANGRA DRIVE TO ALLOW CONSTRUCTION OF PROPOSED RECYCLED WATERMAIN. FOLLOWING INSTALLATION OF WATERMAIN, REINSTATE/REPLACE FENCING TO MATCH EXISTING.
8. PIPE ALIGNMENT ALONG KANANGRA DRIVE AND SUMMERLAND ROAD IS TO BE NOM. 450mm OFFSET FROM EDGE OF EXISTING BITUMEN U.N.O.

DIAL1100 BEFORE YOU DIG

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
A	20.11.2018	PRELIMINARY ISSUE	J.N.	R.J.	H.M.	C.B.
B	01.04.2019	AMENDED ISSUE	J.N.	R.J.	H.M.	C.B.
C	03.05.2019	NPWS ISSUE	S.HO.	R.J.	H.M.	C.B.
D	04.07.2019	AMENDED NPWS ISSUE NPWS COMMENTS	J.N.	R.J.	H.M.	C.B.
E	08.07.2019	AMENDED NPWS ISSUE	J.N.	R.J.	H.M.	C.B.

SCALES: 0 10 20 A1 □ A3 1:500 □ 1:1000

DESIGN FILE S:\190238\Design\12D\WWPS CONCEPT DESIGN

ALL DIMENSIONS ARE IN METRES. DO NOT SCALE

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email: hunter@adwjohnson.com.au
www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION
RECYCLED WATER MAIN CATHERINE HILL BAY.

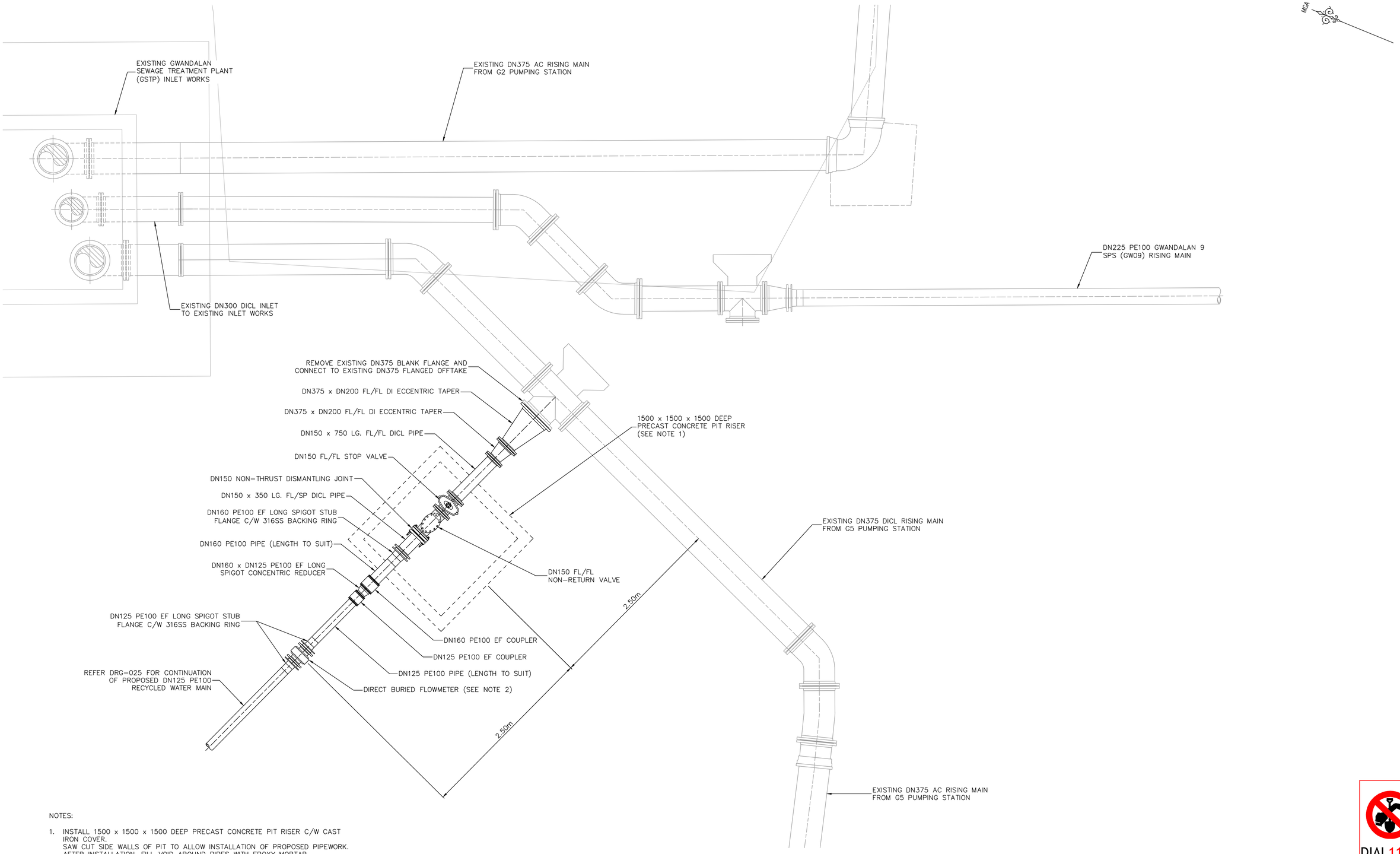
SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT: RECYCLED WATER MAIN
PLAN TITLE: RECYCLED WATER MAIN ALIGNMENT PLAN - SHEET 23

