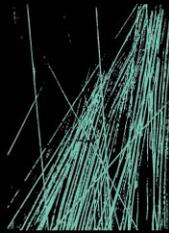


INFRASTRUCTURE MANAGEMENT PLAN FOR SSDA

TWEED VALLEY HOSPITAL

STAGE 2



JHA

JHASERVICES.COM

This report is prepared for the nominated recipient only and relates to the specific scope of work and agreement between JHA and the client (the recipient). It is not to be used or relied upon by any third party for any purpose.

DOCUMENT CONTROL SHEET

Project Number	190009
Project Name	Tweed Valley Hospital
Description	Infrastructure Management Plan
Key Contact	Diego Montelvere

Prepared By

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	REV	G	H	I			
	DATE	13/09/19	18/09/19	02/04/20			

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1 INTRODUCTION

JHA Engineers have been engaged by Lend Lease to provide the design of hydraulic and fire services for the proposed Tweed Valley Hospital development located at 771 Cudgen Road, Cudgen.

This report has been prepared by JHA Consulting Engineers to identify and summarise the proposed hydraulic and fire services utility infrastructure requirements which will be incorporated into the design of the proposed Tweed Valley Hospital project.

This report demonstrates that the existing authorities' sewer and potable water infrastructure have adequate capacity to support the proposed hospital development.

This report should be read in conjunction with the Architectural design drawings and other consultant's design reports submitted as part of this application.

The following documentation has been considered for the preparation of this report:

- Architectural drawings for Stage 2 of the Tweed Valley Hospital prepared by STH/Bates Smart
- Concept Plan and Stage 1 Early and Enabling Works – Hydraulic Engineering Services Infrastructure Management Plan by ACOR, TVH_IMP_HY_SSD_001 rev 07

Table 1.1 details the SEARs requirements for Stage 2 works and references relevant sections within this report that address each requirement. These are intended to be quick references to key sections only. Each item should be considered with the context of this report in its entirety.

Table 1.1: SEARs – Utilities

Requirement	Relevant Report Section
<p>Prepare an Infrastructure Management Plan in consultation with relevant agencies, detailing information on the existing capacity and any augmentation and easement requirements of the development for the provision of utilities including staging of infrastructure.</p>	<p>Sections 4.1.1 & 4.2.1</p>
<p>Stage 1 SSD Consent – Stage 2 Requirements</p> <p>Utilities</p> <p>B30. The Stage 2 Application must;</p> <p>(a) Address the existing capacity and any augmentation requirements of the development for the provision of utilities including staging of infrastructure through the preparation of an Infrastructure Management Plan and Water Reuse Management Strategy in consultation with relevant agencies and services providers. This plan must be based on the conclusions of the Integrated Water Management Report and information provided with the Infrastructure Management Report prepared by ACOR dated 17 October 2018;</p> <p>(c) Be accompanied by evidence of the agreed approach with Council to connect to the existing 300mm water trunk main for water supply services and 300mm diameter sewer rising main for sewerage service for a sewerage discharge up to 35 litres / second. The evidence must include details of financial contributions by the Applicant (if any) with regard to water and sewer headwork charges.</p>	<p>Sections 4.1.2 & 0</p> <p>0 & 4.2.4</p> <p>APPENDIX B – AUTHORITY CONSULTATION 20/06/2019 & APPENDIX C – WATER CONNECTION QUOTE</p>

Please refer to the Consultation report at Appendix G of the EIS for all project government consultation in relation to B30 (c) of the SSD2 conditions.

This document and related work has been prepared following JHA Consulting Engineers Quality and Environmental Management Systems, which are based on AS/NZS ISO 9001 and ISO 14001.

2 DESCRIPTION OF THE PROPOSAL

2.1 OVERVIEW

On the 11 June 2019 the Minister for Planning and Public Spaces granted approval for the Concept Proposal and Stage 1 Early and Enabling Works for the new Tweed Valley Hospital (SSD 9575) located at 771 Cudgen Road, Cudgen (Lot 11 DP1246853). All documents relating to this consent can be found on the major project website of DPIE¹.

The Environmental Impact Statement (EIS) has been prepared to assist in the State Significant Development (SSD) Stage 2 Application for the Tweed Valley Hospital which will be assessed under Part 4 Division 4.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This, along with supporting documentation, will provide a clear outline of the Stage 2 Application.

