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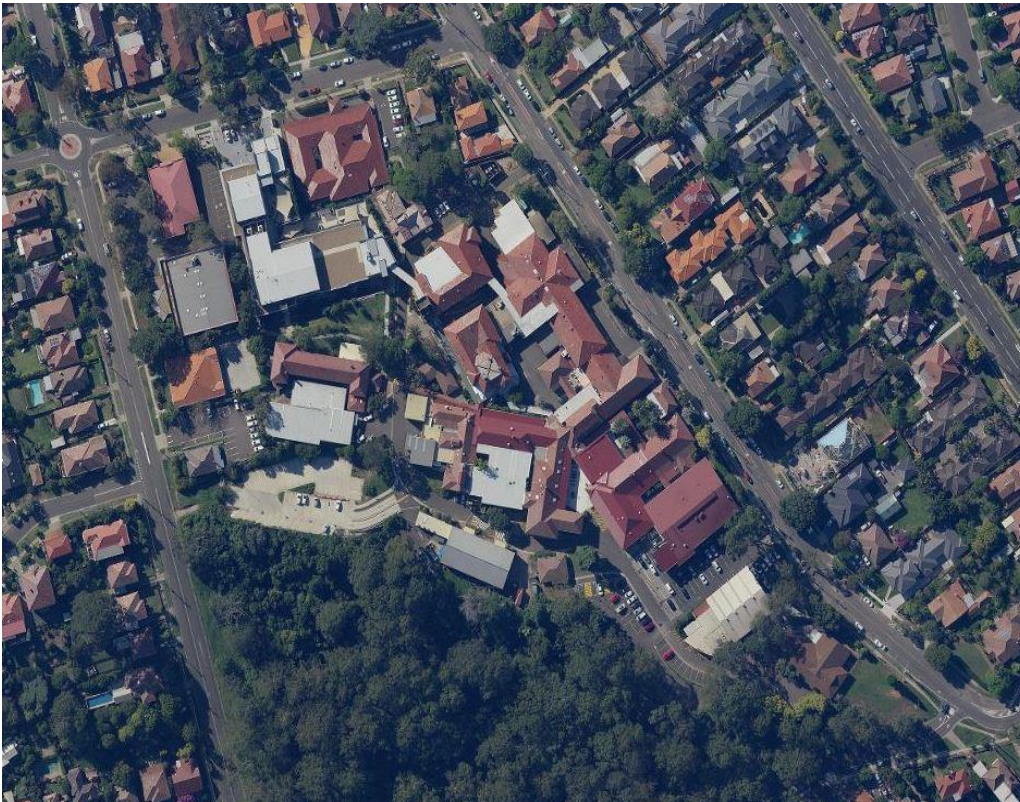
HYDRAULIC AND FIRE SYSTEMS ENGINEERING STATE SIGNIFICANT DEVELOPMENT APPLICATION

Ryde Hospital Redevelopment Project

Prepared for: Health Infrastructure NSW

Document no: ACR-HF-RPT-002

Issue no: Rev D





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Revisions

Revision	Description	Date	Prepared by	Approved by	Signature
A	DRAFT SSDA	02/02/2022	RE and RL	Rhys Edwards	
B	DRAFT 2	11/03/2022	RE and RL	Rhys Edwards	
C	Final Issue	08/04/2022	RE and RL	Rhys Edwards	
D	Final Issue	19/07/2022	RE and RL	Rhys Edwards	

Review Panel

Division/ Office	Name
Building Services / St Leonards	Rhys Edwards

Unless otherwise advised, the parties who have undertaken the Review and Endorsement confirm that the information contained in this document adequately describes the conditions of the site located at Ryde Hospital, NSW.

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1 Introduction

1.1 Project Scope

The Ryde Hospital site is located at 1 Denistone Road, Denistone and comprises Lots 10-11 DP 1183279 and Lots A-B DP 323458. It has an area of approximately 7.69Ha and currently accommodates the existing Ryde Hospital Campus.