PROJECT No. 11688(13)NPWS – DISCIPLINE RWAT – NUMBER 025 REV. E

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 12/07/19 – 09:17 Cad File: C:\Users\jaysonn\appdata\local\temp\AcPublish_5844\11688(13)NPWS-RWAT-001 to 026(E).dwg



INLET WORKS CONNECTION DETAIL

SCALE 1:25

NOTES:

1. INSTALL 1500 x 1500 x 1500 DEEP PRECAST CONCRETE PIT RISER C/W CAST IRON COVER.
   SAW CUT SIDE WALLS OF PIT TO ALLOW INSTALLATION OF PROPOSED PIPEWORK.
   AFTER INSTALLATION, FILL VOID AROUND PIPES WITH EPOXY MORTAR.
   PROVIDE 150mm THICK FREE DRAINING GRAVEL IN BASE OF RISER.
2. CONTRACTOR TO EXTEND POWER AND COMMS FROM GWANDALAN WWTP NEAREST AVAILABLE CONNECTION OUT TO FLOWMETER LOCATION INCLUSIVE OF ANY INTERMEDIATE PITS AS MAY BE REQUIRED.
   CONTRACTOR TO CONFIRM WORKS WITH CCC PLANT OPERATOR PRIOR TO COMMENCEMENT.

DIAL1100 BEFORE YOU DIG

PRELIMINARY ISSUE
NOT FOR CONSTRUCTION

REV.	DATE	AMENDMENT	DRAWN	CHECK	DESIGN	VERIFY
A	20.11.2018	PRELIMINARY ISSUE	J.N.	R.J.	H.M.	C.B.
B	01.04.2019	AMENDED ISSUE	J.N.	R.J.	H.M.	C.B.
C	03.05.2019	NPWS ISSUE	S.HO.	R.J.	H.M.	C.B.
D	04.07.2019	AMENDED NPWS ISSUE NPWS COMMENTS	J.N.	R.J.	H.M.	C.B.
E	08.07.2019	AMENDED NPWS ISSUE	J.N.	R.J.	H.M.	C.B.

DESIGN FILE S:\190238\Design\12D\WWPS CONCEPT DESIGN

SCALES

ALL DIMENSIONS ARE IN METRES. DO NOT SCALE

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email: hunter@adwjohnson.com.au
www.adwjohnson.com.au
ABN 62 129 445 398

CLIENT: ROSE

PROPERTY DESCRIPTION
RECYCLED WATER MAIN
CATHERINE HILL BAY.

SURVEYED: ADWJ
DATUM: A.H.D.

PROJECT: RECYCLED WATER MAIN

PLAN TITLE: INLET WORKS CONNECTION DETAILS

PROJECT No.	DISCIPLINE	NUMBER	REV.
11688(13)NPWS	RWAT	040	E

50mm AT FULL SIZE

Plotted By: jaysonn Plot Date: 12/07/19 - 09:23 Cad File: N:\11688(13)\Drawings\Engineering\Water & Sewer\Recycled Watermain\11688(13) - Issue E (NPWS)\11688(13)NPWS-RWAT-040 to 041(E).dwg

Scheme: Catherine Hill Bay Water Utility
Stage: RWTP Stage 3 - Surplus Recycled Water Transfer Main
Title: Recycled Water Risk Assessment
Revision: Revision 3.1
Date: 22/05/2019

Scope: The Sewerage Risk Assessment covers the sewerage network.
The Recycled Water Risk Assessment covers the source water, treatment processes, water quality and the supply of recycled water to end users.

