



CONSULTANTS

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

PO Box 292  
ST LEONARDS NSW 1590

T 02 9438 5098  
F 02 9438 5398

[www.acor.com.au](http://www.acor.com.au)

ENGINEERS

MANAGERS

INFRASTRUCTURE  
PLANNERS

DEVELOPMENT  
CONSULTANTS

# Tweed Valley Hospital

Hydraulic Engineering Services

Infrastructure Management Plan

Prepared for: Health Infrastructure

Document no: TVH\_IMP\_HY\_SSD\_001

Issue no: Rev 07

ACOR Project no: SY180077

HI / ACOR Contract Number: HI7593HYD

SSD Application no : SSD 9575

Disclaimer

This Report has been prepared in accordance with the scope of services described in the contract or agreement between ACOR Consultants Pty Ltd and the Client. The Report relies upon data, surveys, measurements and results taken at or under the particular terms and conditions specified herein. Changes to circumstances or facts after certain information or material has been submitted may impact on the accuracy, completeness or currency of the information or material. This Report has been prepared solely for use by the Client, ACOR Consultants Pty Ltd accepts no responsibility for its use by other parties without the specific authorisation of ACOR Consultants Pty Ltd. ACOR Consultants Pty Ltd reserves the right to alter, amend, discontinue, vary or otherwise change any information, material or service at any time without subsequent notification. All access to, or use of, the information or material is at the user's risk and ACOR Consultants Pty Ltd accepts no responsibility for the results of any actions taken on the basis of information or material provided, nor for its accuracy, completeness or currency. Any reference to "Report" where used in this Disclaimer is also a reference to any plan, table, data or other document that has been created for the purposes of the "Report" and referred to in the "Report"

REVISIONS

Revision	Date	Purpose	Prepared By	Approved By
01	20/07/2018	Draft for Review	RRG	RRG
02	22/08/2018	2 <sup>nd</sup> Draft for Review	RRG	RRG
03	24/08/2018	3 <sup>rd</sup> Draft Issue for Review	RRG	RRG
04	31/08/2018	Final Draft Issue for HI Review	RRG	RRG
05	03/10/2018	Upgraded to suit review comments	RRG	RRG
06	04/10/2018	Upgraded to suit review comments	RRG	RRG
07	17/10/2018	Upgraded to suit review comments	RRG	RRG

COPYRIGHT

No part of this document may be reproduced, adapted, transmitted or stored in a retrieval system in any form or by any means without written permission unless otherwise permitted under the Copyright Act, 1968. Enquiries should be addressed to ACOR Consultants Pty Limited.

© ACOR Consultants Pty Limited

All intellectual property and copyright reserved.

Contents

1

Executive Summary .....

3

1.1

Overview .....

3

1.2

Hydraulic Infrastructure Services .....

5

2

Hydraulic Services – Introduction .....

6

2.1

Hydraulic Services – Utility Supply Description .....

7

3

Conclusion .....

11

Appendix A - Sewerage Network Diagrams .....

12

Appendix B - Water Supply Diagrams .....

15

Appendix C - Fire Flow Results .....

18

Appendix D - Water Quality Results .....

19

Appendix E - Proposed Gas Loads .....

21

Appendix F - Authority Consultation .....

22

Appendix G - Fire Sprinkler/Hydrant System Calculations .....

28

# 1 Executive Summary

In accordance with SEARS application requirements, this Infrastructure Management Plan has been prepared, in consultation with relevant agencies, detailing information on the existing capacity and any augmentation and easement requirements of the Project for the provision of utilities including staging of infrastructure.

This report has been prepared to support the SSD application (Masterplan proposal and stage 1 works)

## 1.1 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 and design.

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 concept 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.

### 1.1.1 Concept Proposal and Stage 1 Early and Enabling Works

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

The Concept Proposal is informed by service planning to 2032 and has an expected gross floor area in the range 55,000m<sup>2</sup> to 65,000m<sup>2</sup>. 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.

### 1.1.2 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.

### 1.1.3 Preliminary Works (Not Part of SSD application)

Following acquisition of the Project Site, HI 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.

HI 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

### 1.1.4 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.

### 1.1.5 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.

## 1.2 Hydraulic Infrastructure Services

The Tweed Valley Hospital and Associated works can be adequately serviced by existing and proposed authority infrastructure services and will be provided with “fit for purpose” hydraulic and fire engineering services systems.

This infrastructure management plan addresses all authority infrastructure supply services available for the Stage 1 and 2 Project works.

Scope of services covered within this infrastructure management plan include:

- Sewerage systems provided by Tweed Shire Council
- Potable and Fire Water supplies provided by Tweed Shire Council
- LP Gas supply provided by ELGAS.

Authority supply services can be summarized as follows:

- ACOR Consultants have assessed and reported on the condition, capacity, compliance reliability and efficiency of the existing Tweed Shire Council sewerage infrastructure system and have found them to be suitable for connection. Capacity of downstream systems is still to be determined by Council to determine exact sewer connection location.
- ACOR Consultants have assessed and reported on the condition, capacity, compliance reliability and efficiency of the existing Tweed Shire Council water supply infrastructure system and have found them to be suitable for the proposed Project to the existing 300mm water main located in Turnock Street.
- ACOR Consultants have liaised with Jemena and APA Group to confirm availability of natural gas supply for the proposed Project. Advice provided indicated there is currently no gas available in the vicinity of the Project Site, and no future planned works to provide natural gas to this area.
- As a consequence of natural gas not being available for connection, the alternative Liquefied Petroleum Gas (LPG) stored on site within gas tanks, will be utilised. Regular delivery of LPG by ELGAS under current NSW Government contract is being negotiated
- ACOR Consultants have received water quality test results from Tweed Shire Council on 10<sup>th</sup> July 2018 and confirms compliance with Australian drinking water guidelines.

Refer Civil and Electrical engineering water management and infrastructure management plans for civil stormwater and electrical infrastructure plans.

## 2 Hydraulic Services – Introduction

ACOR Consultants Pty Ltd has been engaged by Health Infrastructure to provide authority infrastructure management Plan for the Tweed Valley Hospital.

This report has been prepared to support the SSD application (concept proposal and stage 1 works) and the rezoning

The proposed Tweed Valley Hospital Project consists of: -

- A main entry and retail area
- Administration
- Community Health
- Sub-Acute in-patient units
- Acute in-patient units
- Day only units
- Paediatrics
- Intensive Care Unit
- Mental Health Unit
- Maternity Unit and birthing suites
- Renal dialysis
- Pathology and pharmacy
- Radiation and Oncology
- Emergency Department
- Operating Theatres and endoscopy suite
- Interventional cardiology suite
- Medical Imaging
- Mortuary
- Back of house
- Car parking

New proposed building works can readily be serviced from the existing authority infrastructure including Tweed Shire Council and ELGAS infrastructure.

This infrastructure management plan describes the existing Tweed Shire Council hydraulic and Fire services utility supply capacity, to service the proposed development loads

Hydraulic and fire services include:

- Buildings sewage connecting to Tweed Shire Council Sewerage infrastructure
- Domestic water supply connecting to Tweed Shire Council Water main infrastructure
- Fire protection water supply connecting to Tweed Shire Council Water main infrastructure
- Liquified Petroleum Gas supplied by ELGAS within site bulk storage tanks

This infrastructure management plan does not consider stormwater, which are being reported upon by the civil engineering consultant.

This infrastructure management plan does not consider electrical and communication services, which are being reported on by the electrical engineer.

