Health Infrastructure NSW

CFMHU – Concord Forensic Mental Health Unit

Design Development Report - Hydraulic and Fire Services

Reference: CFMH-HF-RPT-00004

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1. Executive Summary

The Hydraulic and Fire protection services Design Development (DD) report has been developed to form part of the Design Development for the Concord Hospital, Forensic Mental Health Unit (CFMH) project.

The facility has been architecturally designed and serviced as a standalone building, with services connecting into/fed from the existing internal campus infrastructure serving the existing Concord Hospital campus including the mental health precinct.

The key hydraulic and fire protection strategies for the CFMH development are summarised as follows.

1.1 Hydraulic Services

1.1.1 Domestic Cold-Water Supply

A new 80mm connection into the internal campus domestic water supply infrastructure will be made to supply the facility. The facility will be provided with a dedicated sub-meter and backflow prevention. Onsite pressure and flow testing indicate the requirement for pressure boosting pumps. As such a dual vertical inline pump set will be provided within the external plantroom to serve the building. No new independent connection is anticipated to be required to the Sydney Water authority water mains on Hospital Road.

1.1.2 Domestic Hot-Water Supply

Domestic hot water (DHW) shall be distributed from the centralised hot water plant located within the Level 2 plant room and reticulate via a flow and return system.

As part of the ESD initiatives, the DHW system design has been selected as air to water heat pumps with buffer storage tanks complete with heating elements to cater to lower COP during winter periods.

Boiling and chilled water units shall be provided to spaces nominated by NBRS's Room Layout Sheets (RLS).

1.1.3 Sanitary Drainage

A new connection into the existing 150mm internal sanitary drainage asset located on the main distribution road to the east of the site has been reviewed and confirmed that the sewerage can be drained via gravity without the need for a sewer pumping station.

Sanitary drainage shall be designed using aerial drainage principles to effectively minimise material use.

To facilitate on-site cooking, a grease arrestor shall be provided to serve the kitchen and servery spaces as required by Sydney Water authority.

1.1.4 Stormwater

Stormwater shall be collected from roof decks, gutters, balconies and terraces via combination of gravity and siphonic rainwater downpipe systems.

Siphonic drainage shall be used to drain the flat concrete roof decks. Stormwater from graded roofs shall be drained via a conventional system. A series of downpipes shall drain any non-trafficable rainwater to the rainwater tank for reuse for irrigation.

A nominal 36kL inground rainwater tank will be provided as per ESG requirements. Harvested rainwater will only be used for irrigation purposes.

All other stormwater shall connect directly to the external, inground stormwater drainage network (documented by Civil) via stormwater network and pits.

1.1.5 Natural Gas

Due to the reduced carbon aspirations of Health Infrastructure, the projects intention is to decarbonise the facilities footprint as far as financially practicable. One of the largest means of reducing carbon is the omission of fossil fuels (natural gas) usage.

With the electrification of the new building's hot water plant and kitchenette appliances, a natural gas system will not be extended to the new facility.

1.1.6 Fire Hose Reels

Fire hose reels shall be provided to achieve coverage to the building compliant with AS2441 requirements.

In all patient accessible areas, hose reels shall be located in lockable cupboards to protect from tampering, vandalism and harm to building occupants.

A dedicated branch shall be taken from the potable water supply to serve the fire hose reel system only.

1.2 Fire Protection Services

1.2.1 Fire Hydrant and Sprinkler Systems

Based on the assessment of the latest hydrant pressure and flow test results received, the existing private infrastructure is not capable of meeting the full required demand of two hydrants operating simultaneously.

As combined fire hydrant and sprinkler tank will be provided to furnish the aggregate fire flows. The full 60 minute sprinkler and drencher demand will be supplied from the tank In conjunction with the automatic inflow offset reduced volume (5L/s) portion of the hydrant demand will be fed from the main (15L/s) and the remainder will be stored in the tank.

A diesel relay booster pump shall be provided to boost the mains supply into the fire tank located in the plantroom on level 02 in accordance with FER to satisfy automatic infill requirements.

A combined suction line will reticulate from the tank in parallel to the pump house and booster assembly suction outlets located next to the private road frontage.

Downstream of the tank a diesel electric fire pumpset shall be provided to serve the sprinkler and hydrant system. Downstream of the combined fire pumps the hydrant and sprinkler systems will split before exiting the pump house as separate systems.

Each level of the building will be fitted with a monitored subsidiary stop to permit alterations without affecting other occupied floors. Each floor will be provided with a flow switch(s) with flow check facility to provide indication of the fire affected level at the base building fire indicator panel and allow remote testing of the system.

