Bowral & District Hospital Redevelopment

Master Planning Phase

Hydraulic Engineering & Wet Fire Protection Services

AUTHORITY UTILITY SUPPLY REPORT

Acor Consultants Pty Limited
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Date: 2nd June 2016

Revision: B

Report Author: Rhys Edwards

CONTENTS

EXECUTIVE SUMMARY

The Bowral & District Hospital Redevelopment Master Planning project will be provided with “fit for purpose” hydraulic services systems.

This report addresses authority utility supply services available for the proposed development.

Scope of services covered within this report include:-

- Sewerage systems provided by Wingecarribee Council
- Potable and Fire Water supplies provided by Wingecarribee Council
- Natural gas supply provided by Jemena

Authority supply services can be summarised as follows:-

ACOR have assessed and reported on the condition, capacity, compliance reliability and efficiency of the existing Wingecarribee Council sewerage infrastructure system and have found them to be suitable for connection. Capacity of downstream system is still to be determined by the Council and will be subject to servicing head works charges.

ACOR have assessed and reported on the condition, capacity, compliance reliability and efficiency of the existing Wingecarribee Council water supply infrastructure system and have found them to be suitable for the proposed building
New development works will be subject to Wingecarribee Council servicing head works charges.

ACOR have requested the Wingecarribee Council water performance data for flows and pressures. The council has provided this information – refer to Appendix ‘C’ of this report.

ACOR have assessed and reported on the condition, capacity, compliance reliability and efficiency of the existing Jemena natural gas infrastructure system and have found them to be suitable for the proposed building works.

1.0 INTRODUCTION

ACOR Consultants Pty Ltd has been engaged by Health Infrastructure to provide utility supply report for the proposed Bowral & District Hospital redevelopment works.

The proposed works comprise of:-

- Decanting strategy
- Demolition of redundant buildings
- New health care building

New building works is generally proposed to be serviced by the proposed “masterplan”, existing site infrastructure.

This utility supply describes the existing hydraulic and fire services utility supply capacity to service the proposed development sewage, water and natural gas loads.

Hydraulic and wet fire services include:

- Sewerage
- Domestic water supply
- Fire protection water supply
- Natural Gas supply systems

This report does not consider stormwater or electrical supply, which are being reported upon by the civil and electrical engineering consultant.

1.1 UTILITY SUPPLY DESCRIPTION

Authority services adequacy is summarized within the tables below

1.1.1 Sewerage

Item	Description
Supply Authority Name and Contact	Wingecarribee Council Tim Bell – Modelling & Systems Engineer Email: tim.bell@wsc.nsw.gov.au Ph: (02) 4806 0816
Sewerage Main Details	The existing hospital campus has the following sewer mains available for connection. ▪ Council's 150 mm sewer in Bowral St Refer Appendix 'A' Sewer Diagram.
Condition and Reliability	No reports of major failures or surcharging of existing sewer mains Council sewerage system infrastructure failure is unlikely. However, if a catastrophic failure occurred, a significant impact on the operation of the hospital will be imposed. Sewerage main surcharge or blockage would discharge via existing overflow relief gullies.
Existing Sewage Loads	Current (91 hospital beds) Current Equivalent Tenements (ET) = 91 x 1.43 = 130.13 Average Dry Weather Flow = 0.273 **L/sec** (calculated using Sydney Water ADWF formula = ET x 0.0021) Peak Dry Weather Flow = 1.366 **L/sec** (calculated using Sydney Water PDWF formula = 5 x 0.0021 X ET)
Proposed Sewage Loads	Proposed Additional Net 50 Bed increase (by 2026) (Total 141 hospital beds) Proposed Equivalent Tenements (ET) = 141 x 1.43 = 201.63 Average Dry Weather Flow = **0.423 L/sec** (calculated using Sydney Water ADWF formula = ET x 0.0021) Peak Dry Weather Flow = 2.117 **L/sec** (calculated using Sydney Water PDWF formula = 5 x 0.0021 X ET)
Capacity	Wingecarribee Council to verify. Wingecarribee Council Development Servicing Plan (DSP) charges based on published prices effective May 1 2016 are $8,241 per additional ET. Final determination of additional ET to be agreed between Health Infrastructure and Wingecarribee Council.

