CONSULTANTS

Suite 2, Level 1
33 Herbert Street
ST LEONARDS NSW 2065

ST LEONARDS NSW 1590

T 02 9438 5098
F 02 9438 5398

www.acor.com.au

ENGINEERS

MANAGERS

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Tweed Valley Hospital

Hydraulic and Fire Services Engineering

Integrated Water Management Plan Report

Prepared for: Health Infrastructure

Document no: TVH-IWMP-HF-SSD-001

Issue no: 06

ACOR Project Number: SY180077

Health Infrastructure / ACOR Contract Number: HI7593HYD

SSD Application Number: SSD 9575

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REVISIONS

Revision	Date	Purpose	Prepared By	Approved By
01	22/08/2018	Draft Issue	RRG	RRG
02	24/08/2018	Draft Issue for Review	RRG	RRG
03	31/08/2018	Final Draft Issue for Health Infrastructure Review	RRG	RRG
04	03/10/2018	Upgraded to suit review comments	RRG	RRG
05	04/10/2018	Upgraded to suit review comments	RRG	RRG
06	17/10/2018	Upgraded to suit review comments	RRG	RRG

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Appendices

Table of acronyms

Acronyms	Definition
SEARs	Secretary's Environmental Assessment Requirements
AS	Australian Standards
ESD	Environmental Sensitive Design
EIS	Environmental Impact Statement
AHFG	Australasian Health Facilities Guideline
BCA	Building Code Australia
NCC	National Construction code
CSSD	Centralised Sterile Services Department
ICU	Intensive Care Unit
HDU	High Dependency Unit
WELS	Water Efficiency Labelling and Standards

1 Executive Summary

This report addresses overall the waste water and potable systems for the Project, which includes delivery of a new Level 5 major referral hospital to provide the health services required to meet the needs of the growing population of the Tweed-Byron region, in conjunction with the other hospitals and community health centres across the region;

This report is based on Secretary's Environmental Assessment Requirements (SEARs) for application and the associated masterplan drawings, Health Infrastructure (HI) briefing documents and subsequent ancillary information provided.

The Tweed Valley Hospital Project consists of:

- Delivery of a new Level 5 major referral hospital to provide the health services required to meet the needs of the growing population of the Tweed-Byron region, in conjunction with the other hospitals and community health centres across the region;
- A Masterplan for additional health, education, training and research facilities to support these health services, which will be developed with service partners over time. These areas will be used initially for construction site/ compound and at-grade car parking;
- Delivery of the supporting infrastructure required for the new hospital, including green space and other amenities, campus roads and car parking, external road upgrades and connections, utilities connections, and other supporting infrastructure

Scope of services covered within the hydraulic services water management report include:

- Sanitary and trade waste discharge
- Roof water plumbing and drainage systems connecting to existing civil trunk stormwater
- Roof water collection, treatment and re-use
- domestic potable water supply systems
- Water supply for firefighting purposes

Note: Stormwater flow and water quality drainage and management related to the SEARs application is covered in other reports prepared by the Civil Engineer.

The hydraulic services water management can be summarised as follows:

- Consultation with relevant utility supply agencies has been conducted to verify the condition, capacity, compliance reliability and efficiency of the existing Tweed Shire Council sewer and water mains infrastructure and have found them to be acceptable for connection.
- (Refer also Infrastructure management report)
- Sewer and trade waste water from the site to discharge to Tweed Shire Council sewer main via existing internal "house drainage" system in accordance with AS3500 2015 and Tweed Shire Council requirements.
- Tweed Shire Council pressure/flow test results on 13TH July 2018 confirming water main for firefighting purposes is adequate.
- Potable water chemical analysis confirming that water supply provided is in accordance with Australian drinking water guidelines.
- Rain water from roof areas **could be** collected, stored and re-used for landscape irrigation purposes, subject to more detailed cost / benefit analysis
- Environmental sensitive design (ESD) principles as nominated in Section 4.2 of this report will be incorporated within the hydraulic services

2 Key Performance and Design Principles

A major element of this report is to outline the minimum building services design criteria to deliver compliance with NSW Health Infrastructure (HI), NSW Department of Health Engineering guidelines, NSW Department of Health, Tweed Valley Hospital Development briefing documents, user groups and all relevant statutory authority requirements, so that the most cost effective and energy efficient, maintainable solutions are achieved for the Project, with patient care and safety the main priority.

This report is to be read in conjunction with the Hydraulic Services Masterplan report and drawings and will consider

- Statutory building code compliance
- Health Infrastructure requirements
- Effective use and waste minimization of limited water resource.
- Authority infrastructure availability and capacity
- ESD principles

The hydraulic services systems currently documented will:

1. Minimize site potable water consumption.
2. Ensure the safety of building occupants and patients
3. Minimize water wastage
4. Minimize initial capital cost and ongoing maintenance and energy costs.

3 Introduction

ACOR Consultants Pty Ltd has been engaged by Health Infrastructure to design, document and construct building hydraulic engineering services for the proposed new building works within the Project Site.

The report is based on hydraulic services, infrastructure management plan, hydraulic services masterplan report and drawings, using the current architectural background plans.

Scope of services covered within the hydraulic services water management report, include:

- Sanitary and trade waste discharge
- Roof water plumbing and drainage systems connecting to existing civil trunk stormwater
- Domestic potable water supply systems and water supply security measures
- Alternative non-potable water supply systems and reclaimed rainwater
- Specialised Reverse Osmosis treated water
- Demonstration of water conservation measures

3.1.1 Project Overview

On 13 June 2017, the NSW Government announced the allocation of $534 million for the development of a new state-of-the art hospital on a greenfield site in the Tweed, to be known as Tweed Valley Hospital (Project). The Project is located on a portion of 771 Cudgen Road, Cudgen, legally described as Lot 102 DP 870722 (Project Site).

This EIS has been prepared to accompany a State Significant Development Application for the Tweed Valley Hospital which will be assessed under Part 4 of the Environmental Planning and Assessment Act. The Project has been established based on the following supporting documentation:

- Tweed Valley Hospital Business Case
- Tweed Valley Hospital Masterplan
- Tweed Valley Hospital Concept Proposal.

The Tweed Valley Hospital Project for which a staged approval is sought consists of:

- Delivery of a new Level 5 major referral hospital to provide the health services required to meet the needs of the growing population of the Tweed-Byron region, in conjunction with the other hospitals and community health centres across the region;
- A Masterplan for additional health, education, training and research facilities to support these health services, which will be developed with service partners over time. These areas will be used initially for construction site/ compound and at-grade car parking;
- Delivery of the supporting infrastructure required for the new hospital, including green space and other amenities, campus roads and car parking, external road upgrades and connections, utilities connections, and other supporting infrastructure.