Fire hydrants will be located throughout the building within fire stairs and intermediately on floor where required to achieve full coverage of the entire building.

Drenchers are required and provided as per the locations nominated by the Fire Engineer and BCA Consultant advice to protect openings exposure via egress paths.

1.2.2 Fire Detection and EWIS Systems

A new, dedicated fire indicator panel (FDCIE) and dedicated SSISEP (EWIS) will be provided for the CFMHU building. The proposed strategy is to provide a high level interface to the existing mental health precinct wide dry fire system. The brigade callout for the CFMH is proposed to be via the fire panel and ASE within building 109 in line with the current campus strategy.

The EWIS system shall omit speakers from sleeping spaces due to the nature of the building. This will be addressed as part of a performance solution.

Manual Call points and Warden Intercom Phones (WIPs) will only be provided to the fire indicator panel cupboard, admin staff and nurse reception as part of a performance solution to moderate vandalism.

Mimic panels shall be provided at nurse/staff stations for notification and alert purposes.

1.2.3 Portable Fire Extinguishers

New, dedicated portable extinguishers shall be provided in staffed areas and within lockable FHR cupboards.

Fire blankets shall be provided within IPU kitchenettes for immediate response.

1.3 Environmental Expectations

The new facility will be subject to the recently developed HI self-certified ESD process. Several strategies that could be embedded within the ESD Framework have been evaluated through the Whole of Life assessment and the following water conservation and renewable energy measures have been incorporated within the design.

- Reducing town main water supply by:
  - Harvest and reuse building rainwater for irrigation only.
  - Harvesting and/or recirculating fire services test water for re-use within the fire tank or irrigation system.
- Reducing water usage at fixtures and fittings where possible through WELS rating efficiencies.
- Reducing water usage across the site by using:
  - Smart metering and monitoring of water use throughout the building
  - Pressure reducing devices on system reticulation
  - TMV hub monitoring systems to measure temperatures in lieu of open tap testing
- Reducing energy usage through selection of high coefficient of performance (COP) heat pump Domestic hot water plant. Selected with low global warming potential refrigerants such as R531a.
- Using sustainable/recyclable materials such as piping and trench backfill where appropriate.

1.4 Anti-ligature Requirements

All considerations must be given to provide mental health facility specific anti-ligature equipment, fixtures and fittings including tapware, detection and sprinklers, lockable access to equipment and cupboards such as fire hose reels, manual call points and warden intercom phones.

Consideration has been given to anti ligature design including reference to Australasian Health Facility Guidelines – mental health.

2. Acronym Definition

Project-specific definitions:

AusHFG	Australasian Health Facility Guidelines
CFMH	Concord Hospital Forensic Mental Health
ERG	Expert Reference Group
ESG	Engineering Services Guideline
LHD	Local Health District
SLHD	Sydney Local Health District
HI NSW	Health Infrastructure NSW
CSP	Clinical Services Plan
PUGs	Project User Groups
RLS	Room Layout Sheet
SoA	Schedule of Accommodation
SWMHIP	State Wide Mental Health Infrastructure Program

Hydraulic and Fire services definitions:

AC	Asbestos Cement Pipe
AFSS	Annual Fire Safety Statement
ASE	Alarm signalling equipment
BCA/NCC	Building Code of Australia/National Construction Code
COP	Coefficney of Performance
CW	Cold Water
DICL	Ductile iron cement lined
DtS	Deemed to satisfy
EWIS	Emergency Warning and Intercommunication System (also SSISEP)
FDCIE	Fire Detection Control and Indicating Equipment
FER	Fire Engineering Report
FEBQ	Fire Engineering Brief Questionnaire
FH	Fire Hydrant
FHR	Fire Hose Reel
FIP	Fire Indicator Panel
FRNSW	Fire Rescue NSW
H&F	Hydraulic and Fire
HW	Hot Water
IL	Invert Level
NCC	National Construction Code
MCP	Manual Call Point
mPVC	Polyvinylchloride, Modified
uPVC	Polyvinylchloride, Unplasticised
WIP	Warden Intercom Phone

3. Introduction

3.1 Project Overview

The Concord Hospital, Forensic Mental Health Unit (CFMH) project is part of the State Wide Mental Health Infrastructure Program (SWMHIP) and forms part of the $700m capital works component of a broader series of reforms across the state's mental health services. This project focuses on patient-centric models of care, engagement with consumers and communities and best practice service deliveries with improved outcomes for consumers, families and stakeholders.