1.1.2 Domestic Water

Item	Description
Supply Authority Name and Contact	Wingecarribee Council Tim Bell – Modelling & Systems Engineer Email: tim.bell@wsc.nsw.gov.au Ph: (02) 4806 0816
Water Main Details	The existing hospital campus has the following water supply connections to the site: ▪ Wingecarribee Council's 80 mm water main in Bowral St (this is the primary Supply to the Hospital) ▪ Wingecarribee Council's 50 mm water main in Mona Rd (this is the secondary Supply to the Hospital) ▪ Wingecarribee Council's 20 mm water main in Mona Rd (this is the Ambulance water supply) ▪ Wingecarribee Council's 50 mm water main in Mona Rd (this is the old hospital precincts water supply) Bowral & District Hospital currently has four (4) metered water supplies and reticulates through the facility to the various buildings to serve the fixtures, plant and equipment requiring potable water. The existing potable water connections are supplied from: ▪ Existing 100 mm diameter Asbestos Cement (AC) water main in Bowral Street ▪ Existing 200 mm diameter main Medium Density Polytheylene (MDPE) water main in Mona Road ▪ Existing 150 mm diameter main unplasticised polyvinyl chloride (uPVC) water main in Ascot Road ▪ Existing 100 mm diameter main Medium Density Polytheylene (MDPE) water main in Sheffield Road Refer Appendix 'B' – Water Main Diagram
Existing Domestic Water Supply Loads	Current (91 hospital beds) Equivalent Tenement (ET) = 91 x 0.90 = 81.9 ET Note! 1ET = 0.73 kL/day Total (existing) Load = 81.9ET x 0.73 kL/day = 59.87 kL/day Probable simultaneous flow of 13 L/s
Proposed Additional Domestic Water Supply Loads	Proposed Additional Net 50 Bed increase (by 2026) (Total 141 hospital beds) Equivalent Tenement (ET) = 141 x 0.90 = 126.9 ET Note! 1ET = 0.73 kL/day Total Load = 126.9ET x 0.73 kL/day = 92.637 kL/day Probable simultaneous flow of 23 L/s (a net increase of 10 L/s)
Condition and Reliability	Good. No reports of major failures.
Water Supply Available Flow and Pressure	Water flow and pressure analysis were carried out at two test points. Test point is Bowral Street main and test point two is at Mona Road main. Test Point 1 has a maximum flow allowed of 35 L/s at 154.12 kPa

	Test point 2 has a maximum flow allowed of 50 L/s at 120.89 kPa Based on the above test rest results, on-site fixed pressure pumps with storage tanks will be required. Refer Appendix 'C' Flow and Pressure Results
Capacity	Wingecarribee Council to verify. Wingecarribee Council Development Servicing Plan (DSP) charges based on published prices effective May 1 2016 are $6,475 per additional ET. Final determination of additional ET to be agreed between Health Infrastructure and Wingecarribee Council.
Water Quality	Wingecarribee Council to verify.