This report accompanies a State Significant Development Application that seeks approval for the establishment of a maximum building envelope and gross floor area for the future new hospital buildings, and physical Stage 1 Early Works to prepare the site for the future development. For a detailed project description refer to the Environmental Impact Statement prepared by Ethos Urban.

1.2 SEARs Requirements

SEARs requirements anticipated to be required for the preparation of an Environmental Impact Statement (EIS) for the SSDA submission that are applicable for Hydraulic and Fire systems are summarised in Table 1 below:

Table 1 – SEAR's Requirements

Item	SEARs Requirements	Relevant Section of Report
No.20:	Infrastructure Requirements and Utilities In consultation with relevant service providers: <ul style="list-style-type: none"> Identify and assess the impacts of the concept development on existing utility infrastructure and service provider assets surrounding the site. 	Section 2, Table 2 and Section 4
No.20:	<ul style="list-style-type: none"> identify any infrastructure upgrades required on-site and off-site to facilitate the concept development and any arrangements to ensure that the upgrades will be implemented on time and be maintained. 	Section 4 and Section 5
No.20:	<ul style="list-style-type: none"> provide an infrastructure delivery and staging plan, including a description of how infrastructure requirements would be co-ordinated, funded and delivered to facilitate the concept development. 	Section 6

2 Utility Services Assessment

For the Ryde Hospital campus, the site infrastructure strategy will be designed to be a site wide network with main connections being established in Ryedale Rd and Denistone Rd.

Authority (utility) services adequacy is summarized within the table below:-

Table 2 – Utility Services Adequacy summary

Sewer	Domestic Water	Natural Gas	Fire Service
Authority mains are capable	Existing supply mains in the surrounding streets have capable flow Pressure is poor	Adequate capacity in street mains Existing meter is a single run meter and offers no redundancy	Existing supply mains in the surrounding streets have low flow and pressure It is proposed to amplify the towns mains from Blaxland Rd to the Denistone Rd frontage

Note: more detailed analysis is provided in the sections below.

3 Standards and Design Guides

3.1 Australian Standards and Codes

The following lists the primary standards and codes our design approaches are reliant upon:

- National Construction Code (NCC) – 2019 amendment 1 (being the current version at the time of writing this report)
- Plumbing Code of Australia (PCA) – 2019
- Building Code 2016
- AS 3500 Plumbing and Drainage Suite of standards – 2018
- AS 5601 Gas Installations – 2013
- AS 3718:2005 Water Supply Tapware
- AS 4187:2014 Reprocessing of reusable medical devices in health service organizations
- AS 2419.1 Fire Hydrant Installations – 2005
- AS 2118.1 Fire Sprinkler Installations – 2017
- AS 2441 Fire Hose Reels – 2005

3.2 Authority and Regulatory Bodies

The following lists the primary authorities and regulatory bodies our design approaches are reliant upon:

- EP&A – ACT & Regulation
- Ryde City Council
- Jemena Gas Networks
- Sydney Water
- Note: Trade Waste requirements (based on Sydney Water Guidelines)
- Department of Fair Trading
- Fire and Rescue NSW

3.3 NSW Health Policy and Health Infrastructure Guidelines

This report will rely upon the following guidelines and policies, however, the full suite of the NSW HI guides and policies will be applicable:

- NSW Health Policy Directives
- Design Guidance Note No. 5 – Engineering Scope Definition
- Design Guidance Note No. 6 – General Design Principles
- Design Guidance Note No. 13 – Project Team Guidance Relating to Coordination with ERG
- Design Guidance Note No. 16 – Legionella Risk – Delayed / Staged Occupation
- Design Guidance Note No. 20 – Design Deliverables
- Design Guidance Note No. 24 – Importance Levels for Hospital Buildings
- Design Guidance Note No. 30 – Site Investigations – Project Opportunities and Constraints
- Design Guidance Note No. 31 – Water Testing and Compliance
- Design Guidance Note No. 42 – Publicly Accessible Toilets in Healthcare
- Design Guidance Note No.58 – Environmentally Sustainable Development

3.4 AUSHFG

Australasian Health Facilities Guideline (AHFG)

Hospital acquired infections – Engineering down the risk – Handbook – HB 260 – 2003