## 2.1 Hydraulic Services – Utility Supply Description

Authority services adequacy is summarized within the tables below:

### 2.1.1 Sewerage

Item	Description
<b>Supply Authority Name and Contacts</b>	<p><b>Tweed Shire Council</b>  <b>Michael Wraight</b> (Acting Manager) Water and Wastewater  Email <a href="mailto:mwraight@tweed.nsw.gov.au">mwraight@tweed.nsw.gov.au</a>  Phone: (02)66702411 Mobile:0407702373</p> <p><b>Peter Pennycuik</b> - Tweed Shire Council (TSC)  Senior Engineer – Planning and Assets Water and Wastewater  Email <a href="mailto:peterp@tweed.nsw.gov.au">peterp@tweed.nsw.gov.au</a>  Phone: (02)66702638 Mobile:0407916570</p>
<b>Sewerage Main Details</b>	<p>The Project Site has the following existing sewerage infrastructure for possible connection to the site</p> <ul style="list-style-type: none"> <li>300mm pressure sewer rising main in Cudgen Road.</li> <li>300mm and 225mm pressure sewer rising main in Tweed Coast Road</li> <li>1x 225mm pressure sewer rising mains in Turnock Street</li> </ul> <p>Refer Appendix A Sewer Diagram.  Project Siteconnection point to be determined by Council.</p>
<b>Condition, Reliability and Capacity</b>	<p>No reports of major failures or surcharging of existing sewer mains</p> <p>Council sewerage system Infrastructure failure would not impact the operation Tweed Shire Council waste water treatment facility, as advised by Council via email dated 3<sup>rd</sup> August 2018 which reads  <i>"I am reasonably comfortable that with proper hospital systems design, we can provide water supply demand and accommodate the wastewater flow, the latter perhaps with a contribution to a future SRM upgrade.</i>  <i>Cheers"</i>  Peter Pennycuik  Senior Engineer - Planning and Assets  Water and Wastewater  Tweed Shire Council  p (02) 6670 2638  m 0407 916 570</p> <p>Sewerage main surcharge or blockage would discharge via overflow relief gully. Council would implement emergency repairs and temporary measures to allow hospital to operate normally.</p>
<b>Existing Sewage Loads (Tweed Heads Hospital)</b>	<p>Current (193 inpatient / hospital beds)  Current Equivalent Tenements (ET) = 193 X 1.40 = 270.2  Average Dry Weather Flow –1.58 l/sec (ADWF = ET X 2.8 x 0.0021)  Peak Dry Weather Flow –7.9 l/sec (PDWF = 5 X ADWF)</p>
<b>Proposed Sewage Loads</b>	<p>Proposed Beds - 430 (Inpatient / overnight hospital beds)  Proposed Equivalent Tenements (ET) = 430 X 1.40 = 602  Average Dry Weather Flow – <b>3.53l/sec</b> (ADWF =ET X 2.8 x 0.0021)  Peak Dry Weather Flow – <b>17.7l/sec</b> (PDWF=5 X ADWF)</p>
<b>Council Fees and Charges</b>	<p>Tweed Shire Council developer (DSP) charges based on published prices effective July 1, 2015 are approximately \$6,690 per additional E.T  Final determination of additional ET and developer charges to be agreed between Health Infrastructure and Tweed Shire Council.</p>



## 2.1.2 Domestic Water

Item	Description
<b>Supply Authority Name and Contact</b>	<p><b><u>Tweed Shire Council</u></b>  <b>Michael Wraight</b> (Acting Manager) Water and Wastewater  Email <a href="mailto:mwraight@tweed.nsw.gov.au">mwraight@tweed.nsw.gov.au</a>  Phone: (02)66702411 Mobile:0407702373</p> <p><b>Peter Pennycuick</b> - Tweed Shire Council (TSC)  Senior Engineer – Planning and Assets Water and Wastewater  Email <a href="mailto:peterp@tweed.nsw.gov.au">peterp@tweed.nsw.gov.au</a>  Phone: (02)66702638 Mobile:0407916570</p>
<b>Water Main Details</b>	<p>The Project Site has the following existing watermain infrastructure for possible connection to the site</p> <ul style="list-style-type: none"> <li>150mm DICL water main in Cudgen Road</li> <li>150mm CICL water main in Cudgen Road</li> <li>300mm DICL water main in Turnock Street</li> </ul> <p>Refer Appendix B – Water Main Diagram</p>
<b>Existing Domestic Water Supply Loads (Tweed Heads Hospital)</b>	<p>Current (193 hospital beds)  Equivalent Tenement (ET)= 193 X 0.90= 173.7ET  1ET = 0.63kl/day  Total Load = ET X 0.630kl/day= 109kl/day  Probable Maximum Simultaneous Flow – 5.4lsec</p>
<b>Proposed Domestic Water Supply Loads</b>	<p>Proposed Beds 430 ( Inpatient / overnight hospital beds)  Equivalent Tenement (ET)= 430 X 0.90= 387ET (1 ET =0.630KL/day)  Total Load = ET X 0.63kl/day= 243.81kl/day  Probable Maximum Simultaneous Flow – 17.0 l/sec (Subject to detailed calculations and application of diversity) Maximum tank infill rate at 10 litres/sec</p>
<b>Condition and Reliability</b>	<p>Recent Council inspections during programmed works indicated watermains in this area are in good condition.  No reports of major failures or disruptions  130kl water storage (2 x 65KL tanks) for hospital emergency purposes to be constructed as part of hospital development works to provide 3 hours continuous peak supply.  During unforeseen water main failure, Tweed Shire Council would implement emergency repairs and temporary measures to allow hospital to operate normally.  During planned or programmed water main isolation, existing 300mm water main supply in Turnock street is classified as a grade 2 water supply with alternative arrangements for isolation and supply available.</p>
<b>Water Supply Available Flow and Pressure</b>	<p>Water supply flow and pressure test results at Cudgen road 150mm water mains indicate insufficient capacity.  Water supply flow and pressure test result at Turnock Street 300mm water main indicate sufficient capacity  Refer appendix C for flow and pressure test results</p>
<b>Council Fees and Charges</b>	<p>Tweed Shire Council developer (DSP) charges based on published prices effective July 1, 2018 are approximately \$13,926 per additional E.T  Final determination of additional ET and developer charges to be agreed between Health Infrastructure and Tweed Shire Council.</p>
<b>Water Quality</b>	<p>Water quality results have been received by Tweed Shire Council (refer appendix D) and confirm water main supply complies with Australian Drinking Water Guidelines.  Water filtration equipment will be constructed as part of hospital development works to protect water supply quality to hospital patients, staff, public and equipment.  Further detailed testing to be performed to confirm water quality adequacy for specialised equipment such as CSSD equipment.</p>



### 2.1.3 Fire Service Water Supply

Item	Description
<b>Supply Authority Name and Contact</b>	<p><b><u>Tweed Shire Council</u></b>  <b>Michael Wraight</b> (Acting Manager) Water and Wastewater  Email <a href="mailto:mwraight@tweed.nsw.gov.au">mwraight@tweed.nsw.gov.au</a>  Phone: (02)66702411 Mobile:0407702373</p> <p><b>Peter Pennycuick</b> - Tweed Shire Council (TSC)  Senior Engineer – Planning and Assets Water and Wastewater  Email <a href="mailto:peterp@tweed.nsw.gov.au">peterp@tweed.nsw.gov.au</a>  Phone: (02)66702638 Mobile:0407916570</p>
<b>Water Main Details</b>	<p>The Project Site has the following existing watermain infrastructure for possible connection to the site</p> <ul style="list-style-type: none"> <li>150mm DICL water main in Cudgen Road</li> <li>150mm CICL water main in Cudgen Road</li> <li>300mm DICL water main in Turnock Street</li> </ul> <p>Refer Appendix B – Water Main Diagram</p>
<b>Existing Fire Water Supply Loads</b>	<p>Fire Service  0L/sec Fire Hydrant  0l/sec Fire Sprinklers</p>
<b>Proposed Fire Water Supply Loads</b>	<p>Fire Service  20L/sec Fire Hydrant  20l/sec Fire Sprinklers  Maximum tank infill rate at 10l/sec</p>
<b>Condition and Reliability</b>	<p>Recent Council inspections during programmed works indicated watermains in this area are in good condition.  300kl water tanks for hospital emergency fire water storage to be constructed as part of hospital development works.  During water main failure, Tweed Shire Council would implement emergency repairs and temporary measures to allow hospital to operate normally.  Existing 300mm water main supply in Turnock street is classified as a grade 2 water supply with alternative arrangements for isolation and supply available.</p>
<b>Water Supply Available Flow and Pressure</b>	<p>Water supply flow and pressure test results provided by Tweed Shire Council and building height validate storage tanks and booster pumps are required.  Refer appendix C Fire Flow Results</p>

#### 2.1.4 Gas

Based on discussions with Jemena and APA Group, natural gas is not currently or likely to be available in the future for this Project Site.