Ref	Scheme Component	Hazard	Hazardous Event	Impact	Unmitigated Risk					Control Strategy	Mitigated Risk					CCP ? (Yes/No)	Comments
					Likelihood		Consequence		Risk		Likelihood		Consequence		Risk		
72	Use of recycled water in construction and maintenance related activities	Pathogens	Construction worker exposure	Pathogen exposure	C	Possible	3	Moderate	High	1. High quality recycled water is suitable for construction uses. 2. Contractor to develop procedures for using recycled water in construction prior to supply.	A	Rare	2	Minor	Low	No	
73	Use of recycled water in construction and maintenance related activities	Nutrients	Over use	Potential nutrient impacts	C	Possible	2	Minor	Moderate	1. Low nutrient concentration do not pose a risk if used appropriately for dust supression and construction water. 2. Contractor to develop procedures for using recycled water in construction prior to supply.	B	Unlikely	1	Insignificant	Low	No	
74	Use of recycled water in construction and maintenance related activities	Cross contamination	Use of incorrect tanker truck, e.g. drinking water tanker or wastewater tanker.	Pathogen exposure	C	Possible	4	Major	Very High	1. High quality recycled water. 2. Contractor to develop procedures for using recycled water in construction prior to supply.	B	Unlikely	3	Moderate	Moderate	No	
75	Surplus Recycled Water Transfer Pump Station	Pump Station Failure	Mechanical failure of the pump	Loss of transfer capacity leading to potential overflow from 2 ML storage	D	Likely	3	Moderate	High	1. Emergency spare pump maintained in stock onsite for quick changeover as required. 2. Conservative design criteria and low pump run hours provides ample time to undertake repairs or replacement of pump if required. 3. SCADA system used to monitor pump health and will automatically raise alarms for all pump fault and fail to start events. 4. Use of the reputable pump manufacturer grundfos. 5. Operate and maintain the pump to manufacturer recommendations. 6. If required during extended failure, road tanker pump out can be used.	B	Unlikely	2	Minor	Low	No	
76	Surplus Recycled Water Transfer Pump Station	Pump Station Failure	Power outage	Loss of transfer capacity leading to potential overflow from 2 ML storage	D	Likely	3	Moderate	High	1. Power failure detection and alarms included on SCADA systems. 2. Emergency standby generator with auto changeover switch. 3. Conservative design criteria and low pump run hours provides means power can go out for extended periods with minimal impact. 4. 2 ML permeate tank provide substantial storage. 5. If required during extended power outage and generator failure, road tanker pump out can be used.	B	Unlikely	2	Minor	Low	No	
77	Surplus Recycled Water Transfer Pump Station	Pump Station Failure	Comm/SCADA outage	Loss of transfer capacity leading to potential overflow from 2 ML storage	D	Likely	3	Moderate	High	1. Control system designed with local PLC control so the pump will continue to operate during a ccommunications or SCADA failure. 2. Comms outage procedure in IMS requires the operator to udertake additional physical inspection during comms outage.	B	Unlikely	2	Minor	Low	No	
78	Surplus Recycled Water Transfer Main	Pathogens	Pathogens present in surplus recycled water	Pathogens discharged to sewer	E	Almost certain	1	Insignificant	Low	1. Surplus recycled water discharges to sewer hence there is no impact on the environment or any end user. 2. Surplus recycled water is MBR permeate hence under normal operation has no bacteria or protozoa but may contain some viruses.	E	Almost certain	1	Insignificant	Low	No	
79	Surplus Recycled Water Transfer Main	Nutrients	Nutrients present in surplus recycled water	Nutrients discharged to sewer	E	Almost certain	1	Insignificant	Low	1. Surplus recycled water discharges to sewer hence there is no impact on the environment or any end user. 2. Surplus recycled water is MBR permeate hence under normal operation contains very low concentrations of nutrients.	E	Almost certain	1	Insignificant	Low	No	
80	Surplus Recycled Water Transfer Main	Salts	Salts present in surplus recycled water	Salts discharged to sewer	E	Almost certain	1	Insignificant	Low	1. Surplus recycled water discharges to sewer hence there is no impact on the environment or any end user. 2. Surplus recycled water is MBR permeate from a domestic catchment and has a relatviely low salinity in the order of 600 mg/L TDS.	E	Almost certain	1	Insignificant	Low	No	
81	Surplus Recycled Water Transfer Main	Pipeline failure	Major pipeline failure	Release of surplus recycled water to the environment	C	Possible	2	Minor	Moderate	1. Surplus recycled water is high quality MBR permeate, hence the impact of any breaks would be minimal due to the high quality of water being transferred. 2. HDPE pipeline with electrofusion welded joints. 3. Design, construction and testing to the WSA01 Water Supply Code of Australia Hunter Water (2011) and WSA03 Polyethylene Pipe Code (2004). 4. Use of a reputable civil contractor with quality system certification to ISO 9001. 5. 2 ML storage at the RWTP site provide ample time to undertake repairs. 6. SCADA system will be used to assist in detection of main breaks via max flow rate alarms, loss of pressure alarms, abnormal run time alarms etc. 7. Routine inspection and maintenance of assets to minimise the potential for failure. 8. 24 hour call centre for reporting of faults from the public if required.	B	Unlikely	1	Insignificant	Low	No	
82	Surplus Recycled Water Transfer Main	Pipeline leakage	Minor leaks from air valves, joints, hydrants etc	Minor leakage of surplus recycled water to the environment	D	Likely	1	Insignificant	Low	1. Surplus recycled water is high quality MBR permeate, hence the impact of any breaks would be minimal due to the high quality of water being transferred. 2. HDPE pipeline with electrofusion welded joints. 3. Design, construction and testing to the WSA01 Water Supply Code of Australia Hunter Water (2011) and WSA03 Polyethylene Pipe Code (2004). 4. Use of a reputable civil contractor with quality system certification to ISO 9001. 5. SCADA system will be used to detect leak by monitoring pump operation and pressure drop during low flow periods. 6. Routine inspection and maintenance of assets to minimise the potential for failure and to identify leaks.	B	Unlikely	1	Insignificant	Low	No	
83	Surplus Recycled Water Transfer Main	Excessive volume of surplus recycled water	Reduced recycled water usage, increased wastewater generation rate or stormwater infiltration	Potential oveflow of surplus recycled water from 2 ML storage	C	Possible	3	Moderate	High	1. Conservative design flow for the transfer pipeline of approximately 7 L/s allows for the entire daily volume of wastewater without any recycling to be transfer in 12 hours, hence there is substantial spare transfer capacity in the system. 2. 2 ML permeate storage provides substantial storage buffer that can be utilised if required. 3. In an emergency event the system can be supplemented by road tankers, however this is unlikely to be required.	A	Rare	2	Minor	Low	No	

SOLO Water

Water Utility Solutions

Catherine Hill Bay Water Utility

Drinking Water Quality Management Plan

Stage 2

Revision 2.1

September 2019

Document Status

Revision	Date	Revision Details	Author	Review	Approved
1.0	13/06/17	For Interim Operations	B. Irwin	C. Heininger	B. Irwin
2.0	31/08/18	Updated to incorporate the onsite storage and supply and the RWTP Facility for Stage 2	B. Irwin	C. Heininger	B. Irwin
2.1	20/09/2019	Minor revision	B. Irwin	C. Heininger	B. Irwin

Solo Water Pty Ltd

ABN 111 60 013 614

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Phone: 1300 7656 98 (1300 SOLO WU)
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Email: info@solowater.com.au

Contents

1 Introduction

1.1 Background

Catherine Hill Bay Water Utility Scheme (CHBWU), a subsidiary of Solo Water, is the Water Industry Competition Act (WIC Act) licenced Network Operator for the Drinking Water, Recycled Water and Sewerage scheme servicing the Beaches Estate at Catherine Hill Bay (CHB).