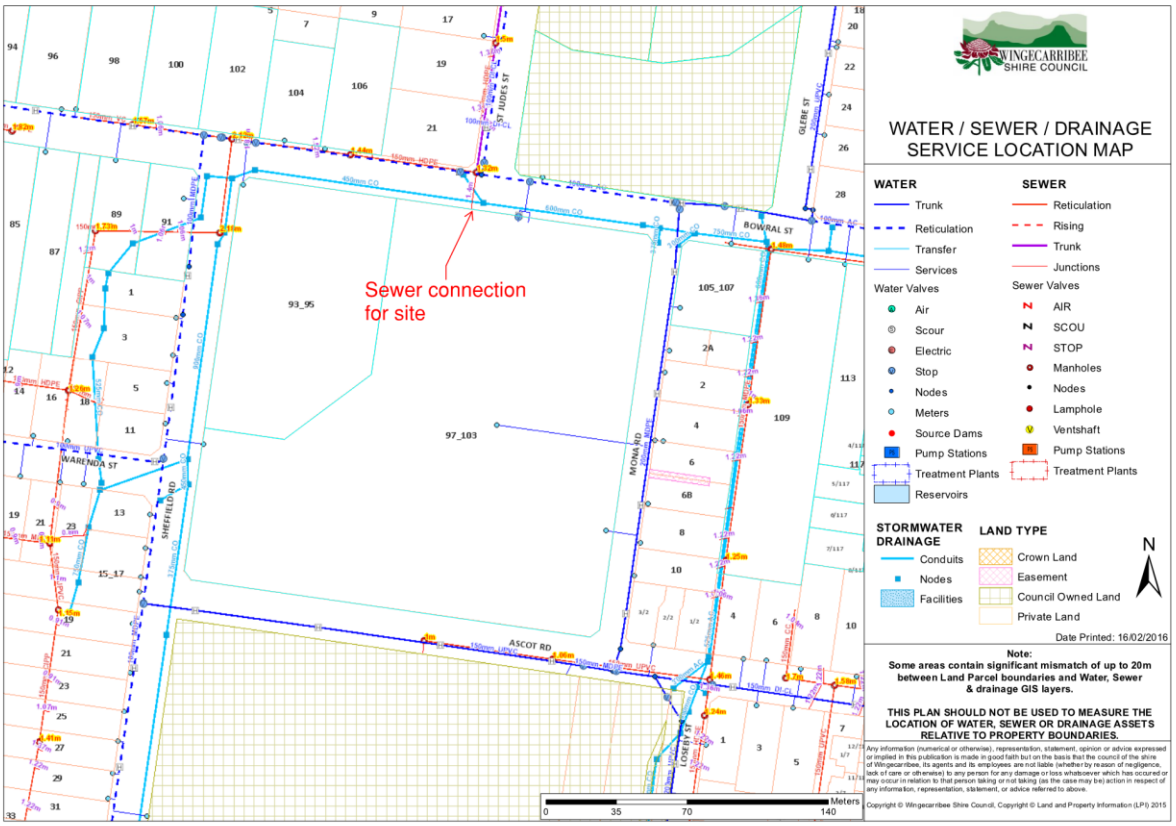
1.1.3 Fire Service Water Supply

Item	**Description**
Supply Authority Name and Contact	Wingecarribee Council Tim Bell – Modelling & Systems Engineer Email: tim.bell@wsc.nsw.gov.au Ph: (02) 4806 0816
Water Main Details	The existing Fire water connections are listed below; ▪ 100 mm diameter connection to 100 mm diameter water supply main in Bowral Street Refer Appendix 'B' – Water Main Diagram
Existing Fire Water Supply Loads	Fire Hydrant = 4.5 L/sec at 275 kPa (and is subject to Specification 10 of Ordinance 70) Fire Sprinklers = Nil
Proposed Fire Water Supply Loads	Fire Hydrant = 20 L/sec Fire Sprinklers = 15 L/sec
Condition and Reliability	Good No reports of major failures.
Water Supply Available Flow and Pressure	Water flow and pressure analysis were carried out at two test points. Test point is Bowral Street main and test point two is at Mona Road main. Test Point 1 has a maximum fire flow allowed of 25 L/s at 257.65 kPa Test point 2 has a maximum flow allowed of 30 L/s at 265.01 kPa Based on the above test rest results, on-site fixed fire pressure pumps with storage tanks will be required. Refer Appendix 'C' Flow and Pressure Results