The development application pathway for the Project consists of a staged Significant Development Application under section 4.22 of the Environmental Planning and Assessment Act 1979 (EP&A Act) which will consist of:

- A masterplan development application and detailed proposal for Stage 1 (early and enabling works); and
- A second development application for Stage 2 works which will include detailed design, construction and operation of the Tweed Valley Hospital (Project Application)

A detailed description of the proposed staging of the Project is provided in the following actions.

3.1.2 Concept Proposal and Stage 1 Early and Enabling Works

This component (and EIS) seeks approval for a Concept Proposal of the Tweed Valley Hospital and Stage 1 early and enabling works.

The Concept Proposal is informed by service planning to 2031/32 and has an expected gross floor area in the range 55,000m2 to 65,000m2.

The hospital is expected to include (with more detail to be confirmed/provided at Stage 2) the following components/ services:

- A main entry and retail area
- Administration Services
- Ambulatory Services
- Acute and Sub-Acute in-patient units
- Paediatrics
- Intensive Care Unit
- Close Observation Unit
- Mental Health Services
- Maternity Unit
- Renal Dialysis
- Pathology;
- Pharmacy
- Cancer Services including Day Oncology and Radiation Oncology
- Emergency Department
- Integrated Interventional Services
- Interventional Cardiology
- Medical Imaging
- Mortuary
- Back of house Services
- Car parking
- Future expansion areas.

3.1.3 Stage 1 Early and Enabling Works

- Early and enabling works, generally comprising:
  - Construction Compound
  - Augmentation and connection of permanent services for the new facility (water, sewer, electricity, telecommunications)
  - Bulk earthworks to establish the required site levels and create a stable landform in preparation for hospital construction
  - Associated in-ground infrastructure and works, including stormwater and drainage works
  - Piling and associated works
  - Site stabilisation, including establishment of necessary erosion and sediment controls
  - Rehabilitation and revegetation of part of the wetland area
  - Construction of internal road ways for use during construction and in preparation for final road formations in Stage 2
  - Retaining walls.

3.1.4 Preliminary Works (not part of the SSD application)

Following acquisition of the Project Site, Health Infrastructure will undertake works to secure the Project Site, establish access, and ensure appropriate environmental control measures are in place.

These Preliminary Works do not form part of the SSD application for the Project and will be undertaken under the exempt development provisions of *State Environmental Planning Policy (Infrastructure) 2007* (ISEPP), the exempt and complying development provisions of *State Environmental Planning Policy (Exempt and Complying Development Codes) 2008* and as Development Without Consent under ISEPP and Part 5 of the EP&A Act as set out below.

Preliminary Works that are Exempt and Complying Development would generally comprise:

- Site establishment including fencing of site
- Set-up temporary accommodation and amenities to service the Preliminary works
- Temporary construction car parking
- Temporary stormwater drainage (for site compound)
- Temporary site electricity supply
- Demolition of existing onsite buildings and structures including remediation of contaminated land.

As referred to in **Section 5.3.2**, under the requirements of SEPP 55 – Remediation of Land, remediation work outlined in the Remediation Action Plan (RAP) is considered to be Category 2 remediation work (i.e. not needing consent). These Preliminary Works would be undertaken in accordance with the RAP and SEPP 55.

Preliminary Works undertaken in accordance with Part 5 of the EP&A Act and the provisions of ISEPP would generally comprise:

- Soil and water management works including sediment basins and associated works to mitigate potential impacts of stormwater runoff from the unimproved site
- New site access point from Cudgen Road at south-western site boundary
- New site access point from Turnock Street roundabout, including intersection upgrade works, electrical connections for street lighting and a new water main connection beneath the road/intersection
- Upgrading the Tweed Coast Road/Cudgen Road intersection to provide a better level of service.

Health Infrastructure would coordinate these Preliminary Works in consultation with the relevant authorities/utility owners (as required) and the Tweed Shire Council. The Preliminary Works have been identified to be progressed once the Project Site is transferred to Health Administration Corporation's (HAC) ownership and in advance of construction of the Stage 1 SSD works. The likely impacts of applicable Preliminary Works would be assessed in the form of a Review of Environmental Factors (REF), prepared in accordance with Part 5 of the EP&A Act and the provisions of the ISEPP.

For clarity, plans attached to this EIS identify the Preliminary Works that are separate to this SSD application

3.1.5 Stage 2: Hospital Delivery - Main Works and Operation

Stage 2 (which will be subject to a separate application) would include the detailed design, construction and operation of the Tweed Valley Hospital. Stage 2 will be subject to a separate application following Stage 1.

3.1.6 Subsequent Stages: Potential Future Expansion

Any subsequent stages would be subject to a separate application(s) as required and would be related to works for potential future expansion of the facility. Details of this are unknown at this stage and would be developed as required.

3.2 Background and Project Context

3.2.1 Project Site

After an extensive site selection process, announcement was made on 30th June 2018 of the new Tweed Valley Hospital Project to be located 771 Cudgen Road, Cudgen.

NOTES
LANDSCAPE INDICATIVE ONLY - REFER LANDSCAPE ZONAL PLAN L-MP-12

3.3 Design Standards

3.3.1 NSW Health and Health Infrastructure Guidelines

- NSW Health Policy Directives
- NSW Health Infrastructure Engineering Services Guidelines – Technical Series dated June 2016

3.3.2 Standards and Codes

This report has used the following Australian Standards and Codes as references:

- National Construction Code – 2016 (being the current version at the time of writing this report)
- AS 3500 Plumbing and Drainage Suite of standards ratified by the NCC
- AS 2419.1 Fire Hydrant Installations – 2005
- AS 2118.1 Fire Sprinkler Installations – 2017 (Subject BCA 2019 adoption)
- AS 1670.1 Fire Detection and Alarm Systems - 2015
- AS 1670.4 – Sound System & Intercom System for Emergency Purposes - 2015
- AS 2441.1 Fire Hose Reels – 2005
- AS 5601 Gas Installations – 2004
- AS 2304 Water storage tanks for fire protection systems – 2011

3.3.3 AUSHFG

- Australasian Health Facilities Guideline (AHFG)
- Hospital acquired infections – Engineering down the risk – Handbook – HB 260 – 2003

3.3.4 Relevant Authorities

Key authorities directly relating to the hydraulic and fire services design are (please see **Table 1** below):

Table 1: Water Authorities

Authority	Asset
Tweed Shire Council	Water Supply, Roof water re-use and Sewer / Liquid Trade Waste Drainage
NSW Fire and Rescue	Regulator for fire hydrants, automatic fire sprinklers and dry fire detection and alarms

4 Outline of the Water Management Systems

4.1 Potable Water

Main Building Works

Adequate and compliant potable water supply is available for connection to Tweed Shire Council water main system. Refer also Hydraulic Services Infrastructure Management Plan.