All drinking water, recycled water and sewerage infrastructure under the scheme is owned, operated, maintained and renewed by Catherine Hill Bay Water Utility Pty Ltd (CHBWU).

CHBWU owns all assets and holds the Network Operator Licence (16/035) for the scheme. CHBWU subcontracts all design, construction, operation and maintenance activities to parent company Solo Water. Solo Water also holds the Retail Supplier Licence (15/036R) for the Catherine Hill Bay scheme and provides the customer and retail services directly to the end use customers.

This Drinking Water Management Plan is a licencing requirement under the WIC Act and has been prepared to ensure that drinking water quality in the scheme is maintained and managed in compliance with the 12 Element of the Australian Drinking Water Guidelines.

1.2 Scheme Overview

This *Drinking Water Quality Management Plan* (IMS-ENVM-B-3727-SW) (DWQMP) has been designed to provide a structured and systematic approach for the management of the drinking water system at the Catherine Hill Bay Water Utility (CHBWU) scheme.

This current version of the document was written specifically to address the management of the drinking water system for Stage 2 of the CHBWU scheme. During Stage 2, and all future stages, the drinking water system involves the following:

- Source bulk potable water from Central Coast Council Kanangra Drive Reservoir
- Bulk potable water is transferred to the CHB scheme via the bulk water pump station and bulk water transfer main;
- Drinking water is stored onsite in a 1 ML drinking water storage tank
- Drinking water is supplied directly to customers via the onsite drinking water supply booster pump station.
- Chlorine residual is maintained in the drinking water storage tank and at the point of supply using an online chlorine monitoring and dosing system.

The DWQMP covers the bulk potable water and drinking water supply system only. For information on the recycled water system refer to the *Recycled Water Management Plan* (IMS-QUAL-B-8446-SW).

1.3 Catherine Hill Bay Water Utility Scheme Stages

The Catherine Hill Bay Beaches subdivision was approved by the Planning Assessment commission under Project Approval MP 10-0204, for 550 residential lots, 1 retail lot, 9 reserves and 2 heritage lots that will be constructed in 7 subdivision stages.

The CHBWU scheme is approved under a separate process under the WIC Act. The scheme is currently licenced to service up to 470 ET with future approval required for the ultimate 550 ET capacity.

A summary of the CHBWU stages for provision of drinking water services to the development is provided below in Table 1.1. This DWQMP is revised and updated as the CHBWU moves through each of the operational stages. This document applies to Stage 2 of the scheme and can provide for up to 470 ET in connections to the drinking water system. The main change in stage 2 is introduction of the onsite drinking water storage tank.

Table 1.1: CHBWU Drinking Water System Staging.

CHBWU Stages	Water Source	Onsite Storage and Treatment System	Drinking Water Network
Stage 1 Interim	Water source is potable water from Central Coast Council Kanangra Drive Reservoir. CHBWU's bulk water pump station is located at the Kanangra Drive Reservoir site. CHBWU supply to customers directly from the bulk water pump station and transfer main.	N/A – No onsite storage. Inline chorine monitoring and dosing system on the bulk water transfer main. The drinking water and recycled water networks are cross connected with a removable cross connection located at the RWTP site.	Drinking water network with connection points provided for up to 470 ET. Recycled water network with connection points provided for up to 470 ET, supplied with drinking water.
Stage 2 – 470 ET	Water source is potable water from Central Coast Council Kanangra Drive Reservoir. CHBWU's bulk water pump station and transfer main is used to fill the onsite 1 ML drinking water tank.	1 ML onsite drinking water storage tank located at the RWTP Facility filled from the bulk water pump station and transfer main. Residual chlorine monitoring and dosing system on drinking water storage tank and booster pump station. Physical removal of cross connection.	Drinking water network with connection points provided for up to 470 ET. No cross connection with the recycled water network.
Stage 3 – 550 ET	No change to drinking water source or point of supply. As per Stage 2.	No change to drinking water storage and treatment. As per Stage 2.	No change to drinking water network apart from expansion of reticulation system to service up to 550 ET.

1.4 Regulatory Framework

The DWQMP forms part of the framework for licencing of private water utility schemes under the Water Industry Competition Act (2006) – (WICA). The key management plans that have been documented to support the CHBWU Network Operator's Licence are:

- Drinking Water Quality Management Plan (DWQMP)
  - *IMS-ENVM-B-3727-SW – DWQMP – Stage 2*
- Recycled Water Quality Management Plan (RWQMP)
  - *IMS-QUAL-B-8446-SW- RWQMP – Stage 2*
- Sewage Management Plan (SMP)
  - *IMS-ENVM-B-3728-SW – SMP – Stage 2*
- Infrastructure Operating Plan (IOP)
  - *IMS-OPER-B-8297-SW – IOP – Stage 2*
- Incident Response & Notification Plan (IRNP)
  - *IMS-AIIR-B-0041-SW – IRNP – Stage 2*
- Operational Environmental Management Plan (OEMP)
  - *IMS-ENVM-B-3736-SW – OEMP – Stage 2*

The above documents are updated as the scheme progresses through each stage.

1.5 Drinking Water Quality Plan Framework

The Australian Drinking Water Guidelines (ADWG) (National Health and Medical Research Council; Natural Resource Management Ministerial Council, 2011, Version 3.3 Updated November 2016) provides a 12-element framework developed to guide the design of a structured and systematic approach for the management of drinking water quality from catchment to consumer, to assure its safety and reliability. The 12-element framework is outlined below in Figure 1-1.