4 Scope of Services

Scope of services covered within the plan include:

- sanitary and trade waste discharge
- roof water plumbing and drainage systems connecting to existing civil trunk stormwater
- domestic potable water supply systems
- natural gas supply systems
- fire protection water supply (hydrants and automatic fire sprinklers)

Hydraulic services can be summarised as follows:

- Consultation with relevant utility supply agencies is to be conducted to verify the condition, capacity, compliance, reliability and efficiency of the existing sewer and water mains.
 - Note: the project's Water Services Coordinator (WSC) is the authorised party for liaison between Sydney Water and the project team for sewer and water supply capacity assessments
- Sewer and trade wastewater from the site to discharge to Sydney Water's sewer main via proposed internal 'house drainage' system in accordance with AS.3500 Part 2 and Sydney Water's requirements
 - Refer to Appendix 'A' and 'B' of this report for indicative layout of existing site infrastructure
- Water supply provided will be in accordance with Australian Drinking Water Guidelines (2011, updated 2016, version 3.4) and AS3500 Part 1 and Part 4
 - Refer to Appendix 'C' of this report of this report for indicative layout of existing site infrastructure
- Amplify the towns mains from Blaxland Rd to the Denistone Rd frontage

- Refer to Appendix 'D' of this report
- Water pressure/flow results was obtained from Sydney Water
 - Refer to Appendix 'E', 'F' and 'G' of this report
- Rainwater from roof areas will be collected, stored and re-used for landscape irrigation purposes
- Roofwater will drain/discharge through a series of rainwater outlets and eaves/box gutters systems designed in accordance with AS3500 Part 3
- Ecological Sustainable Development (ESD) principles will be incorporated into the designs and the construction of the facility as per the agreed pathway

5 Concept SSDA

This section of the report sets out to describe the existing condition, compliance and capacity of the existing Authority infrastructure for hydraulic services network.

5.1 Sewer Drainage

The existing property sanitary drainage system has the following connections into the authority main:

- 2 x 150 mm diameter to the Authority sewer in Fourth Ave
 - 1 x connection in front of Building 7
 - 1 x connection in front of Building 20
- 1 x 150 mm diameter connection in Ryedale Rd receiving sewerage from the majority of the existing campus
- 1 x 100 mm diameter connection in Ryedale Rd receiving sewerage from Building 19

Refer to Appendix 'A' for existing sewer drainage information surrounding the site.

We have carried out preliminary demand calculations which are summarised below:

Table 3 – Water and Sewer Demands

Sewer Loads

Existing	Proposed (2026)	Proposed (2031)
72 kL/day	126 kL/day	126 kL/day
Based on 132 beds	Based on 230 beds	Based on 230 beds

Water Supply Loads

Existing	Proposed (2026)	Proposed (2031)
75 kL/day	130 kL/day	130 kL/day
Based on 132 beds	Based on 230 beds	Based on 230 beds

5.2 Water Supply

The existing water supply system has the following connections into the authority main:

- Sydney Water's water supply in Ryedale Rd (DN100 Cast Iron Cement Lined (CICL))
 - DN80 mm water main and meter - this is the primary supply to the Hospital

- Sydney Water's water supply in Denistone Road (DN100 CICL)
 - DN50 mm water main - this is the secondary supply to the Hospital and perhaps the original connection for the campus
 - This supply is pressure boosted
- Sydney Water's water supply in Fourth Avenue (DN100 CICL)
 - DN50 mm water main – a dedicated supply to the Graythwaite Building
- Sydney Water's water supply in Fourth Avenue (DN100 CICL)
 - DN40 mm water main – a dedicated supply to Building 7

Each of the above supplies are metered water supplies and reticulates through the facility to the various buildings to serve the fixtures, plant and equipment requiring potable water.

The performance of the authority water supply for drinking purposes is adequate for the proposed development. No authority water supply augmentation is required. Any supply concerns will be addressed on site.

Refer to Appendix C for existing water supply information.