Potable water systems for human consumption, hygiene purposes, cistern flushing and process equipment for the site will be supplied directly from Tweed Shire Council Water main located in Turnock Street.

Potable water reticulation will be designed and constructed in accordance with AS3500.1 2015, AS3500.4 2015 and Australian Drinking Water Guidelines.

A new 130,000 litre potable water storage tank(s) with associated pumps and filter equipment (connected to essential electrical supplies) will provide approximately 8 hours of managed supply to the hospital during a potential utility mains failure.

Additionally, Tweed Shire Council Water have confirmed new connection will be classified as Grade 2 to provide improved reliability to the Health Campus.

Potable water cross contamination prevention with hazardous areas (Laboratories, dirty utility rooms, operating theatres and alike), as nominated in AS/NZS 3500.1 2003, will be achieved by the installation of approved backflow prevention valves.

Refer also “additional ESD initiatives” section for incorporated waste minimization measures.

4.1.1 Sanitary and Trade Waste Drainage

Main Building Works

Sanitary waste generated by the site will be designed and constructed in accordance with AS3500.2 2015, Tweed Shire Council requirements and industry best practice and discharge directly to Tweed Shire Council sewer infrastructure in Tweed Coast Road.

Refer also “additional ESD initiatives” section for incorporated waste minimization measures.

Designated hydraulic trade waste (Laboratories, commercial kitchens and alike) will be pre-treated in accordance with AS3500.2 2015, Tweed Shire Council requirements and industry best practice and will discharge directly to internal house sewer reticulation system.

Typically the following pretreatment systems will include:-

a) Grease arrestors will be required for the commercial kitchen and any food retail café etc.

b) Cancer treatment methods to be determined, in particular treatment of thyroid cancer utilising Iodine 131.

c) Dilution pit(s) for pathology and other hospital laboratories.

d) Cooling pit(s) for high temperature discharge such as CSSD, RO plant disinfection equipment, steam boilers etc.

Final determination of liquid trade waste management systems will be based on final schedules of accommodation and models of care.

It is envisaged that the current trade waste agreement for the existing Tweed Hospital site will be transferred and modified for the Project Site upon completion of Stage 2 works.

4.1.2 Roof Water Plumbing and Drainage

Main Building Works

Generally, rainwater collection systems will interconnect with the existing civil stormwater system and will be designed in accordance withAS3500.3 2015, State Office of Water, Tweed Shire Council requirements, and Australia Rainfall and Runoff, based on the following minimum criteria:

- Eaves gutters – 1 in 20-year 5-minute storm event (230mm/hr)
- Eaves gutters (Collection for re-use) – 1 in 100-year 5-minute storm event (300mm/hr)
- Podium areas – 1 in 20-year 5-minute storm event (230mm/hr)
- Box gutters – 1 in 100-year 5-minute storm event (300mm/hr).

Rain water collection and re-use for non-potable purposes is being considered for further life cycle cost / benefit analysis. Refer also Section 4.1.3 for alternative water supply systems.

Drainage from the helipad will discharge separately to the civil trunk stormwater drainage system via a “flame trap” device located under the helipad in a plantroom.

Water quality devices prior to discharge to Council system is contained within the Civil Engineering report.

4.1.3 Alternate Water Supply Systems

Main Building Works

Alternative non-potable water supply could be supplied from proposed roof water collection tank(s) located adjacent to serviced yard area, and could provide supplementary irrigation water supply for drip irrigation only formalised front entry landscaped areas only

Based on available historical rainfall data for this area, available roof collection area, extent of landscape irrigation and water balance calculations, there would be no cost and no major environmental benefit of its implementation. (Refer also Appendix E for water balance calculations)

Rainwater collection and re-use for other non-potable applications such as toilet flushing, have been discounted due to risks associated with possible air borne bacteria in a hospital environment.

4.1.4 Reverse Osmosis Water (RO)

Main Building Works

Reverse Osmosis water supply will be required for:

a) Centralised Sterile Services Department (CSSD).

b) Renal treatment facilities

CSSD plant will be located in the plantroom in close proximity to the CSSD area.

The RO plant will be designed in accordance with AS 4187 2014 version.

Plant and disinfection methods to be agreed based on user group consultation and discussions with CSSD equipment supplier.

RO water for renal treatment area will be located within a plantroom located within the renal treatment area. The renal RO plant and associated piping can be constructed and maintained under specialist lease agreement or constructed using hospital construction funds and maintained thereafter by facilities management.

Renal dialysis outlets are required in ICU/HDU clinical areas, it is expected that portable RO units will be utilised. Filtered water will be provided for to each “nominated bed” to allow connection of the portable unit.

4.1.5 Fixtures, Fittings and Tapware

Main Building Works

Sanitary fixtures, fittings and tapware where nominated on architectural plans and room data sheets will be in accordance with NSW Department of Health requirements. Final selections will be based on whole of life cost, water/energy efficiency, W.E.L.S registration (4-star minimum except showers to be minimum 3 star), availability, ease of maintenance, aesthetic appearance and durability.

4.2 Additional ESD Initiatives

Main Building Works

Refer also ESD report prepared by Steensen Varming Australia.

The following additional ESD measures are to be considered in future planning stages and subject to final cost / benefit analysis.

- Solar contribution for water heating (minimum 50% annual solar gain)
- Metering of water supplies including hot water metering
- Increased thickness of thermal insulation on all hot water supplies to improve efficiency.
- Recyclable materials selection
- Low voltage power generation by the way of converting liquid flow (either water supply or sewage) at authority points of connection into energy
- Capture and reuse of fire services test water
- Capture of mechanical plant waste heat for input into domestic water heating plant

5 Conclusion

Based on Tweed Shire Council and ELGAS sufficient capacity is available to adequately service the proposed building works.

Water and waste water systems to be implemented will meet the requirements of all statutory building codes, NSW Health requirements, NSW Health Infrastructure requirements and current industry best practice regarding water, waste and energy efficiency.