The Tweed Valley Hospital Project broadly consists of:

- Construction of a new Level 5 major regional 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 facilities across the region);
- Delivery of the supporting infrastructure required for the Tweed Valley Hospital, including green space and other amenities, roads and car parking, external road upgrades and connections, utilities connections, and other supporting infrastructure.

2.1.1 STAGE 2 HOSPITAL MAIN WORKS AND OPERATION

The Stage 2 SSD component will seek consent for the Main Works and Operation of the Tweed Valley Hospital, including:

- Construction of Main Hospital Building: A main entry and retail area, Administration, Community Health, In-Patient units, Outpatient clinics and day only units, Child and Adolescent Services, Intensive Care Unit, Mental Health Unit, Maternity Unit and Birthing Suites, Renal Dialysis, Pathology, Pharmacy, Radiation and Oncology as part of integrated Cancer Care, Emergency Department, Perioperative Services, Interventional Cardiology, Medical Imaging, Mortuary, Education / Training / Research, Back of House services, Rooftop Helipad
- Construction of Support Buildings referred to as the Health Hub containing: Oral Health, Community Health, Aboriginal Health, Administration, Education / Training / Research.
- Internal roads and carparking, including multi-deck parking for staff, patients and visitors.
- Construction of temporary building for the 'Tweed Valley Skills Centre'
- External road infrastructure upgrades and main site access.
- Environmental and wetland rehabilitation, including rehabilitation of existing farm dam as outlined in the Biodiversity Development Assessment Report (BDAR) prepared for the Concept Proposal and Stage 1 works
- Site landscaping.
- Signage.
- Utilities and service works.

¹ <https://www.planningportal.nsw.gov.au/major-projects/project/10756>

The works outlined above comprise five key components, which are subject to various funding allocations and may be delivered independently to each other. Stage 2 has therefore been defined in the following sub-stages²:

- Stage 2A – Main Hospital Building complete with supporting roads, services infrastructure and landscaping
- Stage 2B – Main Hospital Building incremental expansion areas
- Stage 2C – Health Hub
- Stage 2D – Tweed Valley Skills Centre
- Stage 2E – Multi-deck car park

Development consent is sought for the all 5 components of Stage 2 under this SSDA.

Plans for Stage 2 Main works and Operation are attached in Appendix B of the EIS. Approval of Stage 2 will enable the new Tweed Valley Hospital to be built which will provide a much-needed contemporary health service facilities for the surrounding region.

2.1.2 POTENTIAL FUTURE EXPANSIONS

Any subsequent stages or modifications to the proposal would be subject to separate applications as required including the potential future expansion of the facility.

² Stages are not listed in chronological order and may be delivered independently to each other

3 AUTHORITY INFRASTRUCTURE

3.1 SEWER DRAINAGE

The Tweed Valley Hospital precinct is surrounded by the following sewerage infrastructure for possible connection to the site:

- S1 – 300mm pressure sewer rising main in Cudgen Road
- S2 – 225mm trunk sewer gravity main in Turnock Street