Photograph 1 - Potable water master meter located externally off Ryedale Rd – Serving the existing campus



Existing
meter

Photograph 2 - Potable water meter located externally for the Graythwaite Building



Photograph 3 - Potable water meter serving Building 7



Photograph 4 – Secondary water meter located on Denistone Road



Photograph 5 – Secondary water meter located on Denistone Road, complete with backflow device

Augmentation of water supply main from Blaxland Rd to Denistone Rd for fire-fighting supplies is required due to the inadequate performance of the mains for fire-fighting purposes. This augmentation will be solely for fire-fighting supply. The drinking water supply will be sourced from the existing authority water main in Ryedale Rd.

Refer to Appendix D for water supply augmentation information.

5.3 Natural Gas Supply

The site is currently supplied with high pressure (1050 kPa) from a steel gas main in Ryedale Road. A gas meter compound located within the site boundary, near the existing on-grade carpark, south of Building 19 and comprises of one (1) large volume, single-run natural gas meter (AL-1400, which is capable of passing 40 GJ/hr of gas). A single run gas meter is an antiquated approach, whereby all new hospitals, or existing hospitals which are required to have gas meter volumes upgraded, are to be replaced with the dual-run meter sets.



Photograph 6 – Existing site's master gas meter and regulator assembly

Augmentation of the authority natural gas supply main is not envisaged. The authority (Jemena Gas) has been consulted with the expected / proposed loads.

6 Stage 1 - Early Works

This section of the report sets out to describe the proposed works associated with the existing site infrastructure and enabling the existing site for the proposed development. It does not go into details of the existing systems within the existing building stock which are being demolished.

The existing site wide services are operationally and functionally sufficient but, in part, will not comply with current statutory requirements without significant upgrade works. A summary of the site infrastructure modifications and approach is listed below:

- Diversion of existing DN150 mm sewer drainage pipeline which will be located directly under the new building footprint
 - Diversion of this pipework will be investigated pending availability of connection point depths
- Upgrade (upsizing) of existing potable water main site infrastructure from Ryedale Road and diversion of new main around the footprint of the new building
 - Relocation of existing meter water meter and upgrade new meter set to suit latest technology and Sydney Water requirements
 - Increase site main infrastructure from DN80 mm to DN100 mm
 - Implementation of new ring main
- Upgrade and relocation of existing natural gas master meter and inground piping
- Modifications to existing fire-fighting site mains
 - Localised diversion
 - Localised cutting and capping

6.1 Potable Water

Potable water systems for human consumption, hygiene purposes, cistern flushing and process equipment for the development will be supplied directly from the Sydney Water water main and constructed in accordance with AS3500.1, AS3500.4, Sydney Water requirements and Australian Drinking Water Guidelines.

The existing potable water supply infrastructure is DN80mm and will be largely removed and upgraded with new DN100mm pipes.

6.2 Sanitary Plumbing and Drainage

It is not envisaged that direct connections to the authority mains will be needed for this development other than retaining the existing connections.

The existing site sewer infrastructure will be diverted, removed and replaced to cater for the proposed development. It is envisaged that the site infrastructure will largely comprise of DN150mm sewer drainage lines.

New sewer and sanitary drains will be constructed to the requirements of AS3500.2 and Sydney Water requirements and connected to the site infrastructure.

6.3 Roofwater Plumbing and Drainage

Roof water plumbing from the roof areas will be designed to convey the roof water down to the lowest level where it will be discharged into the main civil stormwater trunk main system.

The roof drainage system will be based on an Annual Recurrence Interval (ARI) of 1 in 100year with a 5 minute duration. All roofed areas will have an independent overflow system which has 100% capacity of the

primary downpipe system. This rainfall ARI is compatible for buildings with box gutters or flat roofs. Eaves gutters are being considered as they reduce the risk of water ingress.

Roof water collection, treatment and re-use will be incorporated for landscape irrigation water supply. Consideration is being given to other alternative water uses.

As the northern half of the site is located within the Terry's Creek Catchment and the southern half is within the Parramatta River Catchment. Stormwater is directed to site infrastructure and then to local council / authority drainage pipes which are carrying large volumes of upstream stormwater. (Refer to the Project's Civil Engineers Report).