The project scope is creating a new facility within the existing Concord Hospital Campus, including:

- 18 medium secure forensic beds
- 24 low secure forensic beds

The project scope also includes the demolition of existing 1950's building 29 (Fire Services building).

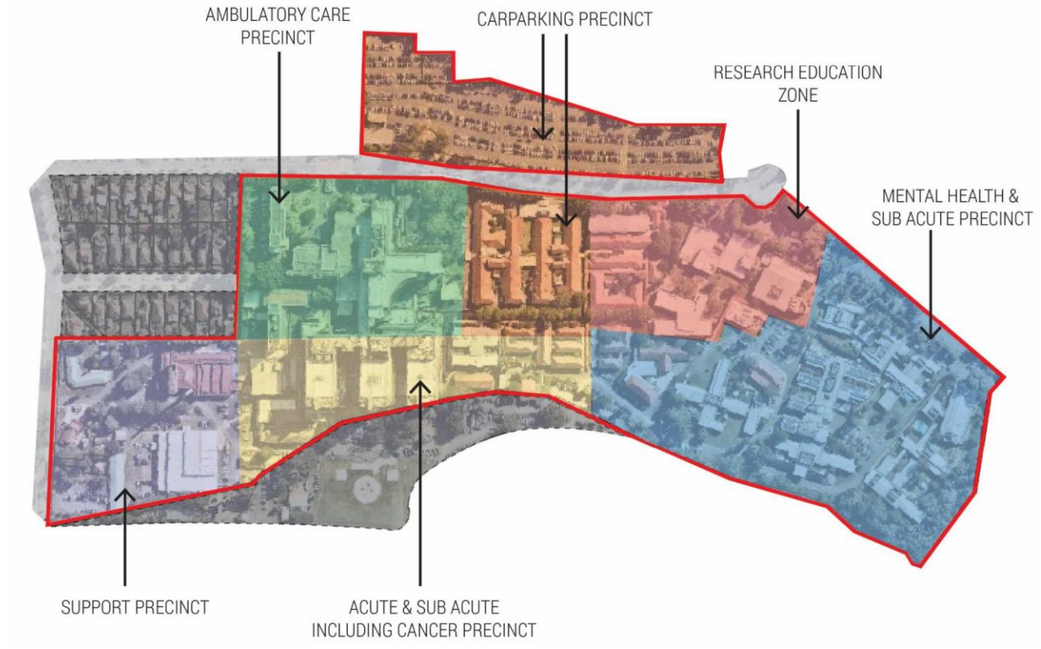


Figure 1 - Concord Hospital - Zonal Master Plan

3.2 Site Location and Adjacencies

The Site is located within the Concord Hospital grounds, and adjacent the Concord Centre for Mental Health, which hosts a range of services including:

- Admission Office
- Acute Mental Health Units
- Child & Adolescent Unit
- Intensive Psychiatric Care Unit
- Gender separated High Dependency units
- Older Person Psychiatric Unit
- Rehabilitation Unit
- Extended Care Unit
- Electroconvulsive Therapy (ECT) Clinic.

The Concord Repatriation General Hospital (Concord Hospital) is a large multifaceted health precinct, located in the western sector of the Sydney Local Health District (SLHD). It is located in the City of Canada Bay Local Government Area (LGA) in Sydney, NSW. Concord Hospital operates as a general hospital, building on its proud heritage of caring for the Veteran community, it now services the local communities of Concord, Strathfield, Burwood and beyond.

As a 750-bed, teaching hospital for the University of Sydney, the facility offers a comprehensive range of specialty and sub-specialty services, many of which are recognized as centres of excellence worldwide.

Supported by these services is the Concord Centre for Mental Health, a modern purpose-built facility for inpatient care with additional comprehensive patient support services including admission and assessment, acute and rehabilitation adult services, services for older people and extended adolescent care 24/7.

In addition, the ANZAC Health & Medical Research Institute is located onsite, undertaking research into disorders of lifestyle and aging. The Institute recognises the contribution that the nations Veteran's and War Widows have made in establishing the society we have today.