Diagram 3.1 below, illustrates the surrounding authority sewer mains

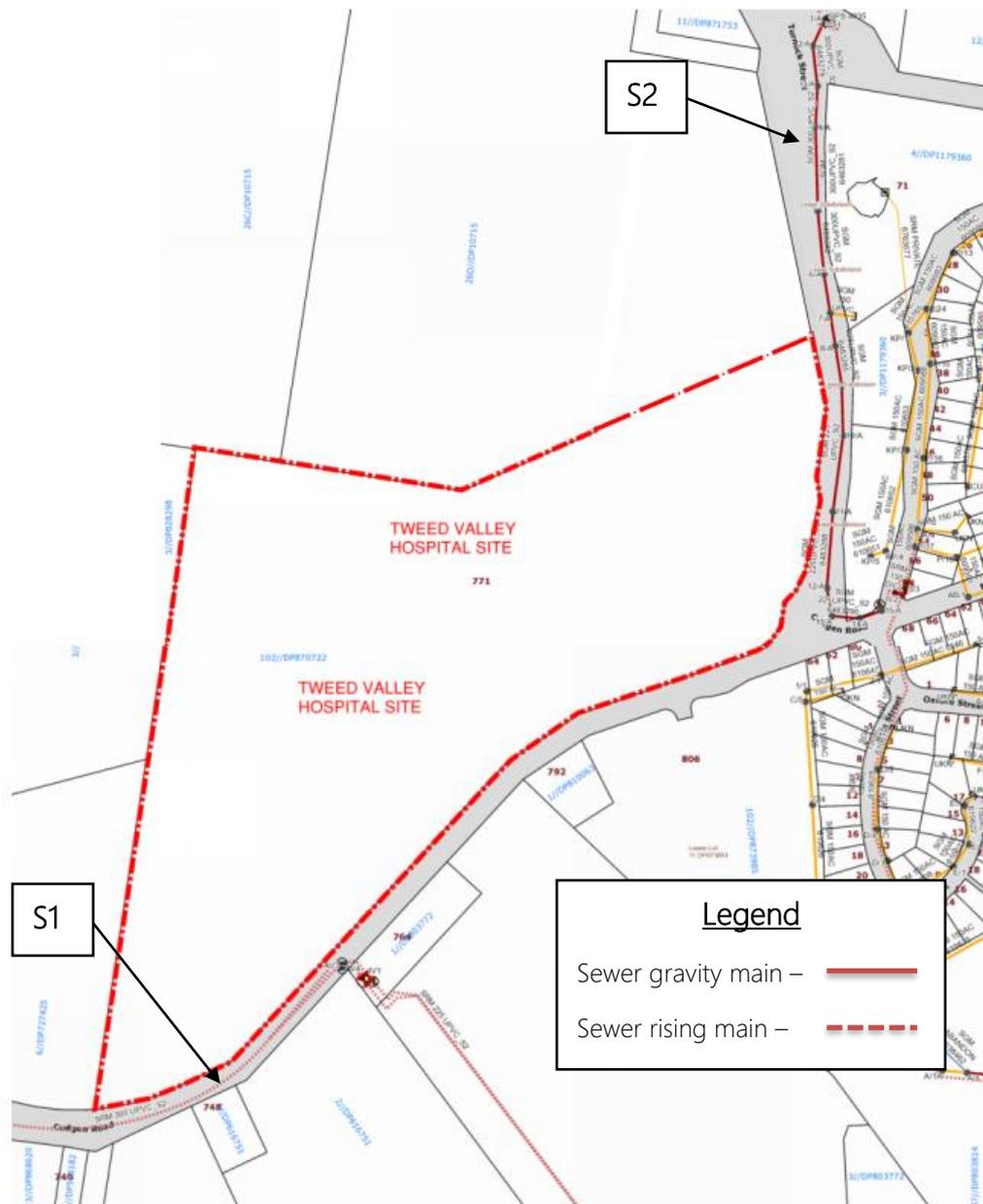


Diagram 3.1: TSC Sewer Infrastructure Map

3.2 POTABLE WATER

The Tweed Valley Hospital precinct has frontage to the following authority water mains:

- W1: 150mm DICL water main in Cudgen Road
- W2: 150mm CICL water main in Cudgen Road
- W3: 300mm DICL trunk water main in Turnock Street

The pressure test results for the 300mm DICL trunk water main in Turnock Street can be found in the appendices of this report obtained from the Stage 1 SSD by Acor.

Diagram 2.1.2 below, illustrates the surrounding authority water mains.