Whilst capturing and reusing the building's roof water will have negligible effect on the local council's stormwater infrastructure, it is being adopted on this project. In addition, the project strategy for stormwater management includes flood mitigation and on-site detention prior to discharge to the council system. (Refer to the Project's Civil Engineers Report).

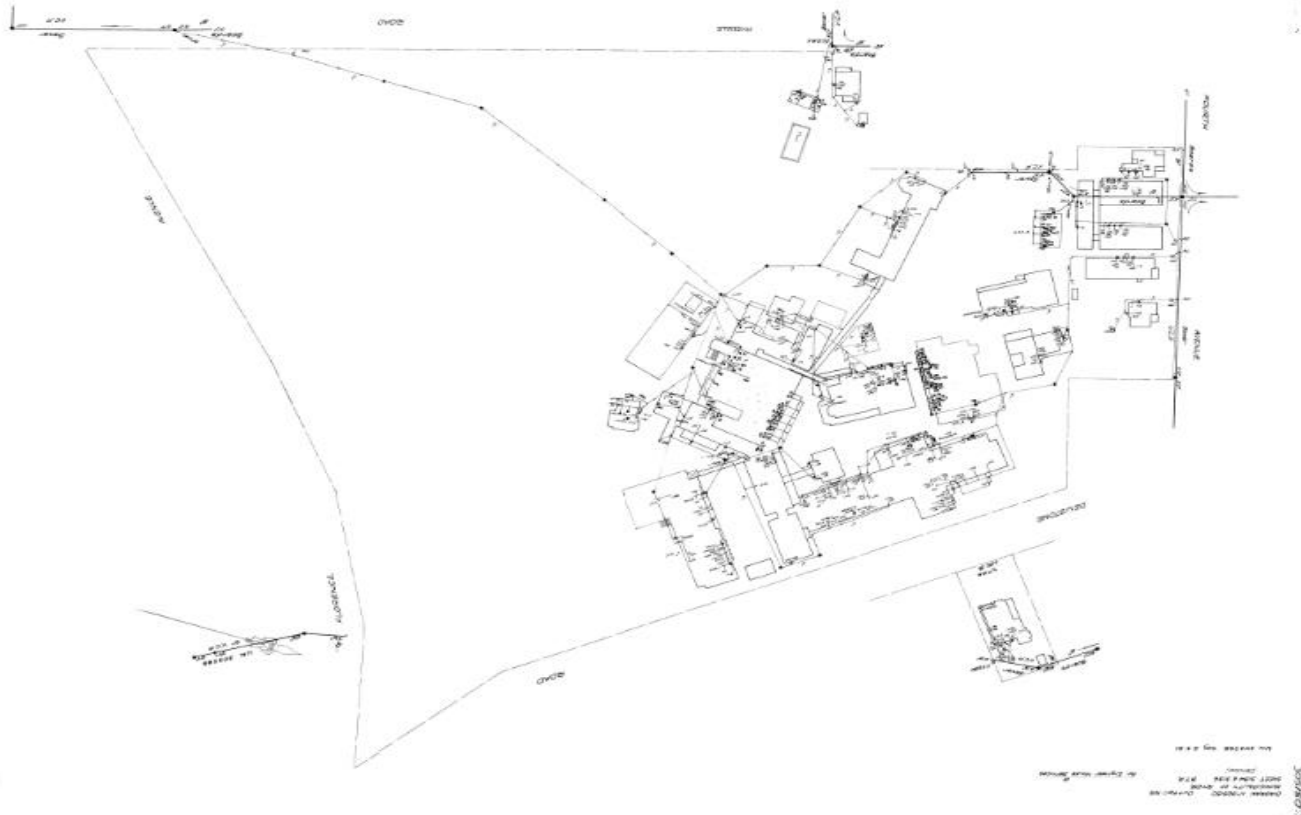
6.4 Ecologically Sustainable Design Initiatives

ESD measures are being considered to be implemented to achieve a target comparable with 5 Star Greenstar and the DGN058 framework. Refer to ESD consultant report for pathway.