Appendix A - Authority Site Water Supply

Council Reference: Water Conveyancing - Flow Tests
Your Reference:

TWEED SHIRE COUNCIL

13 July 2018

Customer Service | 1300 292 872 | (02) 6670 2400
tsc@tweed.nsw.gov.au
www.tweed.nsw.gov.au
PO Box 816
Murwillumbah NSW 2484
Please address all communications to the General Manager
ABN: 90 178 732 496

ACOR Consultants (Caitlyn Kasch)
Suite 2, Level 1 33 Herbert St
ST LEONARDS NSW 2065

Dear Caitlyn

Your application for pressure/flow testing:
Elrond Drive

I refer to your application for flow/pressure information at the above location. Council has completed a field test on 13 July 2018 at 10.00am.

The test was completed on a 300 mm main as shown on the attached plan. The results from this test are provided below: Site plan attached.

Test 1
Fire Hydrant 1 – Elrond Drive as per attached plan (Flow & Pressure)

Description	Pressure (kPa) Hyd 1
Static Pressure	500
Residual Pressure at the following flow rates:	
5L/s	470
10L/s	440
15L/s	370
20L/s	280
25L/s	170
Maximum Flowrate (L/s) 28	0

You should be aware that these were the readings at the time of this test and results may fluctuate throughout any given day depending on reservoir level and water use at the time. This advice is valid at the date of issue, however, should be reviewed at suitable frequencies for your particular need to allow for system changes over time.

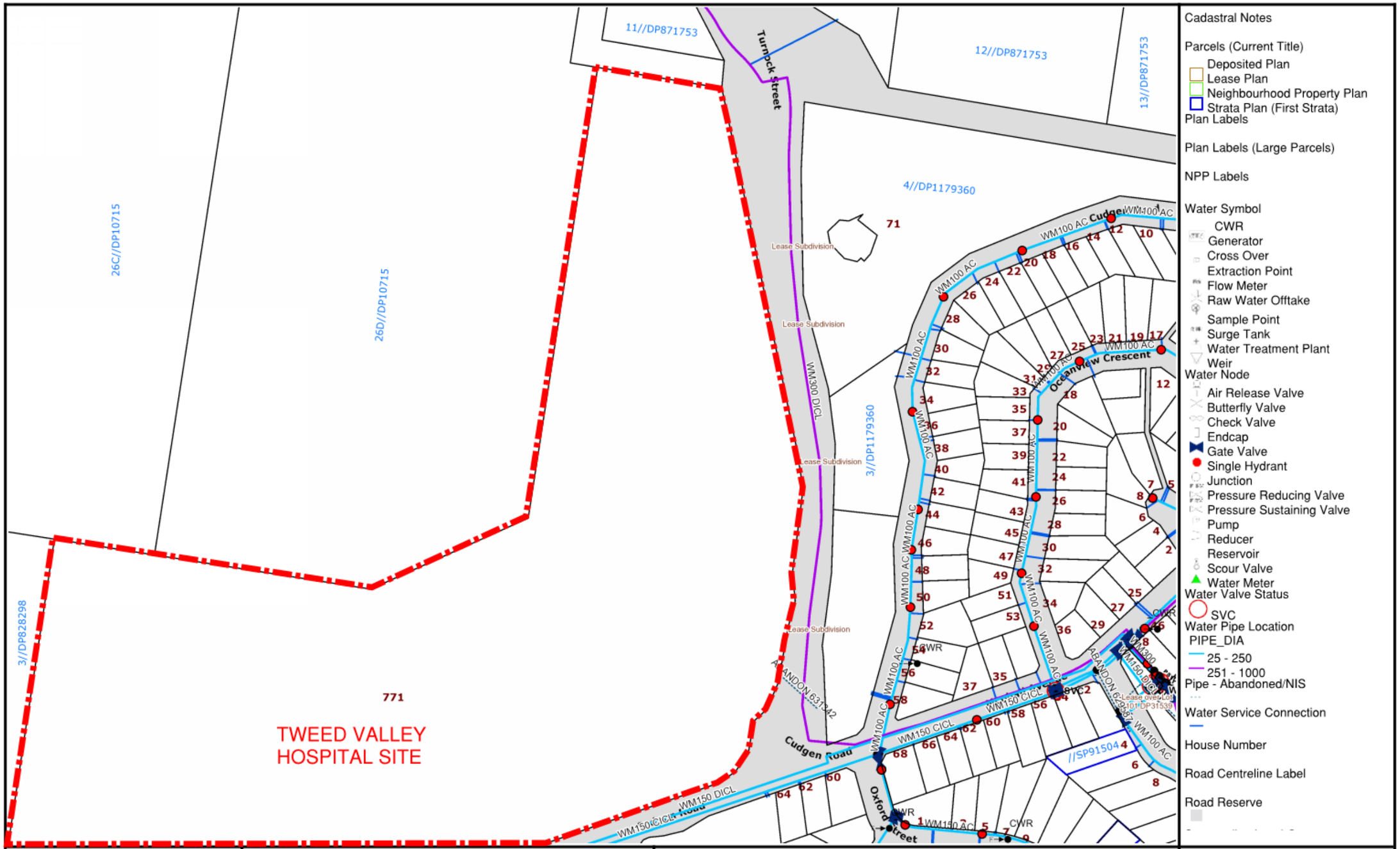
Yours faithfully

Michael Wraight
Manager Water

Attachments

TWEED SHIRE COUNCIL

WATER



Cadastral Notes

Parcels (Current Title)
- Deposited Plan
- Lease Plan
- Neighbourhood Property Plan
- Strata Plan (First Strata)

Plan Labels

Plan Labels (Large Parcels)

NPP Labels

Water Symbol
- CWR
- Generator
- Cross Over
- Extraction Point
- Flow Meter
- Raw Water Offtake
- Sample Point
- Surge Tank
- Water Treatment Plant
- Weir

Water Node
- Air Release Valve
- Butterfly Valve
- Check Valve
- Endcap
- Gate Valve
- Single Hydrant
- Junction
- Pressure Reducing Valve
- Pressure Sustaining Valve
- Pump
- Reducer
- Reservoir
- Scour Valve
- Water Meter