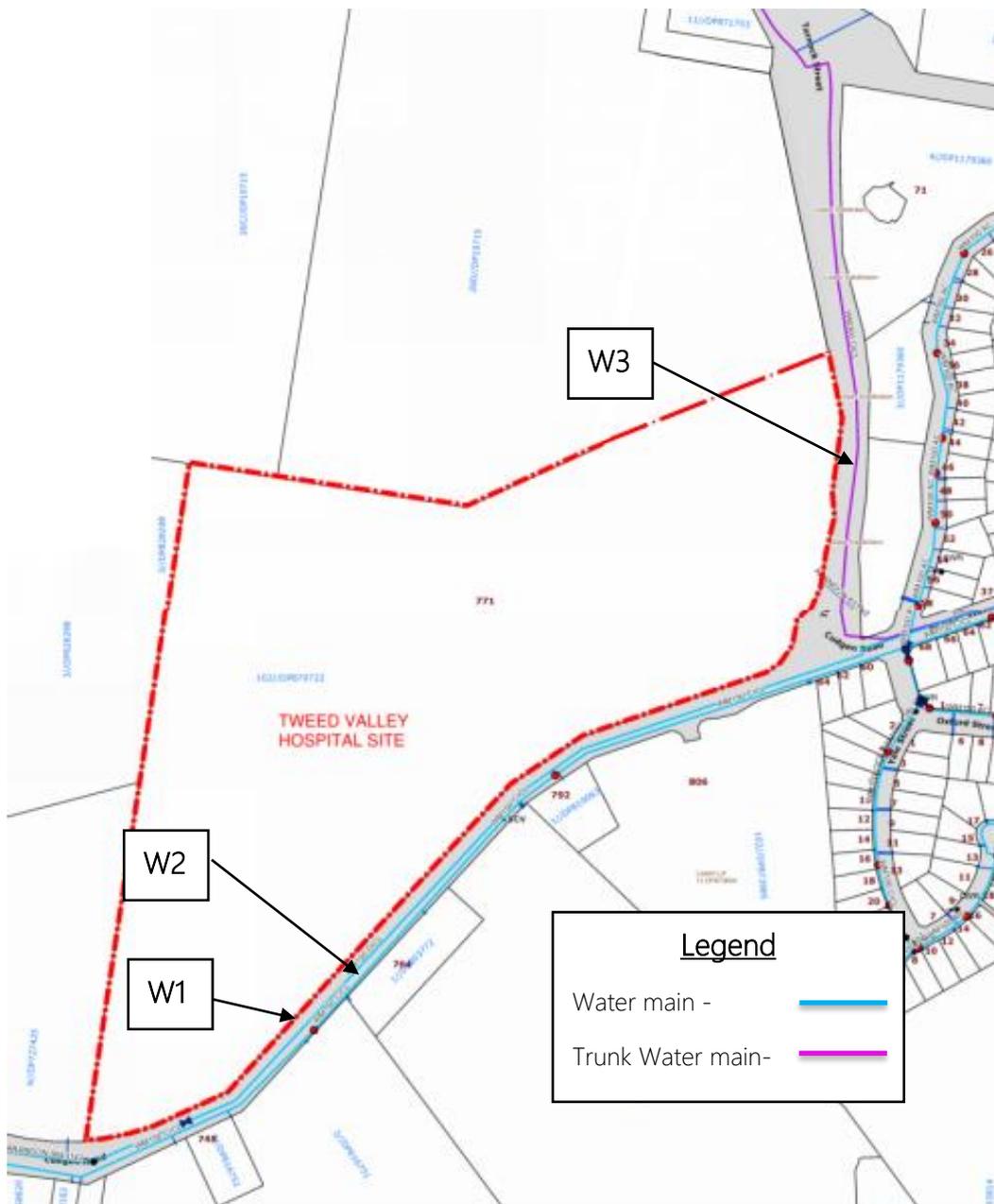


Diagram 3.2: TSC Water Infrastructure Map

3.3 GAS SERVICES

Preliminary discussions with Jemena and APA Group have indicated that natural gas infrastructure is currently unavailable within close vicinity of the project site. Both authorities have provided advice that there is no projected plan for expansion of their infrastructure in the near future to the Kingscliff/Cudgen area.

4 PROPOSED INFRASTRUCTURE SERVICES

4.1 SEWER DRAINAGE

4.1.1 CONNECTION POINT

Preliminary discussions and liaison with Tweed Shire Council (TSC) have concluded, that sewer discharges from Tweed Valley Hospital, can be discharged (via an onsite pump station) to the existing 300mm sewer rising main (pressure) in Cudgen Road. The deemed connection point is at the south-western corner of the site, which TSC have confirmed has adequate capacity to cater for the proposed hospital loads.

This connection is to be achieved via the installation of a private gravity sewer drainage system, connecting to a new sewer pumping station, complete with an additional 200kL emergency storage tank. The emergency tank will provide a 24 hour storage volume in case of emergency and shall be located adjacent to the service yard.

Diagram 4.1 illustrates the proposed sewer connection point.