For the purposes of this report Liquefied Petroleum Gas (LPG) will be utilized for domestic hot water, mechanical heating equipment and possible commercial cooking equipment

Item	Description
<b>Supply Authority Name and Contact</b>	<b>ELGAS</b> Name :Dale Mckay Local Area Representative Email : dale.mckay@elgas.com.au Telephone: 131 161
<b>Existing LPG Details</b>	Delivery timetables to be negotiated with ELGAS to determine final gas tank volumes incorporating N+1 spare capacity.
<b>Existing Gas Supply Loads</b>	Nil current load
<b>Proposed LP Gas Supply Loads</b>	Refer appendix E Total site gas load upon Stage 2 completion Total 25,375mj/hr say 26,000mj/hr (Subject to final detail design)
<b>Reliability</b>	Good No reports of major delivery delays in this area. If ELGAS was unable to deliver gas to the site, gas fired plant for domestic hot water and mechanical heating would not be available until site storage tanks are replenished. As consequence, it is proposed to allow for additional two weeks of LPG capacity in the storage tanks to allow for unforeseen tanker delivery delays. During extended gas delivery delays ELGAS would implement emergency repairs and temporary measures to allow hospital to operate normally on a continuous basis Supplementary electric backup hot water storage to be considered as part of concept and schematic design stages.
<b>Capacity</b>	Adequate capacity will be available subject to final detail calculations

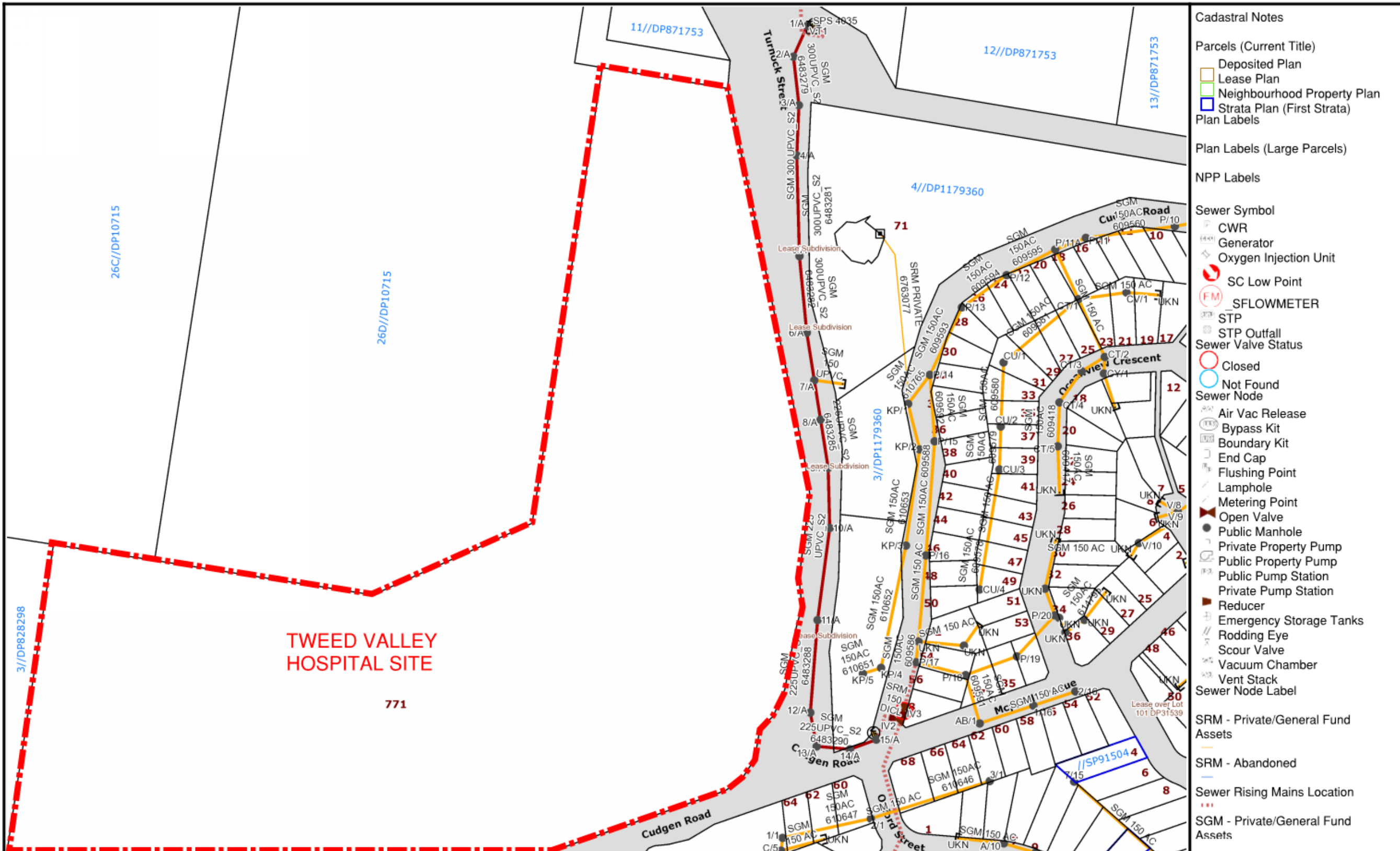
### **3 Conclusion**

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.

