7 April 2021

JOHN HUNTER HEALTH & INNOVATION PRECINCT

HYDRAULIC AND FIRE SERVICES SSDA UTILITY REPORT

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HYDRAULIC AND FIRE SERVICES SSDA UTILITY REPORT

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REVISIONS

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APPROVALS

04	J. Skubevski``	D. Power	T. Wise
Rev #	**Author**	**Reviewer**	**Approver**

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1.0 INTRODUCTION

Warren Smith Consulting Engineers (WSCE) have been engaged by NSW Health Infrastructure (HI) to prepare a Utility Services Report for the proposed development works at the John Hunter Hospital related to hydraulic services.

The development will include refurbishment works to the existing John Hunter Hospital as well as the construction of a new Acute Services Building as shown in *Figure* 1-1

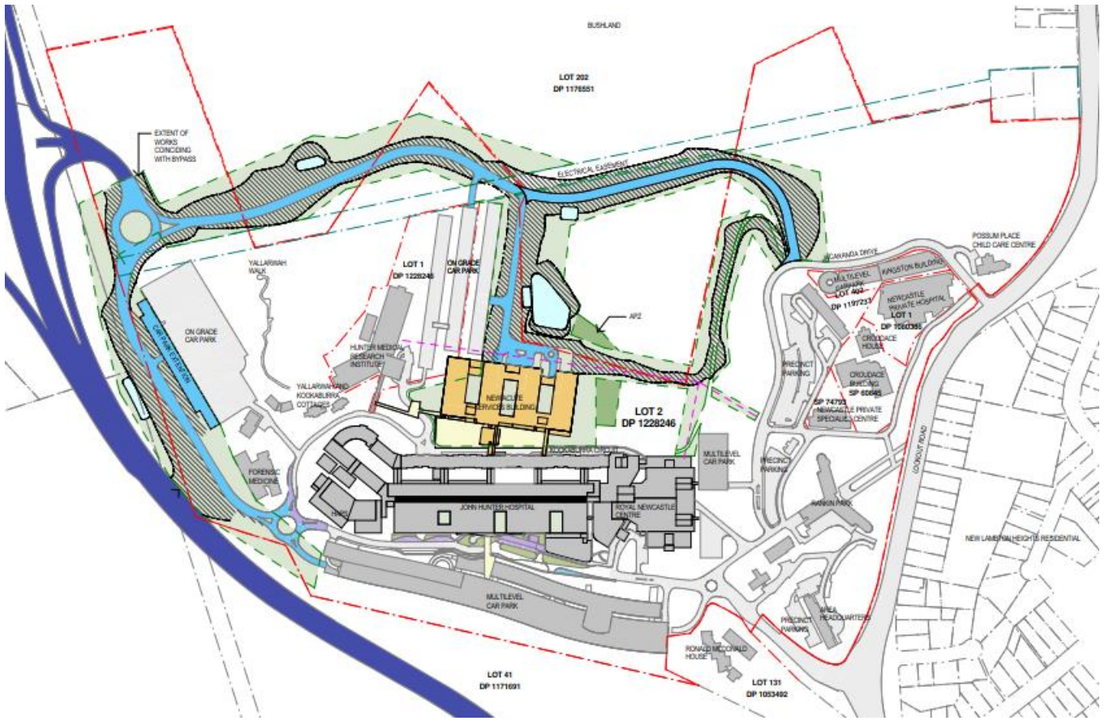

Figure 1-1: Sketch showing proposed new Acute Services Building (ASB)

This report has been prepared for submission as part of the SSDA and responds to the Planning Secretary's issue of the environmental assessment SEAR's Requirements for the John Hunter Health & Innovation Precinct as outlined below.

SEARs REQUIREMENTS	RELEVANT SECTION OF THE REPORT
13. Utilities	
Assess the impacts of the development on existing utility infrastructure and service provider assets surrounding the site	See Section 2.0 and Appendix A
Identify any infrastructure upgrades required off-site to facilitate the development and any arrangements to ensure that the upgrades will be implemented on time and be maintained	See Sections 1.0 , and 2.0 .
Provide an infrastructure delivery and staging plan, including a description of how infrastructure requirements would be co-ordinated, funded and delivered to facilitate the development	See Section 2.1.
16. Soil, Water and Air	
Identify an adequate and secure water supply for the life of the project (confirming it's an authorised and reliable supply and assessing the current market depth where water entitlement is required to be purchased)	Section 2.2.2.1

1.1 PROJECT OVERVIEW

In June 2019, the NSW Government announced a significant expansion of the John Hunter and John Hunter Children's Hospitals with the $780 million John Hunter Health and Innovation Precinct (JHHIP) project.