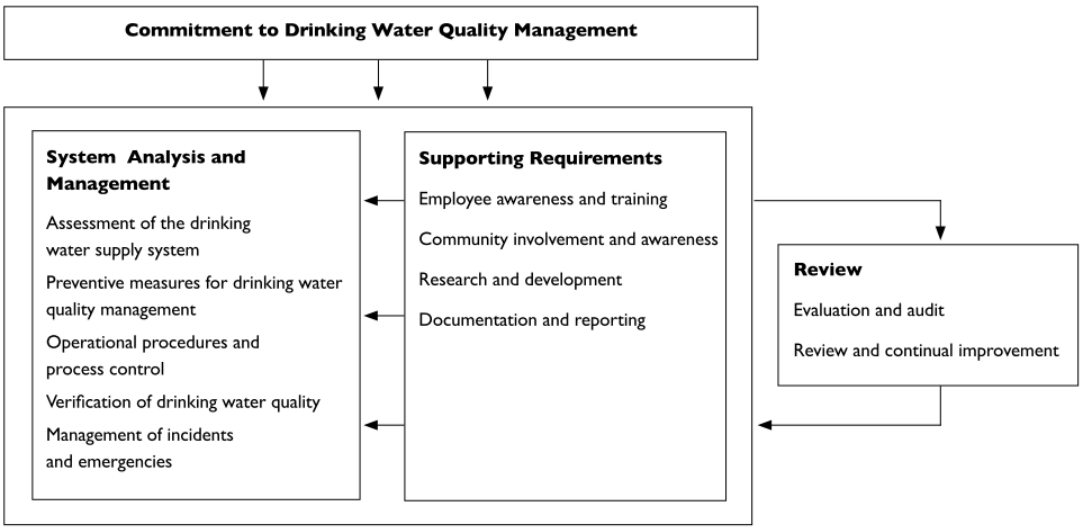

Figure 1-1: 12-Element framework for drinking water quality management (ADWG: 2011)

1.6 Solo Group – Integrated Management System

The DWQMP will also apply within the broader context of the Solo Group Integrated Management System (IMS). The purpose of the IMS is to ensure that the company provides projects, products and services in a safe and environmentally responsible manner, whilst also meeting the high standards demanded by the company and expected by our customers and business partners.

The IMS is primarily defined within the following management plans which provide the overriding framework for the implementation of the IMS for the Solo Group including Solo Water activities at CHB. These include the following:

1. Quality Management Plan (IMS-QUAL-B-8401)
2. Environmental Management Plan (IMS-ENVM-B-3714-SW)
3. Safety Management Plan (IMS-SAFE-B-4801)

In supporting these management plans, the IMS *Document Control Procedure (IMS-DOCC-D-2420)* and the associated *Document Control Register (IMS-DOCC-G-2414)* details the control procedures and associated register for all controlled documents (e.g. policies, plans, procedures, registers and forms) within the IMS.

The DWQMP and associated documentation are incorporated within this system.

1.7 DWQP Roles and Responsibility

Solo Water has the following responsibilities established by this RWQMP:

- Operate the systems according to the Infrastructure Operating Plan (IMS-OPER-B-8297-SW) and this DWQMP.
- Review data from monitoring to verify the effectiveness of the operational and critical control point plans and respond to, or document areas of non-compliance.
- Undertake corrective response actions (as outlined by critical control point plans and emergency response procedures) when CCP limits are exceeded.
- Review and update identified areas for improvement as documented using the Corrective Action Request Procedure (IMS-COMP-D-0817) and tracking corrective actions within the Corrective Action Request (CAR) Log (IMS-COMP-G-0818).
- Record employee training and community engagement projects.
- Satisfy internal and external auditing requirements.
- Conduct and record annual and triggered reviews of this management system
- Report findings from annual/triggered reviews to validate and verify the functionality of this management system, and
- Update this DWQMP where necessary after review, in response to changes to the recycled water management system, or for any other relevant reason.

Staff members from Solo Water with support from Solo Resource Recovery compliance department staff will form the RWQMP team and will be responsible for implementation and review of the management plan and supporting systems. Nominated positions and roles within the RWQMP team are listed in the *Infrastructure Operation Plan (IOP) (IMS-OPER-B-8297-SW)* and the *Solo Water Organisational Chart (IMS-OPER-G-8321-SW*).

SOLO Water

Water Utility Solutions

Catherine Hill Bay Water Utility

Recycled Water Quality Management Plan

Stage 2

Version 1.2

September 2019

Document Status

Version	Date	Revision Details	Author	Review	Approved
A	01/02/2017	Preliminary draft for design development	JC Schrotter (Aquatis)	B. Irwin C. Heininger	
1.0	28/08/2018	Revised following detailed design of RWTP. For NSW Health Consultation.	B. Irwin	C. Heininger	B. Irwin
1.1	5/11/2018	Removed recycled water use for construction.	B. Irwin	C. Heininger	B. Irwin
1.2	20/09/2019	Minor revision	B. Irwin	C. Heininger	B. Irwin

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1 Introduction

1.1 Overview

This *Recycled Water Quality Management Plan (IMS-QUAL-B-8446-SW)* (RWQMP) has been designed to provide a structured and systematic approach for the management of recycled water at the Catherine Hill Bay Water Utility (CHBWU) scheme and is a requirement of the Network Operator Licence 16/035.