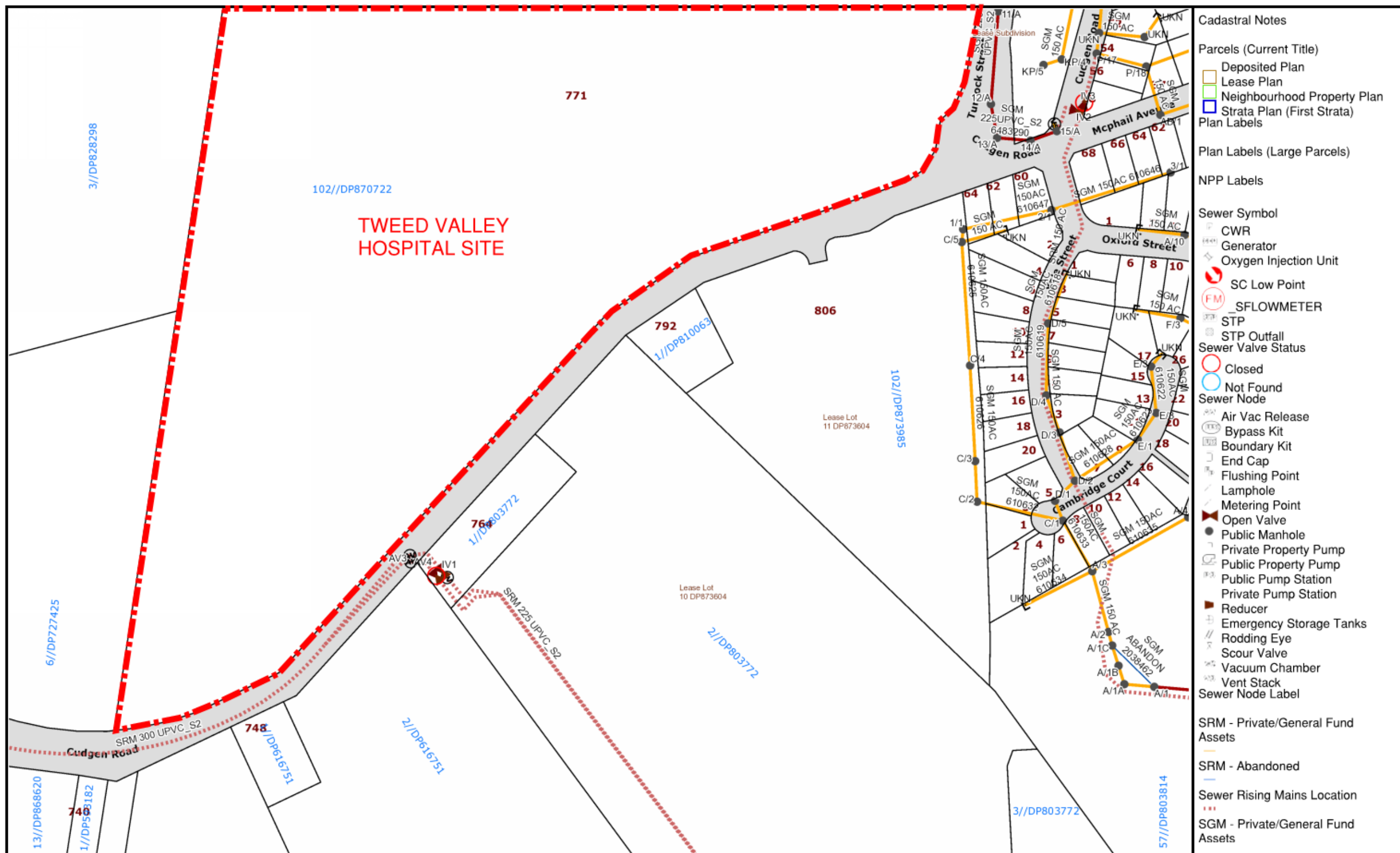
## Appendix A - Sewerage Network Diagrams