The JHHIP will transform healthcare services for Newcastle, the greater Hunter region and northern NSW communities. The infrastructure will provide additional inpatient capacity to the John Hunter and John Hunter Children's Hospitals and create further opportunities for partnerships with industry and higher education providers.

The JHHIP will deliver an innovative and integrated precinct with industry-leading facilities working in collaboration with health, education and research partners to meet the current and future needs of the Greater Newcastle, Hunter New England and Northern NSW regions.

The John Hunter Health and Innovation Precinct Project is being planned and designed with ongoing communication and engagement with clinical staff, operational staff, the community and other key stakeholders with a strong focus on the following:

- Patient-centered care
- Contemporary models of care
- Future economic, health and innovation development opportunities
- Environmental sustainability

1.2 SUBJECT SITE

The John Hunter Health Campus (JHHC) is located on Lookout Road, Lambton Heights, within the City of Newcastle Local Government Area (LGA), approximately 8km west of the Newcastle CBD. The hospital campus is located approximately 3.5km north of Kotara railway station.

The JHHC comprises the John Hunter Hospital (JHH), John Hunter Children's Hospital (JHCH), Royal Newcastle Centre (RNC), the Rankin Park Rehabilitation Unit and the Nexus Unit (Children & Adolescent Mental Health).

JHHC is a Level 6 Principal Referral and tertiary Hospital, providing the clinical hub for medical, surgical, child and maternity services within the Hunter New England Local Health District (HNELHD) and across northern NSW through established referral networks. Other services at the campus include the Hunter Medical Research Institute (HMRI), Newcastle Private Hospital and the HNELHD Headquarters.

Figure 1-2: Aerial view of property boundary (Source: Google Maps)

1.3 SSDA PROPOSAL

Approval is being sought for a new Acute Services Building and refurbishment of existing hospital facilities at John Hunter Hospital comprising:

- Construction and operation of a new seven-storey Acute Services Building (plus 4 semi-basement levels) to provide:
    - an expanded and enhanced Emergency Department;
    - expanded and enhanced medical imaging services;
    - expanded and enhanced intensive care services - Adult, Paediatric and Neonatal;
    - expanded and enhanced Operating Theatres including Interventional Suites;
    - an expanded Clinical Sterilising Department;
    - Women's Services including Birthing Unit, Day Assessment Unit and Inpatient Units;
    - integrated flexible education and teaching spaces;
    - expanded support services;
    - associated retail spaces;
    - new rooftop helipads;
    - new semi-basement car parking;
- Refurbishment of existing buildings to provide:
    - additional Inpatient Units;
    - expanded support services;
- A new Hospital entry canopy and works to the existing drop off;
- Link bridge to the Hunter Medical Research Institute (HMRI);
- Campus wayfinding and signage;
- Landscape works;
- Site preparation including bulk earthworks, tree removal, environmental clearing, cut and fill;
- Mines grouting remediation works;
- Construction of internal roads network and construction access roads and works to existing at-grade carparking;
- Connection to the future Newcastle Inner City Bypass; and
- Inground building services works and utility adjustments.

1.4 BED NUMBER SUMMARY

Modelling and calculations have been based on Clinical Services Plan which details an increase of 156 beds to a total of 923 beds to the 2031/32 planning horizon.

2.0 UTILITY SERVICES INFRASTRUCTURE

2.1 UTILITY SERVICES DEMAND CALCULATIONS

WSCE have made enquires to the utility operators and they can confirm the existing demand/load information of their assets, which they can utilise to determine any required amplification and upgrades to existing infrastructure, as a result of the load induced by the additional beds. However, there are currently no known upgrades to the utilities infrastructure services that are known to be required as result of the proposed redevelopment works.

The calculations within this section have been based on the additional 156 beds of the proposed redevelopment works. This figure has been explained in Section 1.4

2.1.1 SEWER SERVICES

The sewer services demand calculations for both peak and daily average flows have been estimated based on the following methods:

- Average water use based on Sydney Water Average Daily Water Usage Table (Appendix A)
- Average sewer discharge based on Hunter Water Corporation Sewer Discharge Factor (SDF)
- Peak sewer discharge based on Gravity Sewerage Code of Australia WSA 02-2014, Hunter Water Edition, Version 2, Part 1

2.1.1.1 AVERAGE SEWER DISCHARGE

The daily total sewer discharge has been calculated utilising Sydney Water Corporation Average daily water usage chart (Refer Appendix A) and Hunter Water Corporation Sewer Discharge Factor (SDF).

Considering Hospital as Category 5 in Hunter Water Corporation Sewer Discharge Factor categories the midpoint of the Sewer Discharge Factor band is 85%.