Water Valve Status
- SVC

Water Pipe Location
PIPE_DIA
- 25 - 250
- 251 - 1000

Pipe - Abandoned/NIS

Water Service Connection

House Number

Road Centreline Label

Road Reserve

Civic and Cultural Centre
3 Tumbulgum Road
(PO Box 816)
Murwillumbah NSW 2484

T | (02) 6670 2400 | 1300 292 872 F | (02) 6670 2429
W | www.tweed.nsw.gov.au

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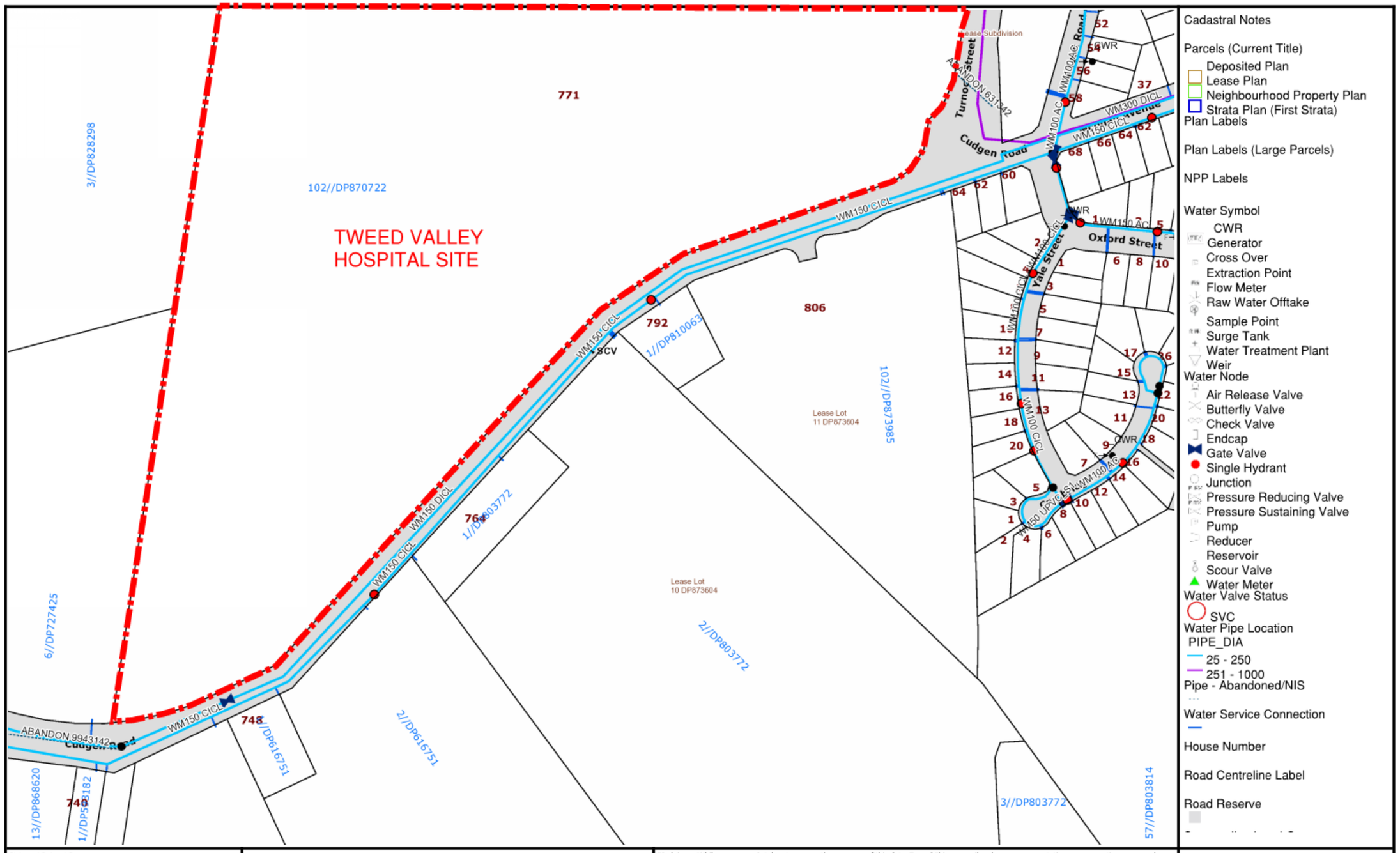
Metres 50 100 150 200 250

Scale at A3 page size

Author:Tweed Shire Council

TWEED SHIRE COUNCIL

WATER



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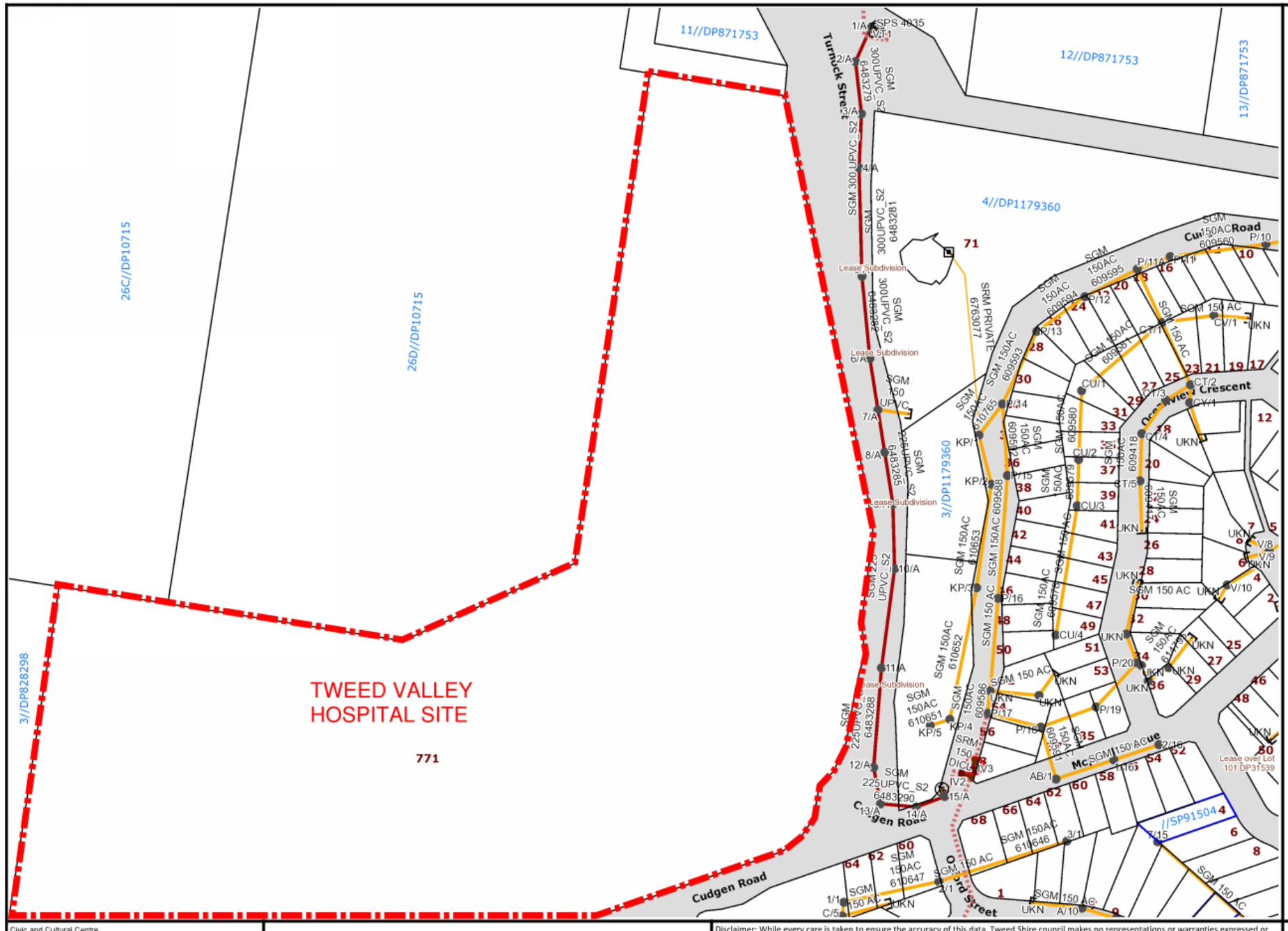
Author:Tweed Shire Council