SEWER





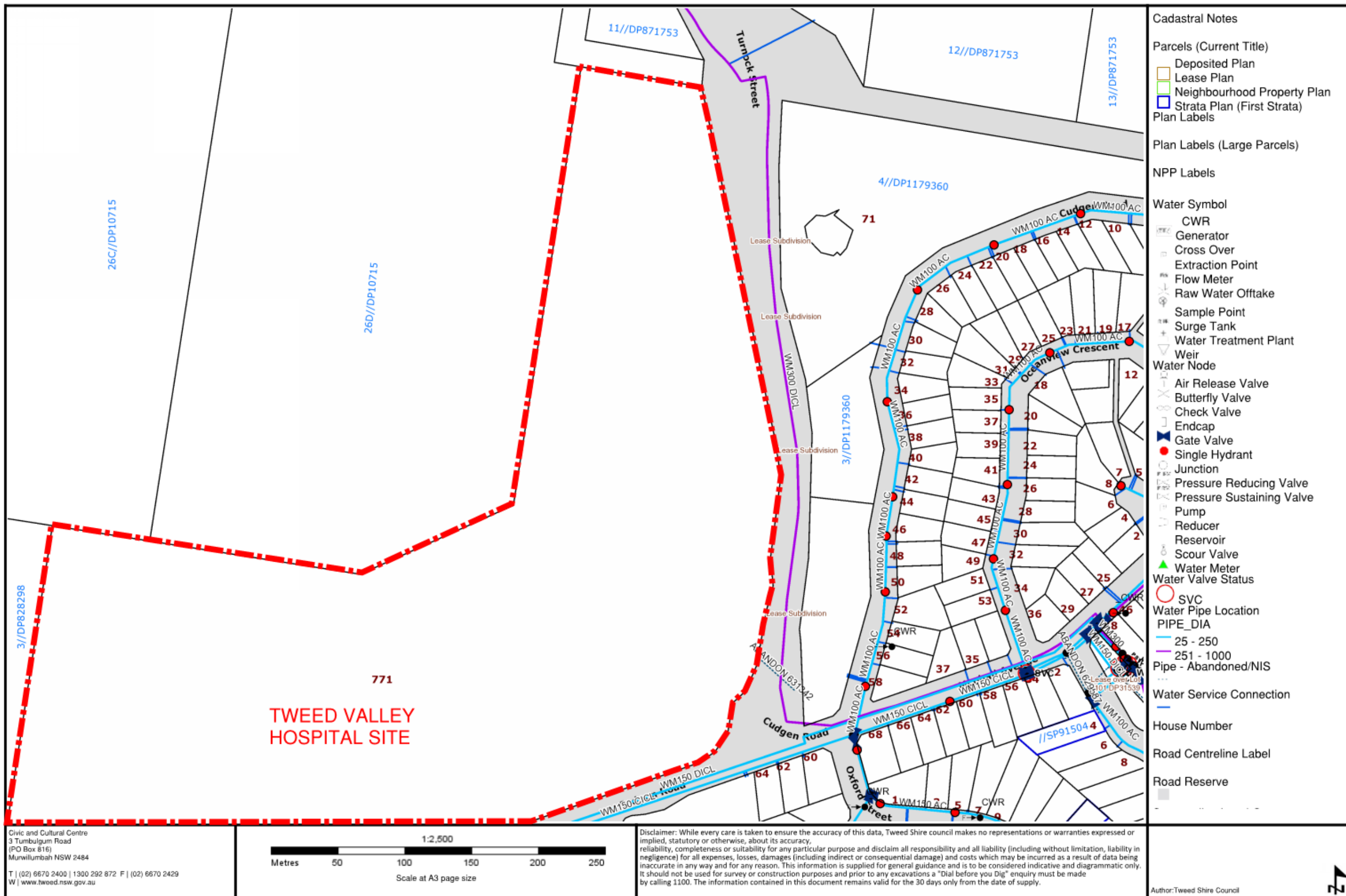
SEWER



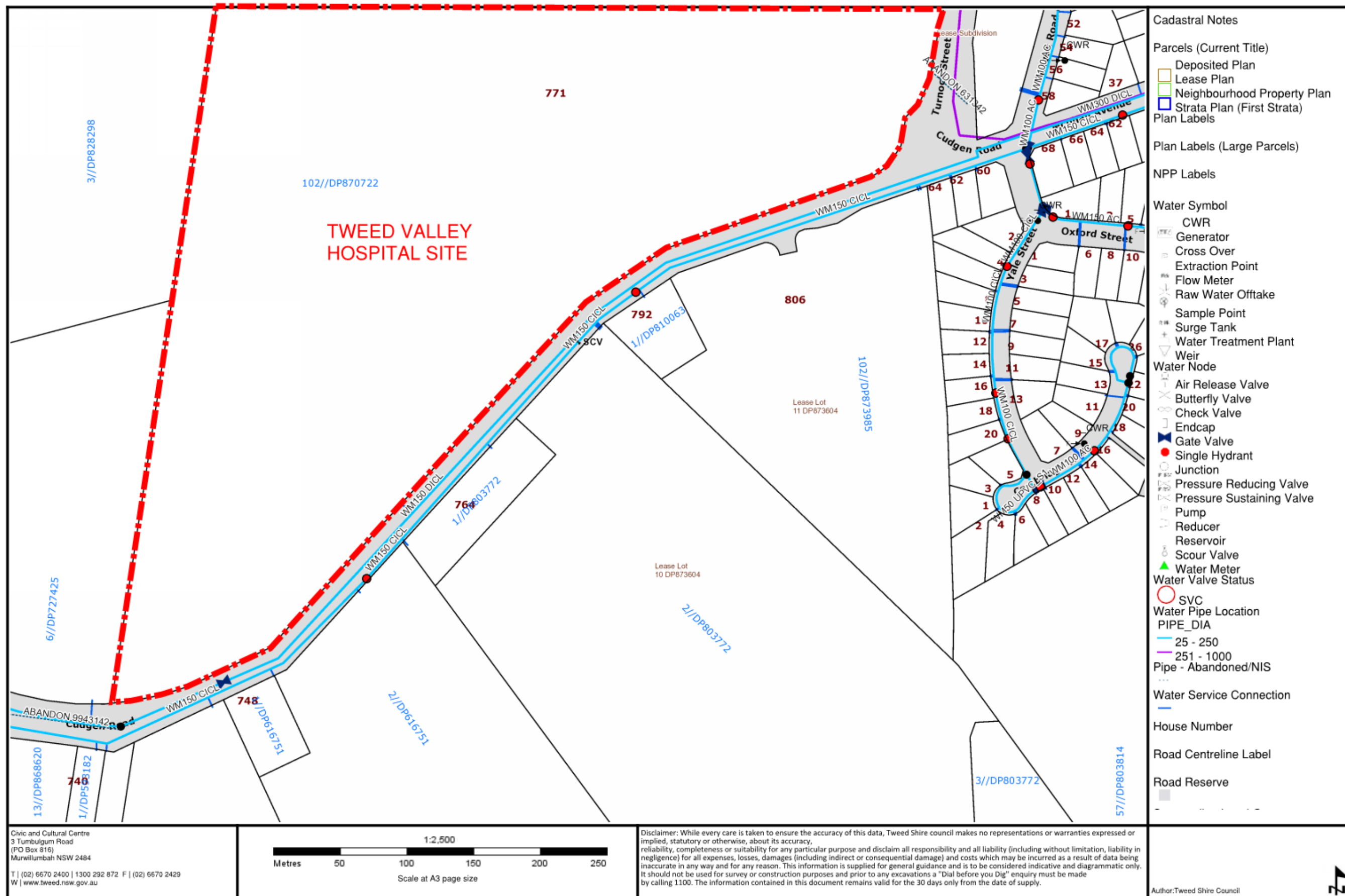


## Appendix B - Water Supply Diagrams

WATER



WATER



Appendix C - Fire Flow Results

Council Reference: Water Conveyancing - Flow Tests  
Your Reference:



13 July 2018

Customer Service | 1300 292 872 | (02) 6670 2400

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

tsc@tweed.nsw.gov.au  
www.tweed.nsw.gov.au  
f i t y p g+ in  
PO Box 816  
Murrumbidgee NSW 2484  
Please address all communications  
to the General Manager  
/EN 90 178 732 496

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*





## Appendix D - Water Quality Results

### Typical Water Quality Analysis (2016-17)

Compared with the Australian Drinking Water Guidelines (ADWG)



Measure		ADWG Guidelines		Water Treatment Plant		
Parameter	Units	Health	Aesthetic	Bray Park	Uki	Tyalgum
<b>Physical Characteristics</b>						
- True Colour	HU	NA	15	<1	,1	<1
- Turbidity	NTU	NA	0.5	0.2	0.5	0.2
- Hardness	mg CaCO <sub>3</sub> /L	NA	200	56	43	42
- Alkalinity	mg CaCO <sub>3</sub> /L	NA	15	62	41	46
- Total Dissolved Solids	mg/L	NA	600	132	125	95
- pH	pH units	NA	6.5 – 8.5	7.5	7.8	7.3
<b>Disinfectants</b>						
- Free Chlorine	mg/L	5	0.6	0.2-1.0	0.2-1.0	0.2-1.0
<b>Disinfection By-products</b>						
- Trihalomethanes	mg/L	0.25	na	0.03	0.02	0.03
<b>Chemical Characteristics</b>						
- Aluminium	mg/L	NA	0.2	<0.01	0.01	<0.01
- Antimony	mg/L	0.003	NA	<0.001	<0.001	<0.001
- Arsenic	mg/L	0.01	NA	<0.001	<0.001	<0.001
- Cadmium	mg/L	0.002	NA	<0.001	<0.001	<0.001
- Calcium	mg/L	NA	NA	14	10	8
- Chloride	mg/L	NA	250	21	22	14
- Chromium IV	mg/L	0.05	NA	<0.001	<0.001	<0.001
- Copper	mg/L	2	1	0.02	<0.01	0.07
- Fluoride	mg/L	1.5	NA	0.94	0.03	0.07
- Iron	mg/L	NA	0.3	<0.01	<0.01	<0.01
- Magnesium	mg/L	NA	NA	5	4	5
- Manganese	mg/L	0.5	0.1	<0.01	<0.01	<0.01
- Nickel	mg/L	0.02	NA	<0.001	<0.001	<0.001
- Lead	mg/L	0.01	NA	<0.001	<0.001	<0.001
- Sodium	mg/L	NA	180	20	21	13
- Sulfate	mg/L	500	250	9.7	16	2
- Zinc	mg/L	NA	3	<0.005	<0.005	<0.005

## Typical Water Quality Analysis (2016-17)

### Compared with the Australian Drinking Water Guidelines (ADWG)



Microbiological						
- Total Coliforms	cfu/100mL	na	na	0	0	0
- E. coli	cfu/100mL	0	na	0	0	0
<ul style="list-style-type: none"> <li>– NA - no published guideline</li> <li>– ADWG refers to the 2011 Australian Drinking Water Guidelines</li> <li>– ADWG Health refers to a health related guideline value which does not result in any significant risk to the health of the customer over a lifetime of consumption.</li> <li>– ADWG Aesthetic refers to an aesthetic guideline value that is associated with acceptability of water to the consumer in regard to appearance, taste and odour.</li> <li>– This table is based on data from the 2016/2017 financial year WTP weekly sampling.</li> </ul>						



## Appendix E - Proposed Gas Loads

Project Number:

SY18-0077

Prepared by:

R.Gruber

Date:

11th July 2018

Project Reference:

Tweed Valley Hospital

Prepared For:

NSW Health Infrastructure

2018 BUSINESS CASE GAS LOAD CALCULATOR

ACOR

CONSULTANT

Bed numbers 2018 -2024 Business Case	Design Rate (MJ/hr)	Operating Capacity (include %)	Hours per Day	MDQ MJs		Weeks per Year	Total Annual Load (MJs)	Comments
Retained load				0				
Nil retained load	0	0%	0	0	0	0	0	
Existing Retained Total	0			0			0	
Proposed								
Main Hospital Mechanical	0	9%	24	0	7	52	0	SVA to provide estimates
ED/ICU/OR/FM Plantroom Domestic Hot Water	2000	15%	24	7200	7	52	2,620,800	Subject to final detailed design
Mechanical Steam Boilers	0	22%	24	0	7	52	0	Subject to final detailed design
IPU/MAT/AMB/RAD/MH Domestic Hot Water	3000	15%	24	10800	7	52	3,931,200	Subject to final detailed design
Commercial Kitchen	2000	30%	16	9600	7	52	3,494,400	Subject to final detailed design
CSSD Domestic Hot Water	600	15%	16	1440	7	52	524,160	Subject to final detailed design
OT Domestic Hot Water	400	15%	16	960	7	52	349,440	Subject to final detailed design
Retail Café	500	50%	14	3500	7	52	1,274,000	Subject to final detailed design
Provision for future expansion	1140	100%	24	27360	7	52	9,959,040	To be confirmed
Proposed new loads	9640			60860			22,153,040	
Co Gen								To be confirmed
Co-Gen	0	90%	14	0	5	52	0	To be confirmed
Supplementary Heating	0	14%	24	0	7	52	0	To be confirmed
Without Co-Gen								
MHQ	9640		MDQ	60860		ACQ (MJs)	12,194,000	
MHQ with Diversity								
With Co-Gen								
MHQ	2500		MDO	13100		ACQ (MJs)	4,768,400	

Note: LP Gas supply (ELGAS)

Main Supply Pressure

100kPa

Building Supply Pressure

7kPa

Note: LP Gas supply (ELGAS)