CATEGORY	SDF BAND	MIDPOINT OF BAND	DEEMED DISCHARGE FLOWS	CUSTOMER TYPE
1	0%	0%	No discharge to the sewer system	No Connection to the Sewerage System
2	1% - 25%	10%	A small proportion of metered water is discharged to the sewerage system	Typical enterprises include Nurseries and market gardens
3	26% - 50%	35%	Around half of metered water is discharged to the sewerage system	Typical enterprises include licensed clubs with catering facilities and substantial external watering eg. bowling greens
4	51% - 75%	60%	A significant proportion of metered water is discharged to the sewerage system	Typical enterprises include a public swimming pool with showering/toilet facilities and external watering.
5	76% -100%	85%	Most, if not all metered water is discharged to the sewerage system	Typical enterprises include restaurants and hotels.

Figure 2-1: Snip regarding Sewer Discharge Factor Category
(https://www.hunterwater.com.au/home-and-business/managing-your-account/business-pricing-fees-and-charges)

Table 2-1 below shows the total average daily sewer demand imposed on the sewer services utility infrastructure by the additional bed increase of the proposed redevelopment.

Table 2-1: Average Daily Sewer Demand Calculation of the additional beds

Metric Unit	Average Water Use (L/Metric Unit/Day)	Sewer Discharge Factor (SDF) midpoint of Band	Average Sewer Discharge (L/Metric Unit/Day)	No. of Beds	Total Average Daily Sewer Discharge (kL)
Bed	271	85%	230.35	156	35.935

Table 2-2 below shows the total average sewer water demand for the proposed ASB. The calculation below is simply to show what the proposed ASB will consume on a daily basis and does not account for the additional load imposed on the network.

Table 2-2: Average Daily Sewer Demand Calculation for the ASB

Metric Unit	Average Water Use (L/Metric Unit/Day)	Sewer Discharge Factor (SDF) midpoint of Band	Average Sewer Discharge (L/Metric Unit/Day)	No. of Beds	Total Average Daily Sewer Discharge (kL)
Bed	271	85%	230.35	367	84.535

2.1.1.2 PEAK SEWER DISCHARGE

The peak sewer discharge is determined using the equivalent tenement (ET) method outlined in the Gravity Sewerage Code of Australia WSA 02-2014, Hunter Water Edition, Version 2, Part 1: Section 3.3.6. The goal is to determine the peak dry weather flow (PDWF)

Sewer Equivalent tenement for Hospital as per Appendix HW N of Gravity Sewerage Code of Australia WSA 02-2014 is 1 / Bed.

$$Equivalent\ Tenements, ET\ for\ 156\ Beds = 156 \times 1 = 156$$

$$Average\ dry\ weather\ flow\ (ADWF) = 0.011\ \times ET$$

$$Average\ dry\ weather\ flow\ (ADWF) = 0.011\ \times 156 = 1.716\ L/sec$$

$$Ratio\ of\ peak\ to\ average\ flow, r = \sqrt{1.74 + \frac{56}{ET^{0.4}}}$$

$$r = \sqrt{1.74 + \frac{56}{156^{0.4}}} = 3.03$$

$$Peak\ Dry\ Weather\ Flow, PDWF = r \times ADWF$$

$$PDWF = 3.03 \times 1.716 = 5.20\ L/sec$$

Therefore, the peak sewer discharge is 5.20 L/sec.

2.1.2 COLD WATER SERVICES

The cold water services demand calculations for both peak and daily average flows have been estimated based on the following methods:

- Average water use based on Sydney Water Average Daily Water Usage Table(Note- Hunter Water Corporation do not provide any guidance related to the average water consumption for the hospitals)
- Peak water use based on DIN 1988-300 Codes of practice for drinking water installations – Part 300: Pipe sizing; DVGW code of practice.

2.1.2.1 AVERAGE COLD WATER USAGE

The average daily water demand has been calculated utilising Sydney Water Corporation Average daily water usage chart (Refer Appendix A) and is shown in Table 2-3

Table 2-3: Average Daily Water Demand Per Hospital Bed as per Sydney Water Corporation Average daily water usage chart

Classification	Metric Unit	Average Demand (L/Metric Unit/Day)
Healthcare		
Hospital Beds	Bed	271

Table 2-3 below shows the total average daily water demand imposed on the water services utility infrastructure by the additional bed increase of the proposed redevelopment.

Table 2-4: Average Daily Water Demand Calculation of the additional beds

Total Beds	Average water use (L/Metric Unit/Day)	Total Average Daily Water Usage (kL)
156	271	42.276

Table 2-5 below shows the total average daily water demand for the proposed ASB. The calculation below is simply to show what the proposed ASB will consume on a daily basis and does not account for the additional load imposed on the network.