Appendix A - Sydney Water – Sewer Services Diagram (SSD)

Sewer Service Diagram
Application Number: 1218651

**Sydney
WATER**



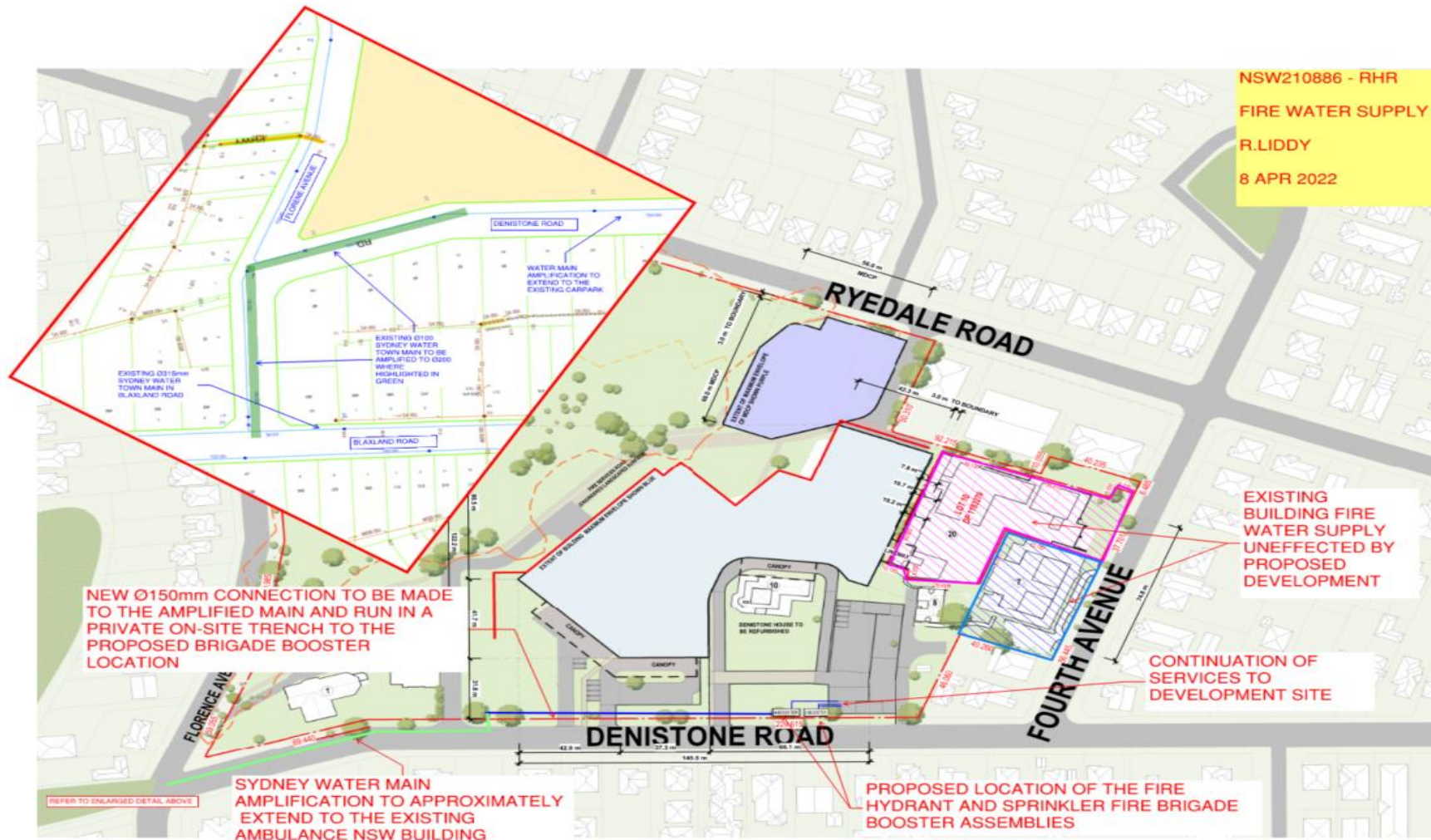
Appendix B - Sewer Drainage



Appendix C - Water & Gas Infrastructure



Appendix D - Water Supply Augmentation – Blaxland to Denistone Rd



Appendix E - Sydney Water Pressure and Flow – Denistone Rd

Statement of Available Pressure and Flow



Laura Skillicorn
33 Herbert Street
St Leonards, 2065

Attention: Laura Skillicorn

Date: 21/07/2021

Pressure & Flow Application Number: 1174395
Your Pressure Inquiry Dated: 2021-06-24
Property Address: Denistone Road, Eastwood 2122

The expected maximum and minimum pressures available in the water main given below relate to modelled existing demand conditions, either with or without extra flows for emergency fire fighting, and are not to be construed as availability for normal domestic supply for any proposed development.

ASSUMED CONNECTION DETAILS

Street Name: Denistone Road	Side of Street: West
Distance & Direction from Nearest Cross Street	103 metres South from Fourth Avenue
Approximate Ground Level (AHD):	100 metres
Nominal Size of Water Main (DN):	100 mm (Test Location B)

EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure	42 metre head
Minimum Pressure	18 metre head

WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	18
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	5	19
	10	13
	11	10
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the water main)	5	14
	10	7
Maximum Permissible Flow	11	4

(Please refer to reverse side for Notes)

For any further inquiries regarding this application please email :

swtapin@sydneywater.com.au

Appendix F - Sydney Water Pressure and Flow – Ryedale Rd

Statement of Available Pressure and Flow



Laura Skillicorn
33 Herbert Street
St Leonards, 2065

Attention: Laura Skillicorn

Date: 21/07/2021

Pressure & Flow Application Number: 1174402

Your Pressure Inquiry Dated: 2021-06-24

Property Address: 243 Ryedale Road, Eastwood 2122

The expected maximum and minimum pressures available in the water main given below relate to modelled existing demand conditions, either with or without extra flows for emergency fire fighting, and are not to be construed as availability for normal domestic supply for any proposed development.