This current version of the document was written specifically to address the recycled water system in Stage 2 of the CHBWU scheme. During this period recycled water will be managed by a supply to customers in the dual reticulation system for toilet flushing, laundry washing machine cold water, irrigation and outdoor cleaning.

Under this RWQMP all surplus recycled water will be transported offsite by licenced liquid waste transport contractor to the nearest accepting municipal WWTP because construction of the surplus recycled water irrigation area in Stage 6 and 7 of the subdivision has not been completed as yet. This RWQMP will be updated with the requirements of the irrigation system in Stage 6 and 7 prior to the irrigation area becoming operational in the future.

All water, wastewater and recycled water infrastructure under the scheme is owned and operated by the Catherine Hill Bay Water Utility Pty Ltd (CHBWU), a subsidiary of Solo Water. CHBWU holds the IPART Network Operator Licence and subcontracts all design, construction, operation and maintenance activities to parent company Solo Water. Solo Water also holds the Retail Supplier Licence (15/036R) for the Catherine Hill Bay scheme and provides the customer and retail services directly to the end use customers.

1.2 Catherine Hill Bay Water Utility Scheme Staging

The Catherine Hill Bay Beaches subdivision was approved by the Planning Assessment commission under Project Approval MP 10-0204, for 550 residential lots, 1 retail lot, 9 reserves and 2 heritage lots that will be constructed in 7 subdivision stages.

The CHBWU scheme is approved under a separate process under the WIC Act. The scheme is currently licenced to service up to 470 ET with future approval required for the ultimate 550 ET capacity.

A summary of the CHBWU stages for provision of recycled water services to the development is provided below in Table 1.1.

Table 1.1: CHBWU Recycled Water Scheme Staging.

CHBWU Stages	Recycled Water Treatment Facility	Recycled Water Supply	Surplus Recycled Water
Stage 1 Interim	N/A – Sewage storage tanks and road tanker pump out.	N/A – recycled water network supplied with drinking water via a temporary and removable cross connection.	N/A – All raw sewage is pumped out
Stage 2 Recycled Water with surplus irrigation (max 470 ET, as per current licence)	Onsite Recycled Water Treatment Facility to produce recycled water compliance to the AGWR using the following unit processes: • Membrane bioreactor • UV disinfection • Chlorine contact tank • Chlorine residual control The above process train achieves LRVs greater than required under the AGWR.	Recycled Water supply to Solo Water end use customers in the Beaches estate for: • Toilet flushing; • Laundry washing machine cold water tap; • Irrigation; • Outdoor cleaning.	All surplus recycled water will be carted offsite to a Municipal WWTP prior to finalisation of the installation and commissioning of the irrigation system in Stage 6 and 7. This RWQMP will be updated to include the requirements of the Stage 6 & 7 irrigation system prior to operation.
Future Stage 3 Recycled Water with surplus discharged offsite (subject to future approvals)	Additional treatment will be provided if required based on the outcomes and conditions of the Stage 3 scheme approval process.	Recycled Water supply to Solo Water end use customers in the Beaches estate for: • Toilet flushing; • Laundry washing machine cold water tap; • Irrigation; • Outdoor cleaning	The offsite discharge location to be confirmed during the Stage 3 approval process. The RWQMP will be updated to include any additional requirements of the offsite discharge system once it is approved.

1.3 Regulatory Framework

The RWQMP forms part of the framework for licencing of private water utility schemes under the Water Industry Competition Act (2006) – (WICA). The key management plans that have been documented to support the CHBWU Network Operator's Licence are:

- Recycled Water Quality Management Plan (RWQMP) – this plan
  - *IMS-QUAL-B-8446-SW- RWQMP – Stage 2*
- Sewage Management Plan (SMP)
  - *IMS-ENVM-B-3728-SW – SMP – Stage 2*
- Drinking Water Quality Management Plan (DWQMP)
  - *IMS-ENVM-B-3727-SW – DWQMP – Stage 2*
- Infrastructure Operating Plan (IOP)
  - *IMS-OPER-B-8297-SW – IOP – Stage 2*
- Incident Response & Notification Plan (IRNP)
  - *IMS-AIIR-B-0041-SW – IRNP – Stage 2*
- Operational Environmental Management Plan (OEMP)
  - *IMS-ENVM-B-3736-SW – OEMP – Stage 2*

The above documents are updated as the scheme progresses through each stage.

1.4 RWQMP Framework

This RWQMP is structured to address the twelve elements of The National Water Quality Management Strategy (NWQMS) *Australian Guidelines for Water Recycling: Managing Health and Environmental Risks* (EPHC, NRMMC & AHMC, 2006) (herein referred to as AGWR). The 12-element framework is outlined in Table 1.2 below.

Table 1.2: The 12 Elements in the AGWR framework.

Element	Description
1	Commitment to responsible use and management of recycled water
2	Assessment of the recycled water system
3	Preventative measures for recycled water management
4	Operational procedures and process control
5	Verification of recycled water quality and environmental performance
6	Management of Incidents and emergencies
7	Operator, contractor and end user awareness and training
8	Community involvement and awareness
9	Validation, research and development
10	Documentation and reporting

11	Evaluation and audit
12	Review and continuous improvement

1.5 Solo Group – Integrated Management System

The RWQMP will also apply within the broader context of the Solo Group Integrated Management System (IMS). The purpose of the IMS is to ensure that the company provides projects, products and services in a safe and environmentally responsible manner, whilst also meeting the high standards demanded by the company and expected by our customers and business partners.