Table 2-5: Average Daily Water Demand Calculation for the ASB

Total Beds	Average water use (L/Metric Unit/Day)	Total Average Daily Water Usage (kL)
367	271	99.457

2.1.2.2 PEAK COLD WATER USAGE

The following peak flows have been estimated for the building:

- Probable simultaneous demand – 6.72 L/sec (based on current architectural clinical planning documents);
- Cooling towers flow rate – 6.5 L/sec (Provided by Mechanical Engineer

2.1.3 FIRE SERVICES

The wet fire services demand calculations has been estimated based on the two largest fire scenarios that may occur within the building, in accordance with the relevant Australia Standards AS2118.1-2017, AS2118.6-2012, and AS2419.1-2017. These scenarios are as follows:

- Scenario 1: A fire within an internal retail space that is near glazed openings protected by drenchers.
- Scenario 2: A fire within an internal car park.

Table 2-6: Water required to suit Scenario 1

Fire Equipment	Qty	Average water use (L/min)	Tolerance to suit over-discharge (%)	Total (L/min)
Fire Sprinkler	18	60	30	1,404
Fire Hydrant	2	10	N/A	1,200
Drencher	10	75	20	900

Total = 1,404 L/Min + 1,200 L/Min + 900 L/Min = 3,504 L/Min (58.4 L/s)

Table 2-7: Water required to suit Scenario 2

Fire Equipment	Qty	Average water use (L/min)	Tolerance to suit over-discharge (%)	Total (L/min)
Fire Sprinkler	12	60	30	936
Fire Hydrant	4	10	N/A	2,400
Drencher	0	N/A	20	0

Total = 936 L/Min + 2,400 L/Min = 3,336 L/Min (55.6 L/s)

2.1.4 NATURAL GAS SERVICES

The natural gas services demand calculations for both peak and daily average flows have been estimated based on the following methods:

- Minimum hourly and annual load: Building thermal model and daily domestic hot water usage with a diversity factor.
- Peak hourly load: Building thermal model and daily domestic hot water usage without a diversity factor;
- Existing gas bills.

Table 2-8: Estimated natural gas demands

Appliance	Qty	Demand/unit (MJ/hour/unit)	Operating capacity (%)	Hours used per day	Days used per week	Weeks used per year
Steam Boilers	3	2,250	30%	15	6	52
Mechanical Water Heating Units	3	4,500	20%	24	7	52
Domestic Water Heating Units	3	2,870	70%	3	7	52
Café/Retail	1	500	100%	3	6	52
ASB Minimum load per hour – 11,252 MJ/hr (megajoule/hour) ASB Maximum (peak) load per hour – 29,360 MJ/hr ASB Total load per annum – 40.120 TJ (terajoule) Existing Site load per hour – 30 MJ/hr Total site load per hour – 41.252 MJ/hr						

2.2 UTILITY CONNECTIONS

2.2.1 SEWER DRAINAGE SERVICES

The site has a frontage to the 225mm Día VCP Hunter Water Corporation sewer main at the northwest side of the Hunter Medical research institute and is not within the ASB footprint.

Figure 2-2 shows the location of the Hunter Water Corporation sewer main.

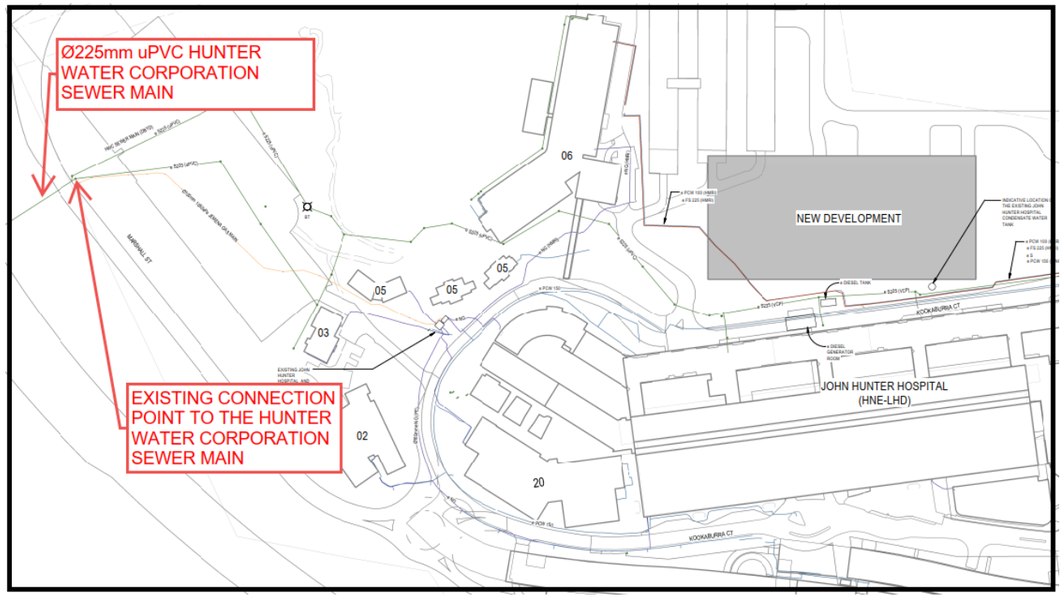

Figure 2-2: Existing Hunter Water Corporation sewer main surrounding the site (Based on surveys and DBYD)

It is proposed to retain the existing boundary connections at the location as shown in *Figure 2-2*. A new in-ground sanitary drainage service will be installed to service the proposed ASB.