Main Supply Pressure 100kPa

Building Supply Pressure 7kPa

# Appendix F - Authority Consultation

## Supply Authority Meeting Number 1 Minutes

Date:	10 July 2018
Office:	ACOR St Leonards
Project Number:	SY018-0077

Meeting Minutes	Meeting Date /Time	5 <sup>th</sup> July 2018 / 9:00am
	Meeting Location	Water and Wastewater Unit Office (Tweed Heads)
	Minutes Taken By	Rob Gruber

Attendees	Name	Initials
	Rob Gruber - Acor Consultants - Principal Email: <a href="mailto:rgruber@acor.com.au">rgruber@acor.com.au</a> Phone: (02)94385098 Mobile: 0412148460	RRG
	Peter Pennycuik - Tweed Shire Council (TSC) Senior Engineer – Planning and Assets Water and Wastewater Email: <a href="mailto:peterp@tweed.nsw.gov.au">peterp@tweed.nsw.gov.au</a> Phone: (02)66702638 Mobile:0407916570	PP
Apologies	Michael Wraight (Acting Manager) Water and Wastewater Email: <a href="mailto:mwraight@tweed.nsw.gov.au">mwraight@tweed.nsw.gov.au</a> Phone: (02)66702411 Mobile:0407702373	MW
Additional for Circulation	Leigh Gilshenan – TSA Project Management Senior Project Manager Email : <a href="mailto:lgilshenan@tsamanagement.com.au">lgilshenan@tsamanagement.com.au</a>	

Agenda	No.	Meeting Topics
	1	Project Status and Scope
	2	Water Supply
	3	Sewerage
	4	Tweed Shire Council Fees and Charges

Meeting Notes and Actions			
No.	ITEM	Action By Whom	Deadline
1.	<b>Project Status and Scope</b>		
1.1	<b>Project Status</b> RRG advised introductory meeting was called to keep TSC informed of proposed new Tweed Valley Hospital to be located on Cudgen Road , Cudgen, as announced by NSW Government representatives.	RRG	N/A
1.2	<b>Project Scope</b> RRG to provide the following to TSC:- <ul style="list-style-type: none"> <li>Proposed hospital beds for current and expected future expansion</li> <li>Water and sewer loading calculations based on Water Directorate calculations method for water and sewer.</li> </ul>	Note	11 <sup>th</sup> July 2018
2.	<b>Water Supply</b>		
2.1	PP tabled watermain network diagram indicating current network configuration. PP to provide RRG with access to network diagram for reporting and costing purposes	PP	As soon as practical
2.2	PP advised that 150mm watermain on Cudgen Road , at TAFE entrance, was pressure and flow tested in 2009. Only achieved 11litres/sec at no residual pressure head. Not suitable for hospital connection. RRG confirmed that Acor still want to proceed with pressure and flow application as submitted for record purposes.	PP to process pressure and flow application	As soon as practical
2.3	PP advised there is a 300mm main located in Turnock Street which should be suitable for connection. Grade 2 connection can be achieved. PP advised the site testing of this main is not possible as there are no hydrants located on the main. RRG requested if pressure and flow advice could be provided by modelling calculations. RRG to make separate application for information	RRG to make separate application to Council	11 <sup>th</sup> July 2018
2.3	PP advised there is ample capacity in the current network for new hospital and other proposed developments in the area.	Note	N/A
2.4	PP advised the current watermain networks have been constructed between 1962 and 2007 and are in good and reliable condition, with no reports of regular failures	Note	N/A
2.5	RRG requested water quality analysis. PP advised to make application through Marty Hancock at Council office.	RRG to make separate application to Council	11 <sup>th</sup> July 2018
3.	<b>Sewerage</b>		
3.1	PP tabled sewerage mains network diagram indicating current network configuration. PP to provide RRG with access to network diagram for reporting and costing purposes	PP	As soon as practical

3.2	PP advised that TSC had never envisaged development of the subject site, and therefore no planning for connection has been performed to date. PP suggest that hospital would require a sewer pumping station and connect to pressure rising main in Tweed Coast Road, which extends to sewage treatment plan. Exact connection point will need to be determined based on other concurrent developments in the vicinity. Length of hospital rising main could range from approximately 350m to 6km RRG to make application request for this study to be performed	Note	N/A
4.	<b>TSC Charges</b>		
4.1	RRG requested TSC standard charges. PP advised:- <ol style="list-style-type: none"> <li>Water supply headworks charges should apply for additional registered beds at \$13,926 per additional Equivalent Tenement (ET) 1ET = 0.9 Bed.</li> <li>Sewer headworks charges should apply for additional registered beds at \$6,690 per additional Equivalent Tenement (ET) 1ET =1.4 Beds.</li> <li>RRG confirmed any discussion and negotiations regarding contributions to be discussed at the senior level of project team and Council</li> <li>Standard fees apply for plan reviews / approvals and inspections during construction</li> </ol>	Note	PP provided TSC 2018/2019 standard fees and charges document , post meeting via email dated 5 <sup>th</sup> July 2018.

	Meeting closed at 9:45am		
--	--------------------------	--	--

Next Meeting			
No.	Location	Date	Time
1.	Tweed Shire Council Offices	TBC	TBC



## Supply Authority Meeting Number 2 Minutes

Date: 13 August 2018  
Office: ACOR St Leonards  
Project Number: SY018-0077

<b>Meeting Minutes</b>	<b>Meeting Date /Time</b>	10 <sup>th</sup> August 2018 / 2pm
	<b>Meeting Location</b>	Water and Wastewater Unit Office (Tweed Heads)
	<b>Minutes Taken By</b>	Rob Gruber

Attendees	Name	Initials
	Rob Gruber (RRG) - Acor Consultants - Principal Email: <a href="mailto:rgruber@acor.com.au">rgruber@acor.com.au</a> Phone: (02)94385098 Mobile: 0412148460	RRG
	Peter Pennycuik (PP) - Tweed Shire Council (TSC) Senior Engineer – Planning and Assets Water and Wastewater Email: <a href="mailto:peterp@tweed.nsw.gov.au">peterp@tweed.nsw.gov.au</a> Phone: (02)66702638 Mobile: 0407916570	PP
	Simone Gillespie (SG) - Tweed Shire Council (TSC) Senior Engineer – Planning and Assets Water and Wastewater Email: <a href="mailto:sgillespie@tweed.nsw.gov.au">sgillespie@tweed.nsw.gov.au</a> Phone: TBC Mobile: TBC	
<b>Apologies</b>	Michael Wraight (Acting Manager) Water and Wastewater Email: <a href="mailto:mwraight@tweed.nsw.gov.au">mwraight@tweed.nsw.gov.au</a> Phone: (02)66702411 Mobile: 0407702373	MW
<b>Additional for Circulation</b>	Leigh Gilshenan – TSA Project Management Senior Project Manager Email: <a href="mailto:lgilshenan@tsamanagement.com.au">lgilshenan@tsamanagement.com.au</a>	
	Susan Folliott – TSA Project Management Senior Project Manager Email: <a href="mailto:sfolliott@tsamanagement.com.au">sfolliott@tsamanagement.com.au</a>	

Agenda	No.	Meeting Topics
	0.2	Previous Minutes
	1.2	Project Status and Scope
	2.2	Water Supply
	3.2	Sewerage
	4.2	Tweed Shire Council Fees and Charges