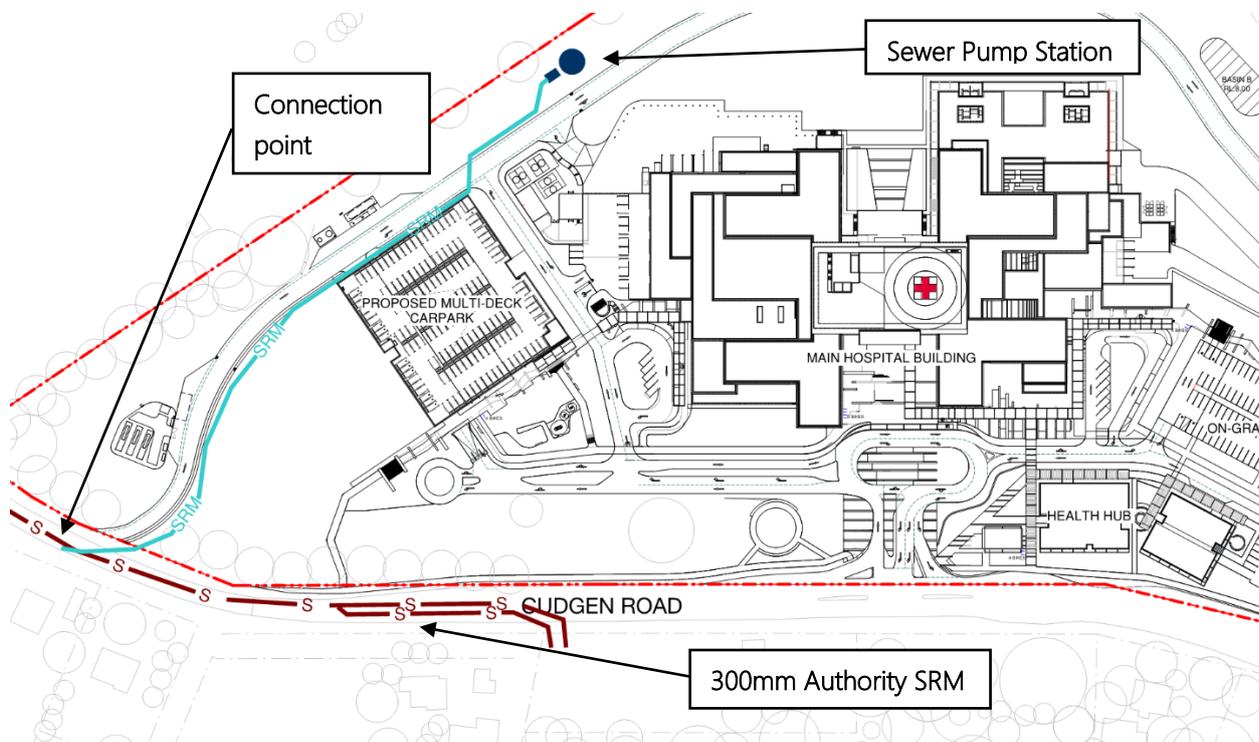


Diagram 4.1: Sewer Connection Point

4.1.2 LOAD ESTIMATION

Abbreviations

- ET – Equivalent Tenements
- ADWF – Average Dry Weather Flow
- PDWF – Peak Daily Dry Weather (sanitary) Flow

Formulas

- $ADWF = 0.0021 \times EP$
- $PDWF = d \times 0.0021 \times EP$

Below is a summary of sewer discharge figures from the main hospital building.

Units (Beds)	ET/Units	Calculated EP's	ADWF (l/s)	PDWF (l/s)
499	3.4	1,697	3.6	17.8

Note peak wet weather flows for the project site will be negligible due to the following reasons:

- Peak discharges to Tweed Shire Councils sewer drainage system will be limited by the duty flow of the sewer pumping station
- Wet type, open sewer manholes and structures are not to be utilised, as the internal sewer drainage system will utilise closed type Sewer Maintenance Shafts, limiting the potential for water ingress
- As part of the commissioning phase, the entire sewer drainage system will be statically tested and CCTV's to confirm water tightness, connections to the stormwater system have not been made and that all pipework is in good working order

Below is a summary of sewer discharge figures from the temporary skills centre.

Units (Occupants)	Calculated EP's	ADWF (l/s)	PDWF (l/s)
43	8.6	0.018	0.14

Below is a summary of the detailed analysis of proposed daily discharge loads which confirm that a 200kL tank is sufficient for 24 hours storage.