Appendix B - Authority Site Sewer

TWEED SHIRE COUNCIL

SEWER



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NPP Labels

Sewer Symbol
- CWR
- Generator
- Oxygen Injection Unit
- SC Low Point
- _SFLOWMETER
- STP
- STP Outfall

Sewer Valve Status
- Closed
- Not Found

Sewer Node
- Air Vac Release
- Bypass Kit
- Boundary Kit
- End Cap
- Flushing Point
- Lamphole
- Metering Point
- Open Valve
- Public Manhole
- Private Property Pump
- Public Property Pump
- Public Pump Station
- Private Pump Station
- Reducer
- Emergency Storage Tanks
- Rodding Eye
- Scour Valve
- Vacuum Chamber
- Vent Stack

Sewer Node Label

SRM - Private/General Fund Assets

SRM - Abandoned

Sewer Rising Mains Location

SGM - Private/General Fund Assets

Civic and Cultural Centre
3 Tumbulgum Road
(PO Box 816)
Murwillumbah NSW 2484

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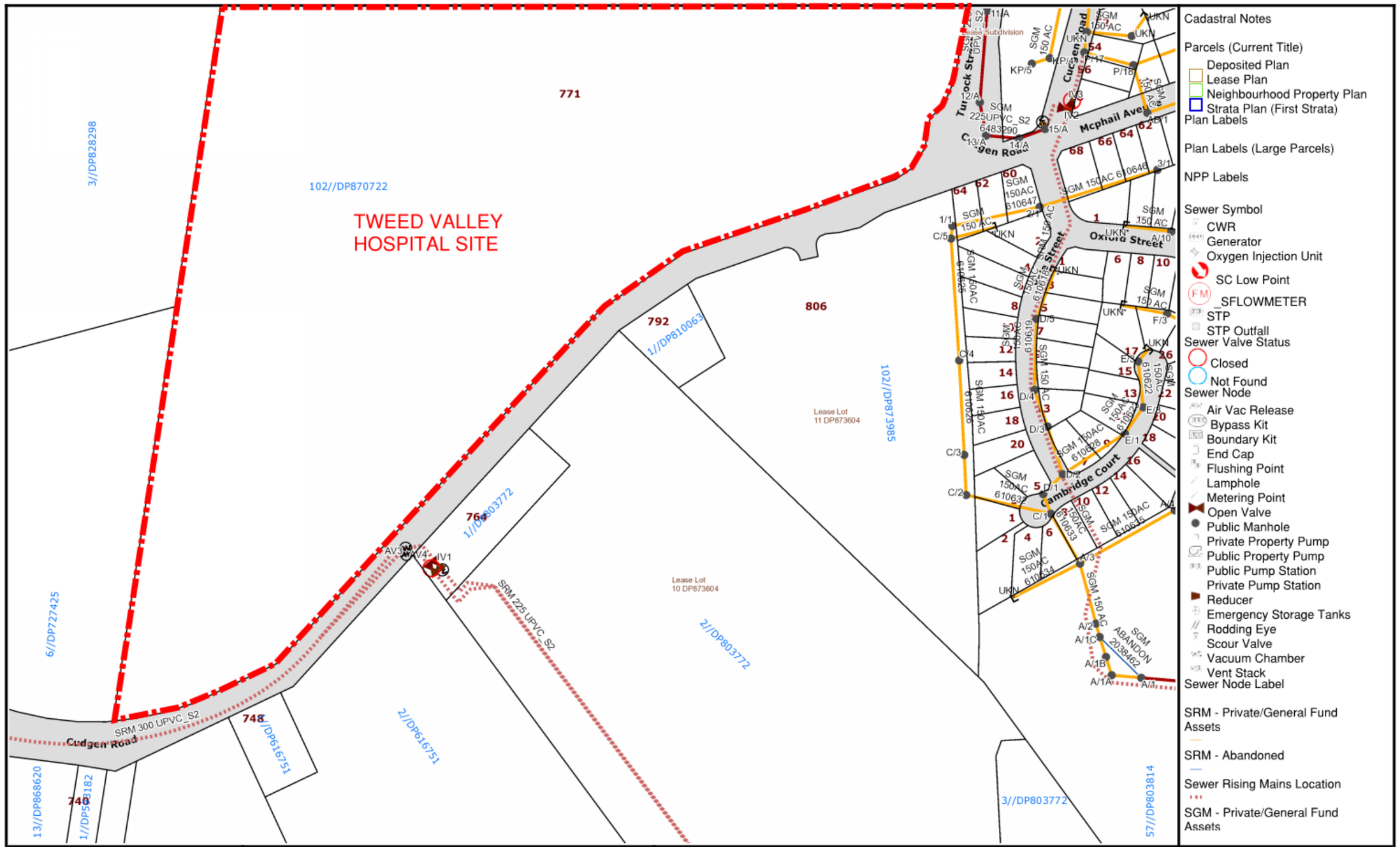
Author:Tweed Shire Council