Meeting Notes and Actions			
No.	ITEM	Action By Whom	Deadline
0.2	Previous Minutes		
0.2.1	<i>Project Status</i> Previous minutes for meeting held accepted by all		
1.2	<i>Project Status and Scope</i>		
1.2.1	<i>Project Status</i> RRG advised project master planning and feasibility being developed for SEARS application for a State Significant Development. Application to incorporate "Early works" and will include:- <ul style="list-style-type: none"> <li>Lead in site water and sewer services</li> <li>Lead in electrical</li> <li>Construction site compound and temporary services</li> <li>Main trunk infrastructure in conjunction with construction haul roads</li> </ul>	Note	N/A
1.2.2	<i>Project Scope</i> Project bed numbers discussed.- <ul style="list-style-type: none"> <li>Current Proposed growth scenarios to be issued to Council</li> <li>Water and sewer loading calculations agreed to be based on total bed numbers to provide conservative approach to site infrastructure services.</li> </ul>	RRG	13 <sup>th</sup> August 2018
2.2	<i>Water Supply</i>		
2.2.1	Temporary water supply for site compound discussed. Council advised there is an existing 20mm supply servicing the existing house which could be utilised. RRG advised 20mm supply would need to be supplemented by storage tank and pumps to meet demand	Note	N/A
2.2.2	PP advised that 150mm watermain on Cudgen Road, at TAFE entrance, was pressure and flow tested in 2009. Only achieved 11litres/sec at no residual pressure head. Not suitable for hospital connection. TSC confirmed that pressure and flow information was completed and could be issued to Acor	TSC	As soon as practical
2.2.3	TSC advised 300mm main located in Turnock Street is suitable for connection. Grade 2 connection can be achieved. TSC provided pressure and flow advice based on tests at Elrond street. RRG advised pressure and flow tests can be verified once main connection to site is complete. RRG to make separate application for main connection. TSC advised quote for main connection can be provided, however final connection approval for construction can only be proved upon approval of SEARs application	RRG to make separate application to Council	14 <sup>th</sup> August 2018

2.2.4	RRG advised water quality analysis report was downloaded FROM Council website and is adequate for master planning purposes. RRG advised, once main connection is completed further testing to be performed by the project team	Note	N/A
2.2.5	TSC (SG) advised that water consumption data is available for the existing Tweed Hospital site and would provide a base point for expected consumption for new development.	TSC	As soon as practical
3.2	<i>Sewerage</i>		
3.2.1	TSC requested likely sewage flow rates to be pumped to Council system, so as to determine preferred sewer connection point.	RRG	14 <sup>th</sup> August 2018
4.2	<i>TSC Charges</i>		
4.2.1	TSC standard charges discussed  1. RRG re-confirmed any discussion and negotiations regarding headworks contributions to be discussed at the senior level of project team and Council  2. Standard fees apply for plan reviews / approvals and inspections during construction	Note	N/A

	Meeting closed at 2:45pm	Note	N/A
--	--------------------------	------	-----

Next Meeting			
No.	Location	Date	Time
1.	Tweed Shire Council Offices	TBC	TBC



## Application for Water Meter Connection / Disconnection / Relocation

**OFFICE USE ONLY**

WM No.  Property No.  Land No.

Have s64 developer charges been paid? ☐ Yes ☐ No

### A1. Application for

☒ Water Meter Connection ☐ Water Meter Relocation ☐ Water Meter Subdivision Connection

☐ Water Meter Disconnection ☐ Water Meter Upgrade

### A2. Applicant

Surname/s  Given Name/s

OR

Company / Organisation  ABN

Postal Address

Telephone  Mobile

Facsimile  Email

### A3. Address of Where the Water Service is Required

Lot Number  Section  DP/NPP/SP

Unit/Street No  Street

Suburb/Town

### A4. Owner/s

Surname/s  Given Name/s

Postal Address

Telephone  Mobile

Facsimile  Email



### A5. Relating Applications

☐ No relating applications

☐ Development Application No.  Date of Determination

☐ Complying Development No.  Date of Determination

### A6. Water Meter Connection

**RESIDENTIAL:**

☐ 20mm ☐ 25mm ☐ 40mm ☐ 50mm ☐ 100mm or larger

**DUPLEX OR TRIPLEX:**

☐ 20mm ☐ 25mm Number of meters required

**COMMERCIAL/INDUSTRIAL:**

☐ 20mm ☐ 25mm ☐ 40mm ☐ 50mm ☒ 100mm or larger

**NOTE!** All Connections (except new 20-25 mm Residential not requiring testable backflow devices or "live") require a quotation from Council. Quotation valid for the current financial year.

### A7. Water Meter Disconnection

☐ Yes

**NOTE!** Generally no charge. A quote maybe required dependent on work required.

### A8. Water Meter Relocation

☐ <1 metre

☐ >1 metre requires a quote = location sketch provided (see page three)

### A9. Type of Building

Indicate the type of building/construction the water service is to be provided for:

☐ Single Dwelling ☐ Attached Dual Occupancy ☐ Detached Dual Occupancy

☐ Community Title Units ☐ Factory/Shop

Number of Units  Number of Factories/Shops  Other

#### A10. Payment of Application

☒ By Post Please post your cheque, made payable to Tweed Shire Council.

☐ In Person Cash, cheque, EFTPOS and credit cards (Visa and MasterCard) are accepted at either of the Customer Service offices between 8.30am and 4.00pm (AEST) Monday to Friday.

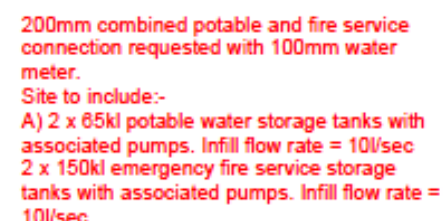
**NOTE!** A surcharge applies to payment via credit card.

I declare that all the information in this application and attachments are true and correct. I declare that I have the owner's approval. I understand that if the information is incomplete the application may be delayed or rejected.

Applicants Name	Robert Gruber
-----------------	---------------

Date	13/08/2018
------	------------

(if metering a duplex or triplex, identify which meter shall service which duplex or which triplex)



Disconnection of existing site 20mm water meter to occur after Stage1 early works completed.

See Standard Water Meter and Sewer Application Fees at [www.tweed.nsw.gov.au](http://www.tweed.nsw.gov.au)  
Forms - Water Supply & Wastewater

1. Water Meter Check If applicant is unsure whether the intended property has a water meter or not, please ring Tweed Shire Council's Water & Wastewater Unit before filling out the water application. Fees for refunds apply.
2. A water application form is not to be filled out for individual assessments of Neighbourhood Property Plans. Please check prior to completing application form.
3. Any connection that is "live" service connection or subject to a water headworks charge requires a quotation, regardless of the size of the service.
4. Council reserves the right to receive payment for service connection or headworks charges prior to installation of the water meter.
5. Services connected to "live" water mains must be installed by Council (a "live" water main is a reticulation main with existing customers connected).
6. Connections to Council's trunk mains will not be approved

## OFFICE USE ONLY - W&amp;WW UNIT ADMINISTRATION

Cashier Date Received		Receipt #	
Water Service Installation		Water Connect Fee	
Water Headworks		Water Levy	
Water Levy		W&WWU Received	
Total Amount Paid			

Duplex/Disconnection Final Meter Reading	<input type="text"/>	Meter No	<input type="text"/>	Unit No	<input type="text"/>
Size of Meter	<input type="text"/>	Installation Date	<input type="text"/>	Meter No.	<input type="text"/>
No. of Black Reading Dials	<input type="text"/>	Unit No.	<input type="text"/>		
Domestic By-Pass Meter No.	<input type="text"/>	Size	<input type="text"/>		
Fire Line By-Pass Meter No.	<input type="text"/>	Size	<input type="text"/>		
Reading	<input type="text"/>				
<input type="checkbox"/> In Ground Box	<input type="checkbox"/> Aboveground Cover	<input type="checkbox"/> Aboveground Uncovered	<input type="checkbox"/> Cag		
Location of Meter	<input type="checkbox"/> LHS	<input type="checkbox"/> RHS	Other <input type="text"/>		

DCV   DCDA   PRZD	Make		Model #		Serial #	
DCV   DCDA   PRZD	Make		Model #		Serial #	
DCV   DCDA   PRZD	Make		Model #		Serial #	