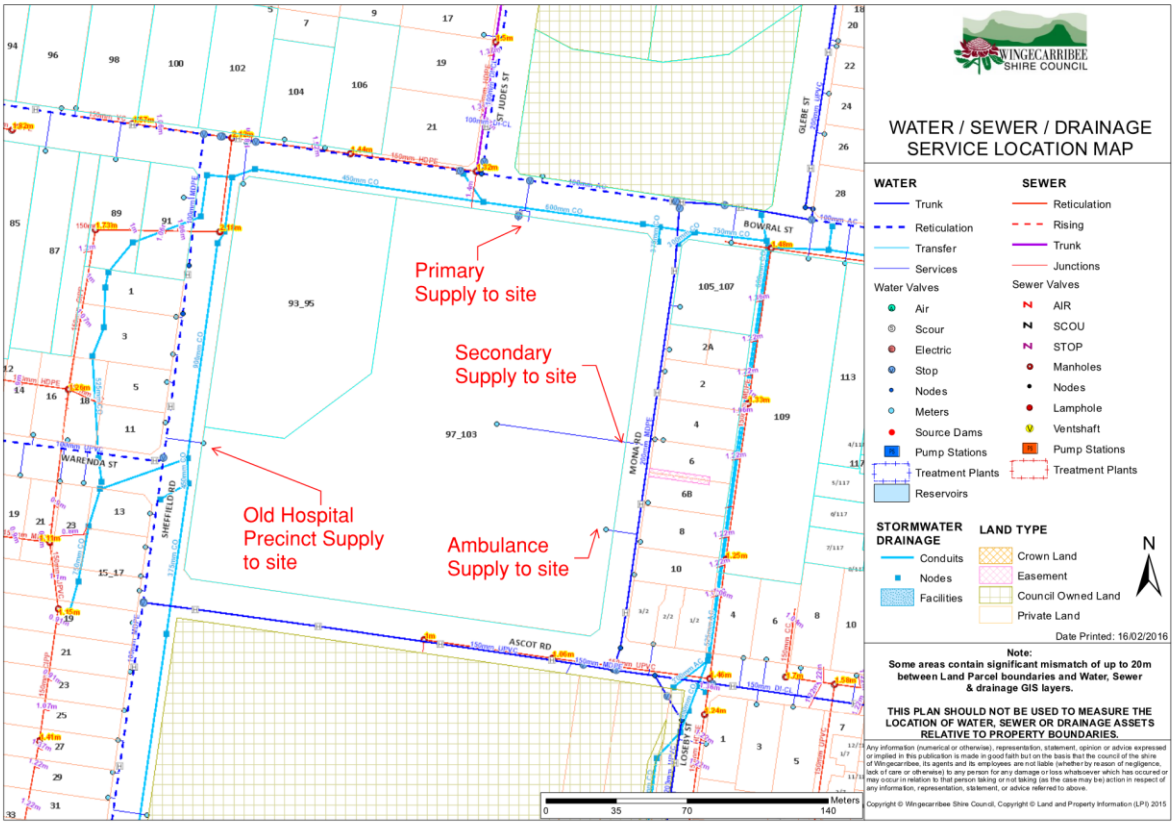
1.1.4 Natural Gas

Item	Description
Supply Authority Name and Contact	Jemena Name: Neale Hilton (Network Development Manager) Email : neale.hilton@jemena.com.au Phone: 0402 060 151
Existing Natural Gas Details	The site is currently supplied with high pressure (1050 kPa), secondary gas main in Ascot Road. A gas meter compound existing within the site boundary, which comprises of two (2) large volume natural gas meters (AL-1400s, which are capable of passing 30 m^3/hr of gas). This arrangement is unique, due to the age of the hospital. Numerous gas sub meters and regulators are located around the site servicing individual building areas and plantrooms. Refer to Appendix 'D'
Existing Natural Gas Supply Loads	Existing site gas load is estimated as 22,708 MJ/hr Refer to Appendix 'E'
Proposed Natural Gas Supply Loads	Total 28,458 MJ/hr Net increase of approximately 5,750 MJ/hr Refer to Appendix 'E'
Condition and Reliability	Good No reports of major failures or delivery issues. Dual gas meters exist, which will offer a level of redundancy should there be a supply failure due to a malfunction within the existing meter compound. It is highly unlikely that there will be a gas supply interruption to the site due to the authority gas supply side.
Capacity	Adequate capacity available subject to final detail calculations Final determination of contribution charges to be confirmed by supply authority upon confirmation of final mechanical and hydraulic design loads. It is likely that the Bowral & District Hospital will be on a "contract customer' basis with Jemena. Any charges will need to be re-negotiated between health Infrastructure (or the LHD) and Jemena
Proposed Works	Redevelopment works to connect to existing site gas infrastructure.