The Hunter Water Corporation sewer main size is deemed adequate for new loads as per the reply by Hunter Water Corporation for the application submitted.

2.2.2 COLD WATER SERVICES

The existing 500mm CICL Hunter Water Corporation water main at the eastern part of the Kookaburra Circuit is located within the John Hunter Health Campus. *Figure 2-3* below illustrates the location of this main.

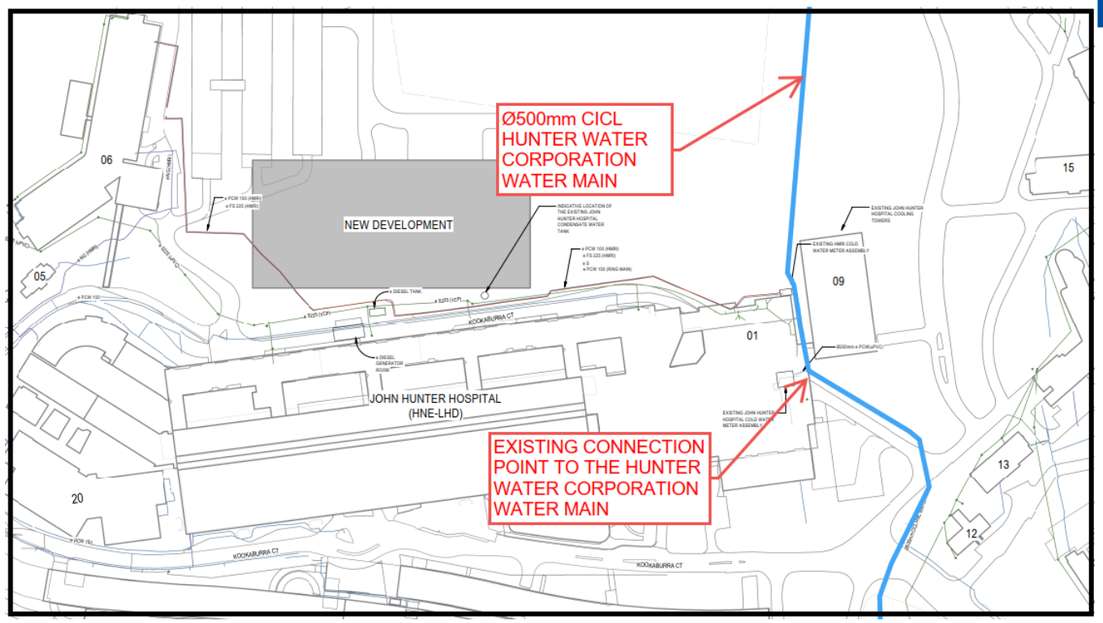

Figure 2-3: Existing Hunter Water Corporation water main surrounding the site (Based on surveys and DBYD)

It is proposed to reuse the existing cold water connection to the Hunter Water Corporation water main as shown in *Figure 2-3*.

WS+P have requested the pressure and flow information from Hunter Water Corporation and have since received advice which has been included in Appendix B.

The water main size is deemed adequate for new demands as per the reply by Hunter Water Corporation for the application submitted.

2.2.2.1 RELIABILITY OF HUNTER WATER CORPORATION WATER MAIN

The setup of the Hunter Water Corporation water main is indicatively shown in *Figure 2-3*.

The cold-water for the John Hunter hospital is fed by a 500mm diameter CICL Hunter Water Corporation water main. The 500mm diameter Hunter Water Corporation water main runs from a reservoir located at 40 Compton Street, North Lambton, NSW (marked as A in) to the reservoir located at 154 Lookout Road, New Lambton Heights NSW (marked as C in) through a booster station (marked as in Figure 2-4) located at 307A Newcastle Road, Lambton, NSW.

The water from the Chichester Dam and the Grahamstown Dam are the sources of water for the New Lambton heights area.

Using Google Earth Pro, it is noted that reservoir ‘A’ is at an elevation of 60m and reservoir ‘C’ is at an elevation of 148m. Based on the discussions with the Hunter Water Corporation and the LHD, the water supply to the existing John Hunter Hospital is supplied from the booster station. In the instance of the failure of the booster station, the cold water for the hospital will be through gravity feeds from reservoir ‘C’, which makes it a 2-way setup. According to Hunter Water Corporation, this 2-way water supply set up along with the non-return valve and stop-valves to the hospital is reliable.