The IMS is primarily defined within the following management plans that provide the overriding framework for the implementation of the IMS for the Solo Group including Solo Water activities at CHB. These include the following:

1. Quality Management Plan (IMS-QUAL-B-8401)
2. Environmental Management Plan (IMS-ENVM-B-3714-SW)
3. Safety Management Plan (IMS-SAFE-B-4801)

In supporting these management plans, the *IMS Document Control Procedure (IMS-DOCC-D-2420)* and the associated *Document Control Register (IMS-DOCC-G-2414)* details the control procedures and associated register for all controlled documents (e.g. policies, plans, procedures, registers and forms) within the IMS.

The RWQMP and associated documentation are incorporated within this IMS.

1.6 RWQMP Roles and Responsibility

Solo Water has the following responsibilities established by this RWQMP:

- Operate the systems according to the *Infrastructure Operating Plan (IMS-OPER-B-8297-SW)* and this RWQMP.
- Review data from monitoring to verify the effectiveness of the operational and critical control plans and respond to, or document areas of non-compliance.
- Undertake corrective response actions (as outlined by critical control point plans and emergency response procedures) when CCP limits are exceeded.
- Review and update identified areas for improvement as documented using the *Corrective Action Request Procedure (IMS-COMP-D-0817)* and tracking corrective actions within the *Corrective Action Request (CAR) Log (IMS-COMP-G-0818).*
- Record employee training and community engagement projects.
- Satisfy internal and external auditing requirements.
- Conduct and record annual and triggered reviews of this management system
- Report findings from annual/triggered reviews to validate and verify the functionality of this management system, and
- Update this RWQMP where necessary after review, in response to changes to the recycled water management system, or for any other relevant reason.

Staff members from Solo Water with support from Solo Resource Recovery compliance department staff will form the RWQMP team and will be responsible for implementation and review of the management plan and supporting systems. Nominated positions and roles within the RWQMP team are listed in the *Infrastructure Operation Plan (IOP) (IMS-OPER-B-8297-SW)* and the *Solo Water Organisational Chart (IMS-OPER-G-8321-SW*).

SOLO Water

Water Utility Solutions

Catherine Hill Bay Water Utility

Sewage Management Plan

Stage 2

Revision 2.2

September 2019

Water Utility **Solutions**

Document Status

Revision	Date	Revision Details	Author	Review	Approved
1.0	13/06/17	For Interim Operations	B. Irwin	C. Heininger	B. Irwin
2.0	31/08/18	Updated to incorporate the RWTP Facility for Stage 2	B. Irwin	C. Heininger	B. Irwin
2.1	5/11/2018	Updated PFD based on removal of recycled water use for construction	B. Irwin	B. Irwin	B. Irwin
2.2	20/09/2019	Minor revision	B. Irwin	C. Heininger	B. Irwin

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1 Introduction

1.1 Background

Catherine Hill Bay Water Utility Scheme (CHBWU), a subsidiary of Solo Water, is the Water Industry Competition Act (WIC Act) licenced Network Operator for the Drinking Water, Recycled Water and Sewerage scheme servicing the Beaches Estate at Catherine Hill Bay (CHB).

All drinking water, recycled water and sewerage infrastructure under the scheme is owned, operated, maintained and renewed by Catherine Hill Bay Water Utility Pty Ltd (CHBWU).

CHBWU owns all assets and holds the Network Operator Licence (16/035) for the scheme. CHBWU subcontracts all design, construction, operation and maintenance activities to parent company Solo Water. Solo Water also holds the Retail Supplier Licence (15/036R) for the Catherine Hill Bay scheme and provides the customer and retail services directly to the end use customers.

This Sewage Water Management Plan is a licencing requirement under the WIC Act and has been prepared to ensure that sewerage system is maintained and managed in compliance with the 12 Element of the Australian Guidelines for Water Recycling.

1.2 Overview

This *Sewage Management Plan* (IMS-ENVM-B-3728-SW) (SMP) has been designed to provide a structured and systematic approach for the management of the pressure sewer network and raw sewage at the Catherine Hill Bay Water Utility (CHBWU) scheme and is a requirement of the Network Operator Licence 16/035.

This current version of the document was written specifically to address the management of the pressure sewer system for Stage 2 of the CHBWU scheme. During Stage 2, and all future stages, the pressure sewer network discharges to the Inlet Balance Tank or Emergency Storage Tanks at the Recycled Water Treatment Plant (RWTP) site.

The SMP covers the pressure sewer network and raw sewage storages only. For information on the RWTP, treatment processes, recycled water uses and water quality requirements, refer to the *Recycled Water Management Plan* (IMS-QUAL-B-8446-SW)

1.3 Catherine Hill Bay Water Utility Scheme Stages

The Catherine Hill Bay Beaches subdivision was approved by the Planning Assessment commission under Project Approval MP 10-0204, for 550 residential lots, 1 retail lot, 9 reserves and 2 heritage lots that will be constructed in 7 subdivision stages.

The CHBWU scheme is approved under a separate process under the WIC Act. The scheme is currently licenced to service up to 470 ET with future approval required for the ultimate 550 ET capacity.

A summary of the CHBWU stages for provision of sewerage services to the development is provided below in Table 1.1. This SMP is revised and updated as the CHBWU moves through each of the operational stages.

This document applies to Stage 2 of the scheme and can provide for up to 470 ET in connections.

Table 1.1: CHBWU Sewerage System Staging.