Building	Item	Qty	Daily Sewer Discharge (litres)	Sub- total Sewer Discharges (Kilolitres)
Main Hospital Building	Ambulatory Care/Emerg/Med Im/Oncology/Renal	46	135	6.21
	IPU/ICU/COU (overnight beds)	499	200	99.80
	Maternity	30	360	10.80
	Food Services	545	20	10.90
	Laundry	545	15	8.18
	Office/Eng/Research Staff	375	20	7.50
	Cooling Towers	1	28723	28.72
	Retail Provision	1	2000	2.00
Health Hub	Dental	12	720	8.64
	Staff	20	20	0.40
	Retail Provision	1	2000	2.00
Total				185.15

Note the storage figures have not been derived from the WSA02 default values and suitable flow measurements have been established as prescribed in the standard confirming the usage figures above are conservative. These are listed below:

- Sydney Water Flow Study Reports indicate hospitals consume 271L/bed/day on average. Applying the results of this report, average daily sewer discharge equate to 133kL applying a 90% discharge factor
- Wyong Hospital (reference) – 3 years of utility bills from Wyong Hospital indicate that the existing 430 overnight bed hospital consumes an average of 153kL a day, or 356L/bed/day. Applying these results, the calculated average daily sewerage discharge would equate to 160kL

4.1.3 ADEQUACY OF AUTHORITY'S INFRASTRUCTURE

The estimated peak wastewater discharges from the Tweed Valley Hospital site are expected to be in the order of 17.8L/s which TSC have confirmed the nominated connection point is able to cater for. The maximum permissible discharge rate to the 300mm rising main for the hospital has been confirmed by TSC to be 35L/s.

The private sewer pumping station capacity and configuration has been designed to ensure the maximum permissible discharge rate is not exceeded.

The private sewer pumping station wet well has been sized to cater for 24 hours emergency storage in the event of a failure. This will incorporate a fixed suction line to allow for removal of contents to a collection truck for disposal offsite.

The reliability and capacity of the 300mm sewer rising main has been confirmed to be adequate by Tweed Shire Council. Refer to extract below,

There is duplicate 225mm sewer rising mains Cudgen Road Council has provided advice to Rob Gruber that there is insufficient capacity for the hospital to connect to the 225mm diameter rising main, however there is sufficient capacity to connect to the 300mm diameter SRM.

35L/s is the maximum we will accept as outlined in the Integrated Water Management Report and this is what we have agreed will be acceptable to convey in our existing SRM.

Simone Gillespie – Tweed Shire Council

Acting Senior Engineer – Planning and Systems Water and Wastewater

4.2 WATER SUPPLY

4.2.1 CONNECTION POINTS

The primary water supply point for the Tweed Valley Hospital has been nominated by Tweed Shire Council as being the 300mm trunk main in Turnock Street with other surrounding infrastructure noted to be insufficient to supply the new hospital.

The following connection points are proposed to adequately supply the development:

- New 200mm combined potable and fire services connection to 300mm trunk main in Turnock Street

Diagram 4.2 illustrates proposed domestic cold water connection lines to the Tweed Valley Hospital building.