In the event of failure of the Hunter Water Corporation water main between the pumping station B and the John Hunter Hospital, the non-return valve installed in 2014 will prevent the depletion of the water storages in the reservoir and provides an uninterrupted cold-water supply to the John Hunter Hospital. Also, in the event of failure of the Hunter Water Corporation water main between the reservoir C and the John Hunter Hospital, the closing of the SV1 valve will prevent water supply interruption to the John Hunter Hospital.

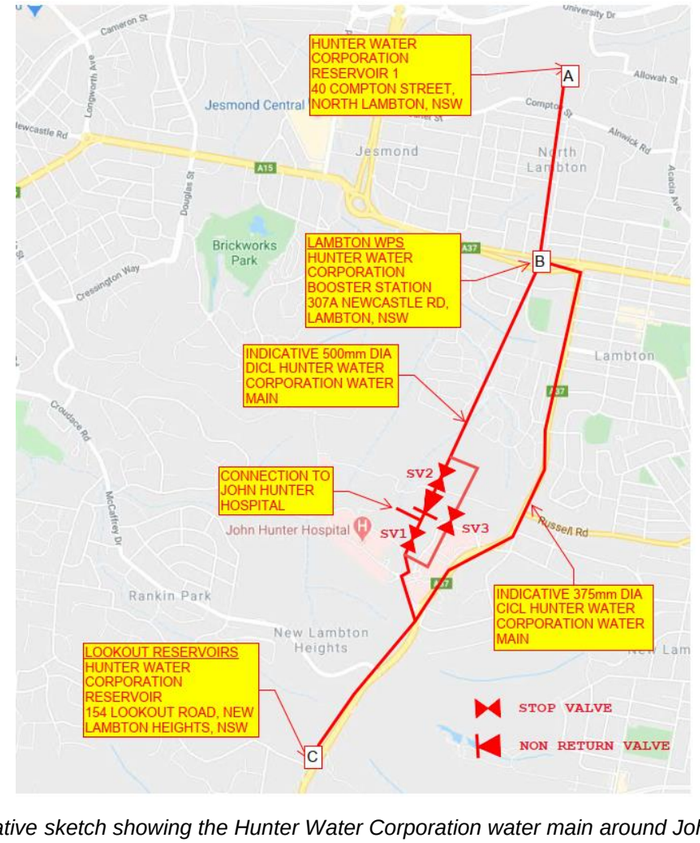

Figure 2-4: Indicative sketch showing the Hunter Water Corporation water main around John Hunter Hospital

To further the supply reliability an onsite in building water storage tank sized for three hours water storage both domestic and cooling tower water supply is proposed.

2.2.3 FIRE SERVICES

The existing 500mm CICL Hunter Water Corporation water main at the eastern part of the Kookaburra Circuit is located within the John Hunter Health Campus. *Figure 2-5* illustrates the location of this main.

It is proposed to reuse an existing fire services water connection to the Hunter Water Corporation water main as shown in *Figure 2-5*.

WS+P have requested the pressure and flow information from Hunter Water Corporation and have since received advice which has been included in Appendix B.

The water main size is deemed adequate for water supply demands in the event of a fire.