APPENDIX A – SEWER DIAGRAM



APPENDIX B – WATER SUPPLY DIAGRAM



APPENDIX C – WATER SUPPLY FLOW RESULTS

Our Ref: 7790/3
Contact: TBELL

WINGECARRIBEE SHIRE COUNCIL

Friday, 13 May 2016

Rhys Edwards
ACOR Consultants
Level 1, 24 Falcon St
Crows Nest NSW 2065

Dear Rhys,

RE: Pressure / Flow enquiry at Bowral Hospital, Bowral St - Test Location 1

Council has undertaken a simulated analysis of the water pressure at the location above on node id: NH02155 as shown on the attached plan. At this point Council advises that:

- A.H.D. of water main is 678.09m
- Water main is 100mm AC
- Reservoir: RES-WC8 Oxley Drive STEEL Top Water Level 746.7; Bottom Water Level:737.8m
- Water Flow Rates simulated (RES-WC8 Oxley Drive STEEL at 84.6% capacity)
- Council's minimum standard for fire flow is 10L/s and 15m residual pressure.
- Maximum static pressure is 44.46m
- Maximum allowable flow at the hydrant is 25L/s with residual pressure above 15m
- Pressure results recorded in the attached report

The test was simulated at peak time (7:30am) using a maximum day demand scenario to allow for the worst case scenario.

The above fire flow and residual pressure information is calculated using Council's computer model of the water supply system, and should not be treated as a guarantee of supply in any way. These values are not representative of conditions at all times of the day or season and are subject to variables beyond Council's control. The calculated hydraulic information provided in this report is valid for 12 months from the date of this letter.

If you have any further enquiries or questions please contact me.

Yours sincerely,

TIM BELL
Modelling & Systems Engineer
Assets - Water and Sewer
Enclosed: Water Modelling Report, Location Plan

Civic Centre, Elizabeth St, Moss Vale, NSW 2577. PO Box 141, Moss Vale. **t. (02) 4868 0888** f. (02) 4869 1203
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Water Modelling Report

WINGECARRIBEE SHIRE COUNCIL

Fire Flow Enquiry - Bowral Hospital, Bowral St - Test Location 1

Street Address	Bowral Hospital, Bowral St - Test Location 1		
Property No.	1704811		
File No.	7790/3		
Top Water Level (m AHD)	746.7	**Bottom Water Level (m AHD)**	737.8
Hydrant Elevation (m AHD)	678.09	**Operating Level at 85% (m AHD)**	745.33

Network & Control BMM Network & Control 0.27
Model Group 2016-019
Node ID NH02155
Resevoir RES-WC8 Oxley Drive STEEL

Introduction

Undertake a Pressure & Flow enquiry for the property address above.

Results of the Pressure / Flow test

A simulation (using Infoworks WS software) was carried out to determine the minimum residual pressure at the node for the supplied flows. The simulation was run on node NH02155 as shown on the attached plan) at 7.30am. Simulation run with reservoir at 85% capacity. The results are recorded in the table below.