ASSUMED CONNECTION DETAILS

Street Name: Ryedale Road	Side of Street: West
Distance & Direction from Nearest Cross Street	2 metres North from Fifth Avenue
Approximate Ground Level (AHD):	97 metres
Nominal Size of Water Main (DN):	100 mm (Test Location C)

EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure	45 metre head
Minimum Pressure	22 metre head

WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	21
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	5	24
	10	20
	15	13
	16	11
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the water main)	5	18
	10	13
	15	6
Maximum Permissible Flow	16	4

(Please refer to reverse side for Notes)

For any further inquiries regarding this application please email :

swtapin@sydneywater.com.au

Appendix G - Sydney Water Pressure and Flow – Fourth Avenue

Statement of Available Pressure and Flow



Laura Skillicorn
33 Herbert Street
St Leonards, 2065

Attention: Laura Skillicorn

Date: 21/07/2021

Pressure & Flow Application Number: 1174379
Your Pressure Inquiry Dated: 2021-06-24
Property Address: Denistone Road, Eastwood 2122

The expected maximum and minimum pressures available in the water main given below relate to modelled existing demand conditions, either with or without extra flows for emergency fire fighting, and are not to be construed as availability for normal domestic supply for any proposed development.

ASSUMED CONNECTION DETAILS

Street Name: Fourth Avenue	Side of Street: North
Distance & Direction from Nearest Cross Street	6 metres East from Ryedale Road
Approximate Ground Level (AHD):	91 metres
Nominal Size of Water Main (DN):	150 mm (Test Location A)

EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions		
Maximum Pressure	51 metre head	
Minimum Pressure	28 metre head	
WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	28
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	5	31
	10	30
	15	28
	20	26
	26	23
	30	21
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the water main)	40	14
	5	27
	10	25
	15	23
	20	20
	26	17
Maximum Permissible Flow	30	14
	40	7
Maximum Permissible Flow		
43		

(Please refer to reverse side for Notes)

For any further inquiries regarding this application please email :

swtapin@sydneywater.com.au