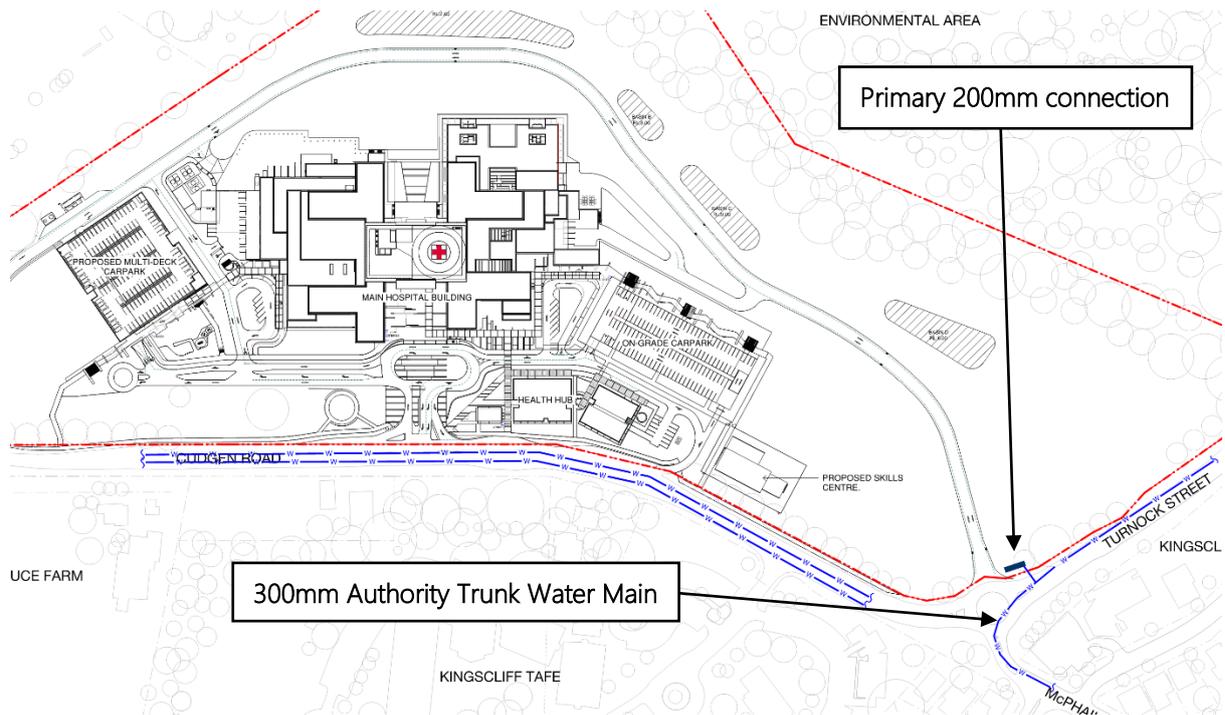


Diagram 4.2: Potable Water Connection Point

4.2.2 LOAD ESTIMATION – POTABLE WATER

Building	Item	Qty	Daily Potable Water Demand (litres)	Sub- total Daily Water Discharges (Kilolitres)	Peak Potable Water Flow (l/s)
Main Hospital Building	Ambulatory Care/Emerg/Med Im/Oncology/Renal	46	150	6.21	1.14
	IPU/ICU/COU (overnight beds)	499	240	99.80	8.42
	Maternity	30	600	10.80	1.13
	Food Services	545	25	10.90	1.35
	Laundry	545	20	8.18	1.02
	Office/Eng/Research Staff	375	25	7.50	0.28
	Cooling Towers	1	71808	28.72	4.41
Health Hub	Dental	12	800	8.64	0.45
	Staff	20	25	0.40	0.15
	Retail Provision	1	3000	2.00	0.08
Total				263.47	18.42

Above is a summary of the detailed analysis of proposed water demand.

Note the analysis have not been derived from the WSA03 default values however the values above have been cross checked and verified to be conservative form actual data listed below:

- Pro-rata from data collected by Sydney Water described in Section 4.1.
 - 545 (overall beds) x 271 (L/day/bed) = 148kL
 - 499 (overnight beds) x 356 (L/day/bed) = 178kL
- Peak potable water flow with peak hour factor of 5
 - Based on Sydney Water Report – 8.55 L/s
 - Based on Wyong Reference – 10.28L/s

Utilising the above water demand estimates, a potable cold water storage tank has been sized for a 3 hour peak demand and a summary have been provided below.

Building	Room	Qty	3 hour PCW Load (litres)	Sub – Total (litres)
Main Hospital Building	Day Beds (Ambulatory/ Emergency/ Medical Imaging/ Oncology/ Renal)	46	50	2,300
	Overnight Beds (IPU/ ICU/ COU)	499	80	39,920
	Maternity	30	200	6,000
	Food Services	545	5	2,725
	Laundry	545	2.5	1,363
	Office/ Engineering/ Research Staff	375	5	1,875
	Dental	12	200	2,400
Health Hub	Staff	20	5	100
	Retail (provision)	1	2,000	2,000
Sub - Total				59,683

The future potable water demands of the Tweed Valley Hospital have been calculated to be as follows:

- Peak flow: 18.42 L/s
- 3 hour peak demand: 70kL
- Average daily demand: 263.5kL

The temporary skills centre potable water demands have been calculated to be as follows:

- Peak flow: 0.18 L/s
- Average daily demand: 1,935L

4.2.3 PEAK DEMAND – FIRE SERVICES

Fire services demands for the Tweed Valley Hospital have been calculated as follows:

- Fire hydrants: 20L/s
- Fire sprinklers (OH3): 21.6L/s
- Fire drenchers: 9L/s

Therefore simultaneous fire demand is estimated to be 50.6L/s

4.2.4 ADEQUACY OF AUTHORITIES INFRASTRUCTURE

Results obtained from Tweed Shire council regarding water main capacities can be found in the appendices section of this report taken from Report SSD1 by Acor. Data for flow rates provided and the proposed building height validates that a storage tank and booster pump-sets are required for both potable cold water supply and fire services.