TWEED SHIRE COUNCIL

SEWER



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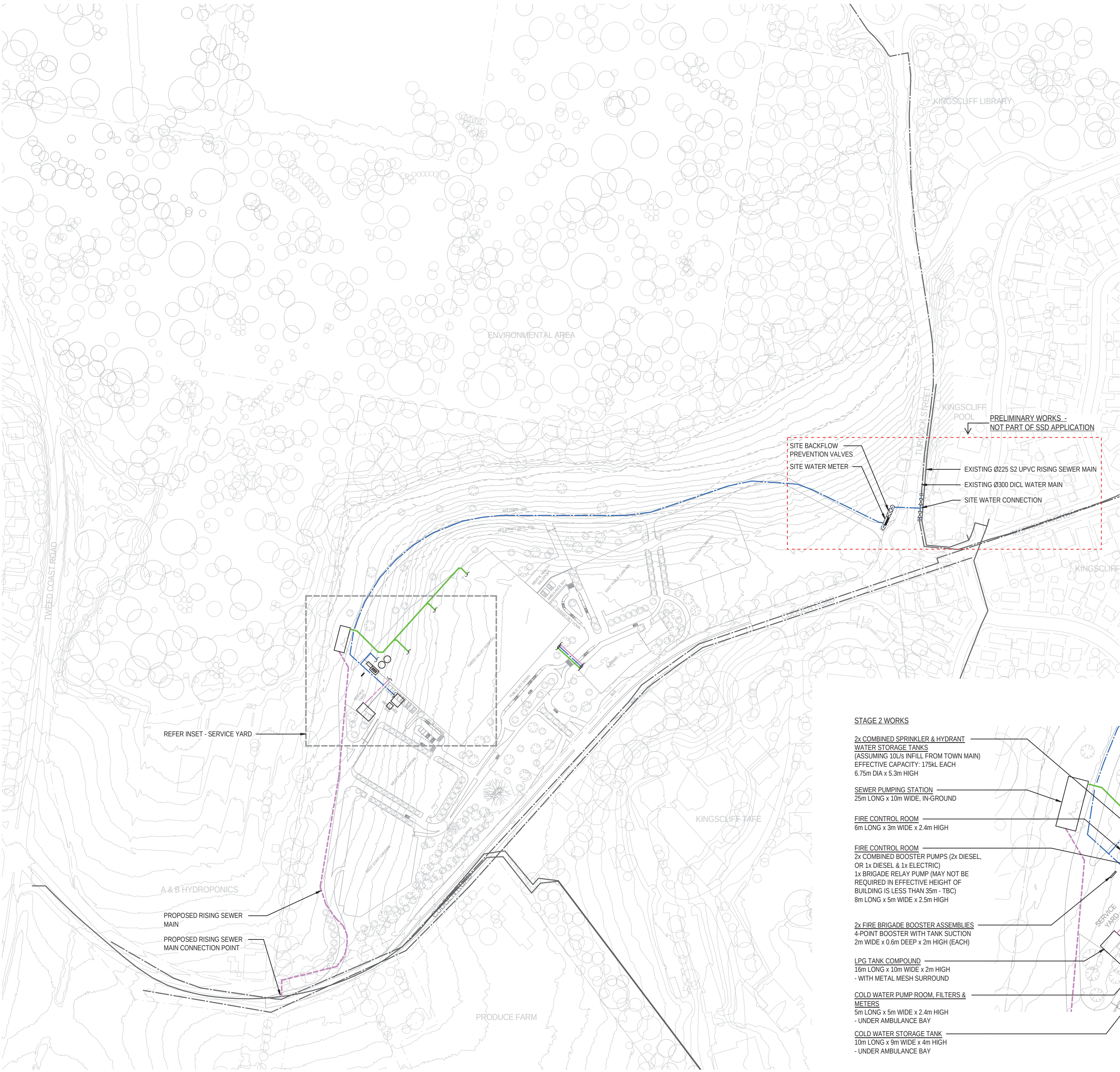
Scale at A3 page size

Author:Tweed Shire Council

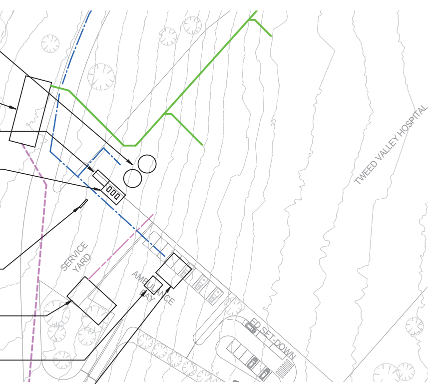
Appendix C Site Plan



KINGSCLIFF LIBRARY
ENVIRONMENTAL AREA
KINGSCLIFF POOL
PRELIMINARY WORKS - NOT PART OF SSD APPLICATION
SITE BACKFLOW PREVENTION VALVES
SITE WATER METER
EXISTING Ø225 S2 UPVC RISING SEWER MAIN
EXISTING Ø300 DICL WATER MAIN
SITE WATER CONNECTION
KINGSCLIFF
TWEED COAST ROAD
REFER INSET - SERVICE YARD
KINGSCLIFF TAFE
A & B HYDROPONICS
PROPOSED RISING SEWER MAIN
PROPOSED RISING SEWER MAIN CONNECTION POINT
PRODUCE FARM

SITE

SCALE: 1 : 2000



STAGE 2 WORKS
2x COMBINED SPRINKLER & HYDRANT WATER STORAGE TANKS
(ASSUMING 10L/s INFILL FROM TOWN MAIN)
EFFECTIVE CAPACITY: 175kL EACH
6.75m DIA x 5.3m HIGH
SEWER PUMPING STATION
25m LONG x 10m WIDE, IN-GROUND
FIRE CONTROL ROOM
6m LONG x 3m WIDE x 2.4m HIGH
FIRE CONTROL ROOM
2x COMBINED BOOSTER PUMPS (2x DIESEL, OR 1x DIESEL & 1x ELECTRIC)
1x BRIGADE RELAY PUMP (MAY NOT BE REQUIRED IN EFFECTIVE HEIGHT OF BUILDING IS LESS THAN 35m - TBC)
8m LONG x 5m WIDE x 2.5m HIGH
2x FIRE BRIGADE BOOSTER ASSEMBLIES
4-POINT BOOSTER WITH TANK SUCTION
2m WIDE x 0.6m DEEP x 2m HIGH (EACH)
LPG TANK COMPOUND
16m LONG x 10m WIDE x 2m HIGH
- WITH METAL MESH SURROUND
COLD WATER PUMP ROOM, FILTERS & METERS
5m LONG x 5m WIDE x 2.4m HIGH
- UNDER AMBULANCE BAY
COLD WATER STORAGE TANK
10m LONG x 9m WIDE x 4m HIGH
- UNDER AMBULANCE BAY
TWEED VALLEY HOSPITAL
SERVICE YARD

SERVICE YARD

SCALE: 1 : 1000

NOT FOR CONSTRUCTION

North

This drawing has been assigned an electronic code that signifies the drawing has been checked and approved by: RRG