Installation/Disconnection Remarks	
------------------------------------	--

Meter Installed/Disconnected by	
---------------------------------	--

Sewerage Discharge Factor		Trade Waste Discharge Factor	
---------------------------	--	------------------------------	--

Route No.	<input type="text"/>	Sequence No.	<input type="text"/>
<input type="checkbox"/> Six Monthly		<input type="checkbox"/> Monthly	
Prepared By	<input type="text"/>	Date	<input type="text"/>
Punched By	<input type="text"/>	Date	<input type="text"/>



Council Reference: PN 4468  
Your Reference: PN 4468



23 August 2018

Customer Service | 1300 292 872 | (02) 6670 2400

Robert Gruber  
Acor Consultants Pty Ltd  
Suite 2, Level 1  
33 Herbert St  
St Leonards NSW 2065

[rogruber@acor.com.au](mailto:rogruber@acor.com.au)

[tsc@tweed.nsw.gov.au](mailto:tsc@tweed.nsw.gov.au)  
[www.tweed.nsw.gov.au](http://www.tweed.nsw.gov.au)



PO Box 816  
Murwillumbah NSW 2484

Please address all communications  
to the General Manager

ABN 90 178 732 498

Dear Mr Gruber

**Water Meter Connection Quote Proposed Tweed Hospital Lot 102  
DP 870722; 771 Cudgen Rd Cudgen**

Please find below quotation for proposed works of the installation of a 200mm combined potable and fire service connection with 100mm water meter:

\$58,341.00

Please note:

- This quote is based on Council's 2018-2019 Fees and Charges and valid until 30 July 2019.
- Council notes that the land is mapped Predictive Aboriginal Cultural Heritage. Any costs associated with potential Aboriginal Cultural Heritage is at the applicants' expense and not included in this quote.

As discussed with Council Engineer Peter Pennycuik on 10 August 2018, Council shall not install this water meter until payment is received and an agreement has been made with Council regarding the provision of services.

The existing 20mm water service to the lot can be utilised until the bulk water meter has been installed.

If you have any further questions please contact Simone Gillespie on 02 6670 2636.

Yours Sincerely



Robert Siebert<sup>cosign</sup>  
Coordinator Strategy and Business Management  
WATER & WASTEWATER UNIT



---

**Robert Gruber**

**From:** Robert Gruber - ACOR  
**Sent:** Tuesday, 12 June 2018 11:48 AM  
**To:** 'Aaron Greaves'  
**Subject:** RE: Tweed Valley Hospital Project - Gas Availability in the Future.

Many thanks Aaron.

Just FYI, I did contact the APA group, but they directed me to Jemena.

regards

Rob.

---

**Robert Gruber | Principal**

ENGINEERS | MANAGERS | INFRASTRUCTURE PLANNERS | DEVELOPMENT CONSULTANTS

**ACOR Consultants Pty Ltd**

Suite 2, Level 1, 33 Herbert St  
St Leonards NSW 2065

**T** +61 2 9438 5098 | **M** 0412 148 460  
**E** [rgruber@acor.com.au](mailto:rgruber@acor.com.au)



[www.acor.com.au](http://www.acor.com.au) | [Careers](#)

This email and any files transmitted with it are intended solely for the use of the addressee(s) and may contain information that is confidential or subject to legal privilege. If you receive this email and you are not the addressee (or responsible for delivery of the email to the addressee), please note that any copying, distribution or use of this email is prohibited and as such, please disregard the contents of the email, delete the email and notify the sender immediately. There is no warranty that this email is error or virus free. It may be a private communication containing opinions personal to the sender and/or the person with whom the sender is communicating, and if so, does not represent the view of ACOR Consultants Pty Ltd, ACN 079 306 246 ABN 40 079 306 246 its subsidiaries, related parties and/or affiliates.

---

**From:** Aaron Greaves <[Aaron.Greaves@jemena.com.au](mailto:Aaron.Greaves@jemena.com.au)>  
**Sent:** Tuesday, 12 June 2018 11:39 AM  
**To:** Robert Gruber - ACOR <[rgruber@acor.com.au](mailto:rgruber@acor.com.au)>  
**Subject:** RE: Tweed Valley Hospital Project - Gas Availability in the Future.

Hi Robert.

Jemena has no plans or intent to extend its natural gas infrastructure to Tweed Heads in the future.

I believe the closest distribution network to your location is the Allgas network owned by APA Group. I would inquire with them as they would most likely be able to assist you.

Cheers

**Aaron Greaves**  
Network Development Manager I & C  
Customer & Markets  
**Jemena**  
Level 12, 99 Walker Street, North Sydney, NSW 2060  
+61 419 230 600  
[Aaron.Greaves@jemena.com.au](mailto:Aaron.Greaves@jemena.com.au) | [www.jemena.com.au](http://www.jemena.com.au)



1

## Appendix G - Fire Sprinkler/Hydrant System Calculations

### Combined Fire Sprinkler/Hydrant System

Note:

Sprinkler system is not required in Site 04 and Site 07, as the effective height of the building is lower than 25 m. However, Health Infrastructure (HI) prefers to have sprinkler system installed on all projects irrespective of building height or other means of achieving NCC compliance, as it is a proactive way of providing life and safety operation, as stated in Engineering Services Guidelines, GL2016\_020

### Sprinkler System Demand

Occupancy classifications	OH 3		Retail store, AS 2118.1-2017 Appendix A3.3
Flow per sprinkler head	60	L/min	
	18	nos.	AS 2118.1-2017 Table 10.2.2, OH 3
Number of sprinklers in the most unfavourable arrays under flat roofs and ceilings			
Total flow required (min.)	1,080	L/min	

### Hydrant System Demand

Maximum fire compartment	5,000	sq.m	Assumption, BCA Table C2.2 - Class 9a building, Type A construction
No. hydrant operating	2	nos.	AS 2419.1-2005 Table 2.1
Flow per hydrant	600	L/min	
Total flow required (min.)	1,200	L/min	

<b>Total Flow Demand</b>	<b>2,280</b>	<b>L/min</b>	<b>38</b>	<b>L/s</b>
--------------------------	--------------	--------------	-----------	------------

### Combined System

Water supply required	Dual	Dual water supply is required if the building is over 25 m in effective height, as per AS 2118.6-2012 Section 2.8.1
-----------------------	------	---

Assumption:

The towns main is capable of supporting the one (1) hydrant flow only, as shown on the test result. The hydrant and sprinkler systems will be connected to the water storage tanks in lieu of town main supply Automatic infill is taken into consideration the building (hospital building or future extension) is over 25 m in effective height. Dual supply will be provided. The building is designed to DtS, i.e. no alternative engineering solution, such as drencher sprinklers, is required

### Water Storage Capacity - Sprinkler

Flow for fire sprinkler system	1,080	L/min	
Duration	60	min	
Water capacity	64,800	L	
Additional capacity	20	%	AS 2118.6-2012 & AS 2118.1-2017 Section 10.3.1.2
Capacity for sprinkler system	77,760	L	
Reduce 1/3	51,840	L	

### Water Storage Capacity - Hydrant

Flow for fire hydrant system	1,200	L/min
------------------------------	-------	-------

### Water Storage Capacity - Hydrant (Auto-infill)

Infill Rate	600	L/min	10	L/s
-------------	-----	-------	----	-----

Duration	240	min	AS 2419.1-2005 Section 4.2
Water capacity	288,000	L	
Water capacity per tank/sagment	144,000	L	

**Capacity Per Tank/Segment** **195,840** L **Effective capacity**

#### 2 X 210,000 L Water Storage Tanks

Diameter	7.5	m
Height	5.3	m

Flow req. for WST	600	L/min
Water capacity	144,000	L
Per tank/sagment	72,000	L

**123,840** L **Effective capacity**

#### 2 X 150,000 L Water Storage Tanks

Diameter	6	m
Height	5.3	m