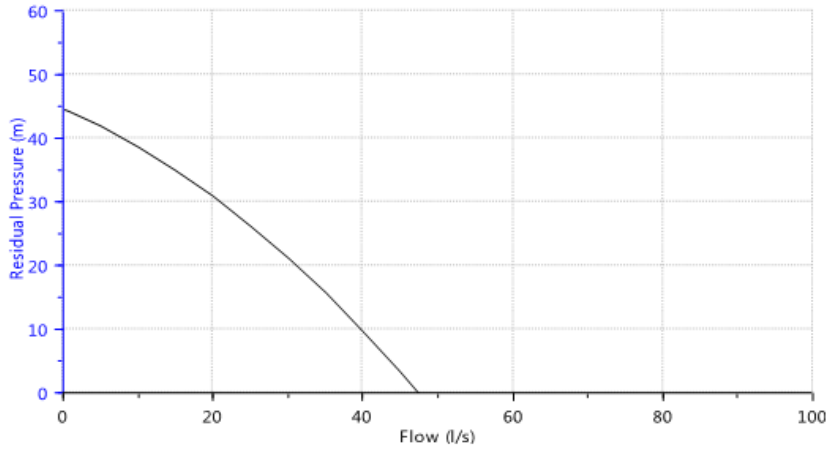
Simulated Flows (l/s)	Minimum Residual Pressure (mHead) at 7:30am	Minimum Residual Pressure (kPa) at 7:30am
0.00	44.46	435.89
1.0	44.13	432.66
5	41.83	410.11
10	38.67	379.13
15	35.00	343.14
20	30.87	302.65
25	26.28	257.65
30	21.23	208.14
35	15.72	154.12
40	9.75	95.59
45	3.32	32.55
50	-3.57	-35.00

Maximum Available Fire Flow	**25.00 L/s**

2016-019 PFE Report Test 1.xlsx
13/05/201611:45 AM

Water Modelling Report

Simulated Hydrant curve for Hydrant NH02155



Notes

Council's target for fire flow is 10L/s at 15m residual pressure.
The information in this report is based on an uncalibrated model of the full water system.
The above is the available hydrant flow at this node without additional fire demands.
The required minimum residual pressure to be maintained at any one time is 15m head.

Our Ref: 7790/3
Contact: TBELL

WINGECARRIBEE SHIRE COUNCIL

Friday, 13 May 2016

Rhys Edwards
ACOR Consultants
Level 1, 24 Falcon St
Crows Nest NSW 2065

Dear Rhys,

RE: Pressure / Flow enquiry at Bowral Hospital, Bowral St - Test Location 2

Council has undertaken a simulated analysis of the water pressure at the location above on node id: NH02691 as shown on the attached plan. At this point Council advises that:

- A.H.D. of water main is 678.09m
- Water main is 200mm PE
- Reservoir: RES-WC8 Oxley Drive STEEL Top Water Level 746.7; Bottom Water Level:737.8m
- Water Flow Rates simulated (RES-WC8 Oxley Drive STEEL at 84.6% capacity)
- Council's minimum standard for fire flow is 10L/s and 15m residual pressure.
- Maximum static pressure is 44.31m
- Maximum allowable flow at the hydrant is 30L/s with residual pressure above 15m
- Pressure results recorded in the attached report

The test was simulated at peak time (7:30am) using a maximum day demand scenario to allow for the worst case scenario.

The above fire flow and residual pressure information is calculated using Council's computer model of the water supply system, and should not be treated as a guarantee of supply in any way. These values are not representative of conditions at all times of the day or season and are subject to variables beyond Council's control. The calculated hydraulic information provided in this report is valid for 12 months from the date of this letter.

If you have any further enquiries or questions please contact me.

Yours sincerely,

TIM BELL
Modelling & Systems Engineer
Assets - Water and Sewer
Enclosed: Water Modelling Report, Location Plan

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www.wsc.nsw.gov.au

Working with you

Water Modelling Report

WINGECARRIBEE SHIRE COUNCIL

Fire Flow Enquiry - Bowral Hospital, Bowral St - Test Location 2

Street Address	Bowral Hospital, Bowral St - Test Location 2		
Property No.	1704811		
File No.	7790/3		
Top Water Level (m AHD)	746.7	**Bottom Water Level (m AHD)**	737.8
Hydrant Elevation (m AHD)	678.09	**Operating Level at 85% (m AHD)**	745.33

Network & Control	BMM Network & Control 0.27
Model Group	2016-019
Node ID	NH02691
Resevoir	RES-WC8 Oxley Drive STEEL

Introduction

Undertake a Pressure & Flow enquiry for the property address above.