Issue.	Description	Date	Drawn	Approved
1	FOR STAGE 1 DA	19.10.18	MPr	RRG

Client
HEALTH INFRASTRUCTURE

Architect
STH + BATES SMART

Project
TWEED VALLEY HOSPITAL

ACOR Consultants Pty Ltd
Suite 2, Level 1, 33 Herbert Street
St Leonards NSW 2065
T +61 2 9438 5098

ACOR CONSULTANTS

ENGINEERS | MANAGERS | INFRASTRUCTURE PLANNERS | DEVELOPMENT CONSULTANTS

Drawing Title
HYDRAULIC SERVICES
SITE PLAN - STAGE 1 EARLY WORKS

Drawn	Date	Scale A1	Q.A. Check	Date
MPr	OCT 2018	As indicated		

Designed	Project No.	Dwg No.	Issue
RRG	SY180077	TVH-MP-HY-SK03	1

Appendix D - Roof Water Re-use Water Balance Calculations

Tweed Valley Hospital
Water Balance for Irrigation

Roof Area	**11,266**	**m^2**
Irrigation	**9,762**	**m^2**
Toilet Flushing Demand	**0**	**m^3**
System Efficiency	**80**	**%**

Whole Site Area	232,232
Non PMF Area	79,452
Hospital Building Area	11,266
Future Retail Buildings Area	7,712
Paved Area	42,306
Green Area	91,496
"Gardens" Area	**9762**

RAINFALL DATA

Rainfall	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Median Rainfall (mm/month)	142.8	145.9	160.2	117.6	98.5	98.3	60.0	38.5	21.2	68.5	110.3	133.3
Rain Days per Month	10.5	12.0	12.9	11.2	9.9	8.2	5.7	5.0	4.7	7.2	9.2	10.1
Rain Periods per Month	4	4	4	4	3	3	2	2	2	2	3	3

IRRIGATION REQUIREMENTS

Irrigation Days	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Turfed Area	14	9	10	11	15	16	22	23	22	19	15	14

Non Irrigation Days	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Turfed Area	18	20	22	19	17	14	10	8	8	12	15	17
Irrigation Period	Peak		Shoulder		Low			Shoulder		Peak		
Water Demand for Turfed Area (mm/day)	2.1	2.1	1.5	1.5	1.5	1.5	1.5	1.5	1.5	2.1	2.1	2.1

Irrigation Required (mm)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Turfed Area	28.4	18.9	14.3	17.0	21.8	24.5	32.3	34.0	33.3	39.9	30.8	29.8

Irrigation Volume Required (m^3)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Turfed Area	276.8	184.5	139.1	166.0	212.3	239.2	314.8	331.9	324.6	389.5	300.7	290.4
Total	**276.8**	**184.5**	**139.1**	**166.0**	**212.3**	**239.2**	**314.8**	**331.9**	**324.6**	**389.5**	**300.7**	**290.4**

264.1 required/month 6.333333

Irrigation Volume Available (m^3)	**1287.0**	**1315.0**	**1443.9**	**1059.9**	**887.8**	**886.0**	**540.8**	**347.0**	**191.1**	**617.4**	**994.1**	**1201.4**

897.6 available 29.91999

Irrigation Volume Surplus (m^3)	**1010.3**	**1130.5**	**1304.7**	**894.0**	**675.4**	**646.8**	**225.9**	**15.1**	**-133.5**	**227.9**	**693.4**	**911.0**

MAXIMUM TANK VOLUME REQUIRED (m^3)

TANK CAPACITY (m^3)	**20.0**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**ANNUAL (SUM)**
Tank Start Volume (m^3)	0.0	0.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	0.0	20.0	20.0	200.0
Tank Inflow (m^3/month)		1287.0	1315.0	1443.9	1059.9	887.8	886.0	540.8	347.0	191.1	617.4	994.1	1201.4	10771.2
Tank Usage Landscape (m^3/month)		276.8	184.5	139.1	166.0	212.3	239.2	314.8	331.9	324.6	389.5	300.7	290.4	3169.7
Tank Usage Toilets (m^3/month)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water Balance (m^3/month)		1010.3	1130.5	1304.7	894.0	675.4	646.8	225.9	15.1	-133.5	227.9	693.4	911.0	7601.5
Tank Finish Volume (m^3)		20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	-113.5	20.0	20.0	20.0	106.5
Tank Overflow Occurs?		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	
External Sourcing Occurs?		No	No	No	No	No	No	No	No	Yes	No	No	No	
Tank Overflow (m^3/month)		990.3	1130.5	1304.7	894.0	675.4	646.8	225.9	15.1	0.0	207.9	693.4	911.0	7695.0
Top Up (m^3/month)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	113.5	0.0	0.0	0.0	113.5

RAINWATER SUPPLY % **96**

The calculations are based on the following information/assumptions:
Weather data was obtained from the Bureau of Meteorology Coolongatta Weather Station
The rainwater tank capacity is calculated to have a minimum 20 day storage capacity for the demand entered

Appendix E - Sewage Pump Station Calculations

Tweed Valley Hospital Sewer Flow and Pump Station Calculation

Project Number:	SY18-0077	Project Reference	Tweed Valley Hospital
Prepared by:	R.Gruber	Prepared For:	NSW Health Infrastructure
Date:	15th August 2018		

Element	EP*1	A (ha)	ADWF*2 (l/s)	d*2	PDWF*2 (l/s)	Density (EP/ha)	A_{eff}*2	C*2	I*2	IFF*2 (l/s)	PWWF*2 (l/s)
Tweed Valley Hospital	1878	3.5	3.94	5	19.72	536	3.5	1.3	68.3	8.64	28.36
Total			3.94		19.72					8.64	28.36

Sewer Pump Station ID	Adopted Pump Size (120%)	Reflux Valve	Approx Nominal Pump Well Capacity (MIN)	Nominal Emergency Storage Capacity (For 2 Hours) m^3	No of Pumps / Pump Duty	Rising Main Size	Rising Main Length (m)
Tweed Valley Hospital Sewer Pump Station	35	PVC	To be confirmed	204	2 x35l/sec @ 20mh (Duty-Stand by)	180 PE 100 SDR 11	To be confirmed

Index:

ET	=	Equivalent Tenements
EP	=	Equivalent Population
A	=	Gross Area
ADWF	=	Average Dry Weather Flow
PDWF	=	Peak Dry Weather Flow
IFF	=	Inflow and Infiltration
PWWF	=	Peak Wet Weather Flow

Note:

1. Refer to Sewerage Load Calculator Schedule For ET and EP Calculation
2. Appendix C of WSA02-2014-3.1