The following arrangements will be implemented to minimise the peak draw-off from the Tweed Shire Council main with both tanks limiting the infill to a maximum of 10L/s

- Potable Cold Water
 - 70kL storage tank
- Fire Services
 - 423.5kL fire water storage tank

The reliability of the water main has been confirmed with Tweed Shire Council as reliable. Refer to extract of advice received,

The existing 300mm trunk water main in Turnock Street is fed via pressure and Water Pumping Station 3 in Chinderah to Kingscliff Reservoir. When the pump is not providing flows in this main, it is fed by the reservoir. Therefore there are two way flows to this location. I am unable to provide a reliability figure, however as it is our main source of supply to Kingscliff, the level is very high to meet our customer Levels of Service"

Simone Gillespie – Tweed Shire Council

Acting Senior Engineer – Planning and Systems Water and Wastewater

Water quality results of the incoming supply has been obtained and have confirmed to meet Australian Drinking Water Guidelines.

4.3 GAS SUPPLY

It is proposed a private bulk underground Liquefied Petroleum Gas (LPG) from ELGAS to be utilised as the primary gas supply for domestic hot water, mechanical heating equipment, commercial cooking equipment and laboratories.

5 APPENDIX A – 300mm TRUNK MAIN PFI

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



PO Box 816
Murwillumbah NSW 2484

Please address all communications
to the General Manager

ABN 90 178 732 498

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

A handwritten signature in black ink, appearing to read "Michael Wraight".

Michael Wraight
Manager Water

Attachments

6 APPENDIX B – AUTHORITY CONSULTATION 20/06/2019

Stakeholder	Key Attendees	Key Aspects	Project Outcome
			Denise to be single point of contact from Council, and Peter Hooper from LendLease is to direct all consulting and builders correspondence through council to Denise for water and waste water .
Tweed Council	Simone Gillespie	Water Connection Temp	Council unsure if Proposed Temp 100mm water supply is feasible due to low pressure (and future conversion to permanent) due to supply pressure
		Sewer Rising main	Construction of 300mm connection proposed.
		Head works	Head works to be agreed. S68 application to be used for SRM sewer connection by JHA consultants. Council recommended this be submitted as a Crown application but use same S68 format and information.
Tweed Council	David Oxenham	Head works Contribution	Noted new charges are in place and slightly lower for Water

7 APPENDIX C – WATER CONNECTION QUOTE

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

tsc@tweed.nsw.gov.au
www.tweed.nsw.gov.au



PO Box 816
Murwillumbah NSW2484

Please address all communications
to the General Manager

ABN: 90 178 732 496

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 Pennycuick 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.

Your Sincerely
A stylized signature in blue and green ink, with a question mark above it.

Robert Siebert cosign
Coordinator Strategy and Business Management
WATER & WASTEWATER UNIT

8 APPENDIX D – WATER ANALYSIS

Typical Water Quality Analysis (2017-18)

Compared with the Australian Drinking Water Guidelines (ADWG)



Measure		ADWG Guidelines		Water Treatment Plant		
Parameter	Units	Health	Aesthetic	Bray Park	Uki	Tyalgum
Physical Characteristics						
- True Colour	HU	NA	15	<1	<1	<1
- Turbidity	NTU	NA	5	0.2	0.5	0.2
- Hardness	mg CaCO ₃ /L	NA	200	60	43	42
- Alkalinity	mg CaCO ₃ /L	NA	NA	59	41	46
- Total Dissolved Solids	mg/L	NA	600	145	125	95
- pH	pH units	NA	6.5 – 8.5	7.4	7.8	7.3
Disinfectants						
- Free Chlorine	mg/L	5	0.6	0.2-1.0	0.2-1.0	0.2-1.0
Disinfection By-products						
- Trihalomethanes	mg/L	0.25	na	0.03	0.02	0.03
Chemical Characteristics						
- 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	35	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	6	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	54	21	13
- Sulfate	mg/L	500	250	4.2	16	2
- Zinc	mg/L	NA	3	<0.005	<0.005	<0.005