Results of the Pressure / Flow test

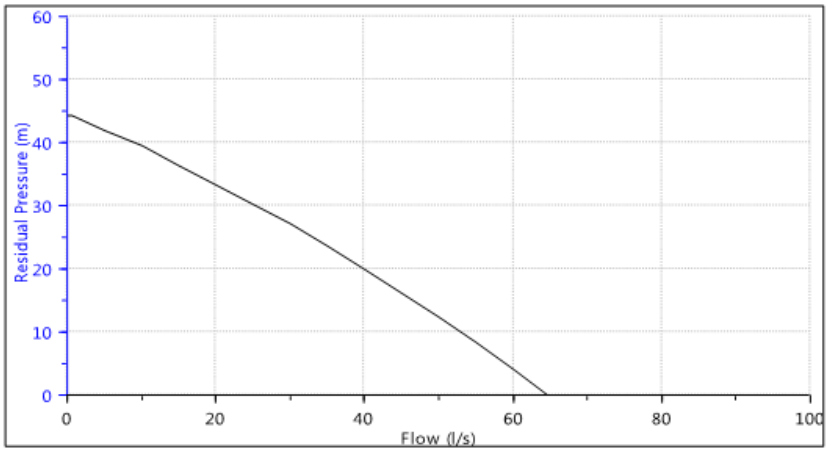
A simulation (using Infoworks WS software) was carried out to determine the minimum residual pressure at the node for the supplied flows. The simulation was run on node NH02691 as shown on the attached plan) at 7.30am. Simulation run with reservoir at 85% capacity. The results are recorded in the table below.

Simulated Flows (l/s)	Minimum Residual Pressure (mHead) at 7:30am	Minimum Residual Pressure (kPa) at 7:30am
0.00	44.31	434.42
1.0	44.01	431.48
5	41.88	410.60
10	39.56	387.85
15	36.43	357.16
20	33.44	327.85
25	30.31	297.16
30	27.03	265.01
35	23.58	231.18
40	19.99	195.98
45	16.24	159.22
50	12.33	120.89