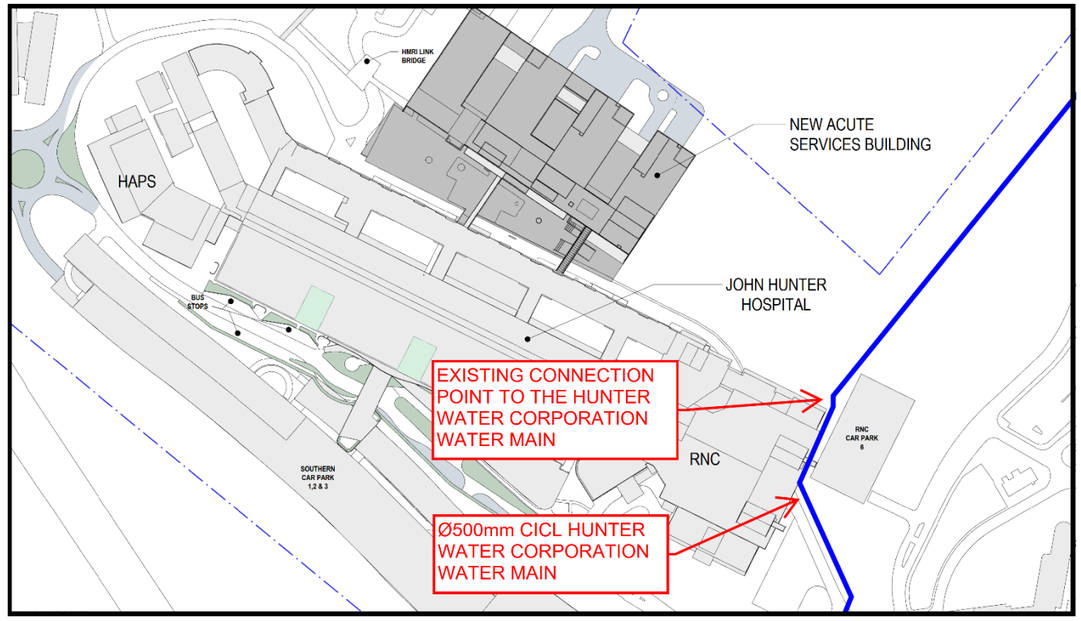

Figure 2-5: Existing Hunter Water Corporation water main surrounding the site (Based on surveys and DBYD)

2.2.4 NATURAL GAS

The existing 100mm 1050kPa steel Jemena gas main at the northern side of the existing John Hunter Hospital site is within the John Hunter Health Campus. *Figure 2-6* below illustrates the location of this main.

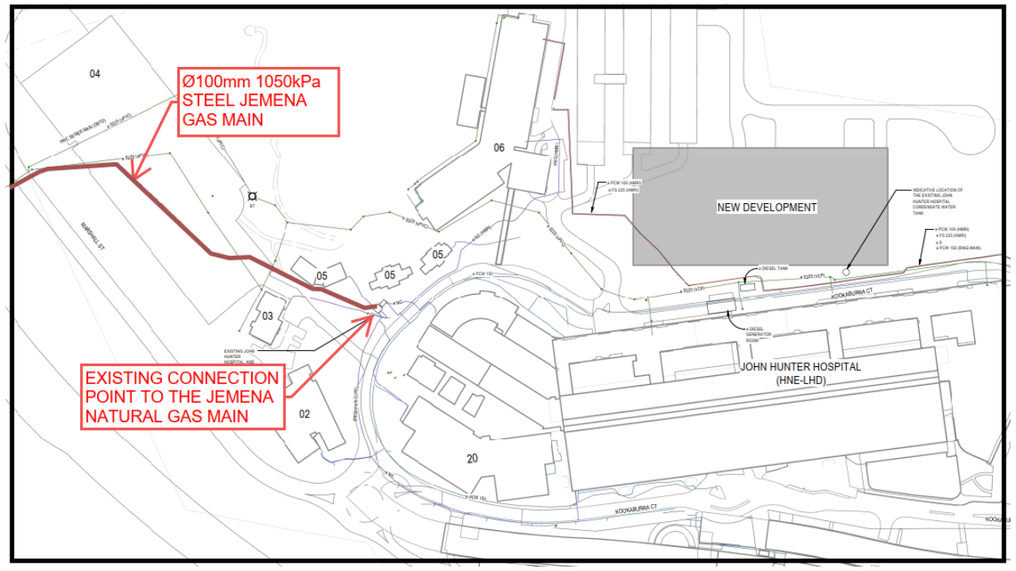

Figure 2-6: Existing Jemena Gas main surrounding the site (Based on surveys and DBYD)

It is proposed to reuse the existing natural gas connection as shown in *Figure 2-6*.

The final connection application to Jemena will need to be submitted by the contractor once all of the loads are confirmed in the later stages of the project.

3.0 APPENDICES

APPENDIX A SYDNEY WATER AVEAGE DAILY WATER USAGE TABLE

Sydney WATER

Average daily water use

By property development type

Water Supply Code of Australia

MWH/PB Flow Study Report

Water usage survey

Development Type	Development Sub-Type	Key Metric	Metric Unit	Average Demand (L/Metric unit/Day)
Residential	Single Lot Torrens	Dwelling	Each dwelling	623.00
	Flats Torrens	Net floor area	Square metre	2.36
	High Rise Units	Net floor area	Square metre	3.34
	Single Lot Community	Dwelling	Each dwelling	623.00
Mixed	Residential / Commercial	Combined floor area	Each dwelling / Square metre	Use separate rates for each component
	Commercial / Industrial	Combined floor area	Square metre	Use separate rates for each component
Commercial	Aged Accom - Self Care	Net floor area	Square metre	2.50
	Aged Accom - Hostel	Bed	Each bed	271.00
	Aged Accom - Full Care	Bed	Each bed	271.00
	Childcare	Net floor area	Square metre	3.60
	Hotel / motel / serviced apartments	Room	Each room	359.94
	Office	Net floor area	Square metre	2.27
	Shopping Centre	Net floor area	Square metre	3.00
	Laundry / Dry Cleaner	Net floor area	Square metre	10.50
	Café / Fast Food / Butcher / Deli	Net floor area	Square metre	2.48
	Retail Units	Net floor area	Square metre	2.48
	Medical / Veterinary	Net floor area	Square metre	2.48
	Mechanical Repair	Net floor area	Square metre	2.48
	Car / Boat Sales	Net floor area	Square metre	2.48
	Car Wash	Net floor area	Square metre	9.40
	Club	Net floor area	Square metre	3.77
Industrial	Heavy Process	As required		
	Chemical Manufacturing	As required		