CHBWU Stages	Sewerage Network	Discharge Location	Ultimate Fate
Stage 1 Interim	The sewerage collection system uses pressure sewer technology. The pressure sewer system uses "duplex" Pressure Sewer Units that service up to 5 lots. Under the Current SMP and WICA licence a maximum of 470 ET can connect to the pressure sewer network.	All raw sewage from the pressure sewer network discharges to the Interim Facility Sewage Pump Out Tanks	All raw sewage is trucked offsite from the Sewage Pump Out Tank and disposed of to the nearest accepting Municipal WWTP owned by Central Coast Council or Hunter Water.
Stage 2		During normal operations the pressure sewer network discharges to the Inlet Balance Tank at the RWTP site. During abnormal operations or emergency conditions the pressure sewer network discharges to the Emergency Storage Tank at the RWTP site.	During normal operation all raw sewage is treated in the RWTP as per the Recycled Water Quality Management Plan (RWQMP) (IMS-QUAL-B-8446-SW). During abnormal operations or emergency conditions, raw sewage may be trucked offsite and disposed of to the nearest accepting Municipal WWTP owned by Central Coast Council or Hunter Water.
Stage 3	Following approval of the Stage 3 scheme the number of connections permitted on the pressure sewer network can increase to 550 ET.	No change to sewerage system or discharge locations.	No change to sewerage system or discharge locations.

1.4 Regulatory Framework

The SMP forms part of the framework for licencing of private water utility schemes under the Water Industry Competition Act (2006) – (WICA). The key management plans that have been documented to support the CHBWU Network Operator's Licence are:

- Sewage Management Plan (SMP) – this plan
  - *IMS-ENVM-B-3728-SW – SMP – Stage 2*

- Recycled Water Quality Management Plan (RWQMP)
    - *IMS-QUAL-B-8446-SW- RWQMP – Stage 2*
- Drinking Water Quality Management Plan (DWQP)
    - *IMS-ENVM-B-3727-SW – DWQMP – Stage 2*
- Infrastructure Operating Plan (IOP)
    - *IMS-OPER-B-8297-SW – IOP – Stage 2*
- Incident Response & Notification Plan (IRNP)
    - *IMS-AIIR-B-0041-SW – IRNP – Stage 2*
- Operational Environmental Management Plan (OEMP)
    - *IMS-ENVM-B-3736-SW – OEMP – Stage 2*

The above documents are updated as the scheme progresses through each stage.

1.5 SMP Framework

This SMP is structured to address the twelve elements of The National Water Quality Management Strategy (NWQMS) *Australian Guidelines for Water Recycling: Managing Health and Environmental Risks* (EPHC, NRMMC & AHMC, 2006) (herein referred to as AGWR).

Although using the AGWR risk management framework, this SMP applies to the raw sewage pressure sewer network and storages only and does not attempt to address treatment and water quality requirements for the recycled water scheme, these are addresses in the *Recycled Water Quality Management Plan* (IMS-QUAL-B-8446-SW- RWQMP).

Table 1.2: SMP framework elements (taken from AGWR)

Element	Description
1	Commitment to responsible management of sewage wastewater
2	Assessment of the sewage system
3	Preventative measures for sewage management
4	Operational procedures and process control
5	Verification of performance
6	Management of Incidents
7	Operator, contractor and end user awareness and training
8	Community involvement and awareness
9	Validation, research and development
10	Document and reporting
11	Evaluation and audit
12	Review and continuous improvement

1.6 Solo Group – Integrated Management System

The SMP will also apply within the broader context of the Solo Group Integrated Management System (IMS). The purpose of the IMS is to ensure that the company provides projects, products and services in a safe and environmentally responsible manner, whilst also meeting the high standards demanded by the company and expected by our customers and business partners.

The IMS is primarily defined within the following management plans which provide the overriding framework for the implementation of the IMS for the Solo Group including Solo Water activities at CHB. These include the following:

1. Quality Management Plan (IMS-QUAL-B-8401)
2. Environmental Management Plan (IMS-ENVM-B-3714-SW)
3. Safety Management Plan (IMS-SAFE-B-4801)

In supporting these management plans, the *IMS Document Control Procedure (IMS-DOCC-D-2420)* and the associated *Document Control Register (IMS-DOCC-G-2414)* details the control procedures and associated register for all controlled documents (e.g. policies, plans, procedures, registers and forms) within the IMS. The SMP and associated documentation are incorporated within this system.

1.7 SMP Roles and Responsibility

Solo Water has the following responsibilities established by this SMP:

- Operate the systems according to the *Infrastructure Operating Plan (IMS-OPER-B-8297-SW)* and this SMP.
- Review data from monitoring to verify the effectiveness of the operational and critical control plans and respond to, or document areas of non-compliance.
- Undertake corrective response actions (as outlined by critical control point plans and emergency response procedures) when CCP limits are exceeded.
- Review and update identified areas for improvement as documented using the *Corrective Action Request Procedure (IMS-COMP-D-0817)* and tracking corrective actions within the *Corrective Action Request (CAR) Log (IMS-COMP-G-0818).*
- Record employee training and community engagement projects.
- Satisfy internal and external auditing requirements.
- Conduct and record annual and triggered reviews of this management system
- Report findings from annual/triggered reviews to validate and verify the functionality of this management system, and
- Update this SMP where necessary after review, in response to changes to the recycled water management system, or for any other relevant reason.

Staff members from Solo Water with support from Solo Resource Recovery compliance department staff will form the SMP team and will be responsible for implementation and review of the management plan and supporting systems.

Nominated positions and roles within the SMP team are listed in the *Infrastructure Operation Plan (IOP) (IMS-OPER-B-8297-SW)* and the *Solo Water Organisational Chart (IMS-OPER-G-8321-SW*).