Maximum Available Fire Flow	**30.00 L/s**

Water Modelling Report

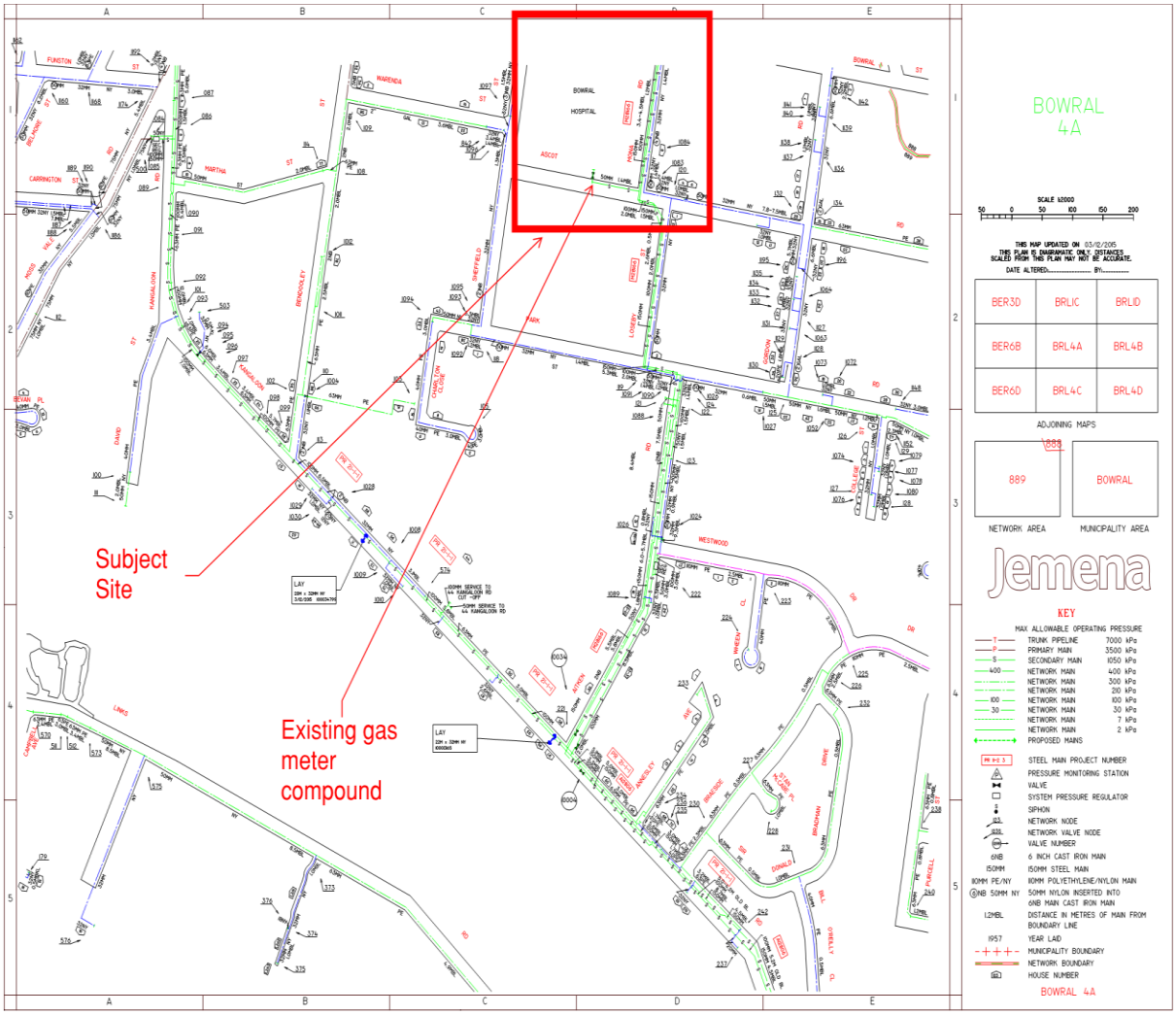
Simulated Hydrant curve for Hydrant NH02691



Notes

Council's target for fire flow is 10L/s at 15m residual pressure.
The information in this report is based on an uncalibrated model of the full water system.
The above is the available hydrant flow at this node without additional fire demands.
The required minimum residual pressure to be maintained at any one time is 15m head.

APPENDIX D – GAS MAIN DIAGRAM



APPENDIX E – EXISTING / PROPOSED NATURAL GAS LOADS

Location	Load (MJ/hr)	Comment
Central Energy Plantroom	10,000 (TBA)	Existing to be retained
Rheem Eternity G26 HWU	200	Existing to be retained – Old Hospital Building
Rheem Gas Storage (170L)	30	Existing to be retained – Old Hospital Building
Rinnai 20 HWU	188	Existing to be retained – Uni of Woll
Rheem Optima Gas Storage (x2)	60	Existing to be retained – Imaging Building
Kitchen	7,000 (TBA)	Existing to be retained
Laundry	5,000 (TBA)	Existing to be retained
Rheem Gas Storage (135L)	30	Existing to be retained – Maintenance Building
Rheem Gas Storage (270L)	200	Existing to be retained – Maintenance Building
Domestic hot water plant	750	Proposed – Loads subject to confirmation
Mechanical Boilers	5,000	Proposed – Loads subject to confirmation
Estimated Total Gas load upon completion	**28,458**	**Loads subject to confirmation**