	Printing Manufacturing	As required		
	Beverage Manufacturing	As required		
	Light Factory Unit	Developed floor area	Square metre	2.82
	Warehousing	Developed floor area	Square metre	2.82
	Transport / Bus depot	Site area	Square metre	0.91
Special Uses	University	Student	Each student	20.00
	School	Student	Each student	20.00
	Hospital	Bed	Each bed	271.00
	Religious assemblies	Developed floor area	Square metre	1.30
	Government depot	Site area	Square metre	0.91
	Community Centre / Library	Floor area	Square metre	1.84
	Sports Fields with amenities	As required		
	Parks & Reserves	As required		
	Services: Police, Ambulance, etc	Floor area	Square metre	1.40

APPENDIX B STATEMENT OF AVAILABLE PRESSURE AND FLOW FROM HUNTER WATER

Hunter Water Corporation
ABN 46 228 513 446

PO Box 5171
HRMC NSW 2310
36 Honeysuckle Drive
NEWCASTLE NSW 2300
1300 657 657 (T)
hunterwater.com.au

Warren Smith & Partners Pty Ltd
Level 9, 233 Castlereagh Street
Sydney NSW 2000

30/09/2020

Dear Larson,

Statement of Available Pressure and Flow

Thank you for your application for a Statement of Available Pressure and Flow. We have assessed the pressure expected to be available at the nearest hydrant under the demand conditions identified in the table below.

The pressure and flow information provide in the table is to be read in conjunction with notes on the following page.

Your REF: 2019-942
Property Address: Lot 2 DP 1228246, 158 Lookout Road New Lambton Heights NSW 2305
Approximate Ground Level: 75.19 m AHD
Water Main Size and Location: DN500 mm CICL located in Traversing main crossing Lot 2 New Lambton Heights NSW 2305
Hydrant No. 1541752

Expected Pressure at Hydrant	Additional Fire Flow (L/s)	Pressure (kPa)
Maximum pressure (Average Day Demand)	0	770
Minimum pressure (Peak Day Demand)	0	720
Pressure expected under peak day demand conditions		
Fire hose reel (x2)	0.66	720
Pressure expected under 95%ile peak day demand conditions		
Fire hydrant /sprinkler installations	5.0 L/s	720
Fire hydrant /sprinkler installations	10.0 L/s	715
Fire hydrant /sprinkler installations	20.0 L/s	705
Fire hydrant /sprinkler installations	30.0 L/s	685
Fire hydrant /sprinkler installations	40.0 L/s	655
Fire hydrant /sprinkler installations	50.0 L/s	620
Fire hydrant /sprinkler installations	60.0 L/s	575

For further information, please direct enquiries to development.planning@hunterwater.com.au

Hunter Water Corporation
ABN 46 228 513 446

PO Box 5171
HRMC NSW 2310
36 Honeysuckle Drive
NEWCASTLE NSW 2300
1300 657 657 (T)
hunterwater.com.au

Notes

This Pressure and Flow Statement is valid for **12 months**.

The provision of additional flow for firefighting is not a requirement under Hunter Water Act or our Operating licence.

We use an InfoWorks hydraulic model for determining flow and pressure in our networks. Pressure and flow in the models are determined using theoretical system demands based on customer connections and peaking factors to adjust peak demand conditions.

While these models are intermittently calibrated using field testing, the accuracy of the results cannot be guaranteed due to ongoing modifications to our networks and increasing demands resulting from growth.

While we endeavour to maintain minimum firefighting pressure above 15m, this cannot be guaranteed into the future and adequate allowance should be made to any firefighting assessment.

The flow and pressure generated by the Info Works model is calculated at the centre of the pipe. Pressure losses due to flow through the hydrant or additional appurtenances, such as standpipes, are not included in the above results and must be factored into any fire flow assessment for the site.

It is the **applicant's responsibility** to ensure that minimum firefighting requirements for the subject site are satisfied.

The use of, and access to, stop valves and hydrants is restricted to Hunter Water employees only. It is an **offence** under Section 25 of the Hunter Water Act to interfere with our assets without prior consent.

Persons accessing our assets without our prior consent may be issued with a **penalty** notice and will be held liable for all costs to repair, rectify and remediate the water supply system impacted by the unauthorised access.

If you require access to our network to perform a flow test please email development.planning@hunterwater.com.au for requirements.

Warren Smith
Consulting Engineers

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