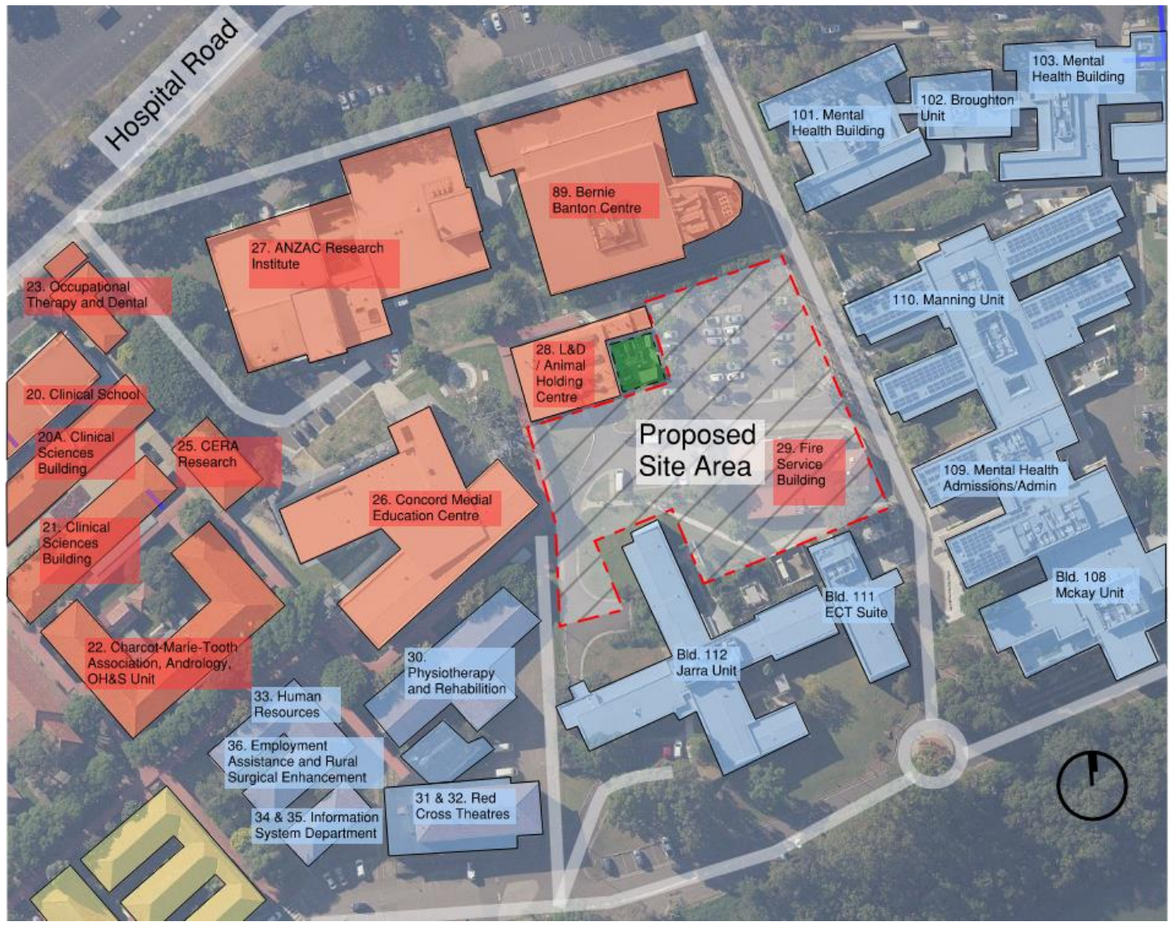


Figure 2 – Forensic Mental Health Unit - Selected Site Area

3.3 Purpose of Design Development Report

This report has been developed for our client Health Infrastructure (HI) to form part of Design Development for the CFMH project. The focus of the report is to outline the design's key concepts, principles and objectives and inform the subsequent development of construction documentation.

The contents of this document should be read in conjunction with the documents produced by the Architect and other consultants for all other disciplines.

3.4 Source of Information

The following sources of information have been used in preparation of this report:

- Architectural Concord Master Plan Report V0.5 dated October 2022, prepared by NBRS Architecture.
- Dial Before You Dig (DBYD)
- Functional Brief - Concord Low and Medium Secure Unit, version 3 dated August 2022.
- Level and Details Survey prepared by LTS (33907 020DT), dated 15/08/2022.
- Architectural DD Layouts dated 16/08/2023.
- Desktop study
- HI guidelines and documentation.
- Concept BCA Report dated 16/01/23
- Fire Engineering input
- Hydraulics Site Services Plan dated 25/11/19
- CFMH Fire Systems Due Diligence Report version 01 dated 09/05/23
- Sewer Investigation Report dated 06/03/23
- Hydrant Flow Test Results dated 25/03/23

It is noted the sources of information used in the preparation of this report do not provide a complete set of documentation.

3.5 Scope and Limitations

This report covers the following disciplines and is to be read in conjunction with all accompanying documentation provided by other disciplines:

a. Hydraulic Services
b. Wet and Dry Fire Protection Services

The report includes:

a. Summary of the basis of design, including any design assumptions, brief, codes and standards.
b. The engineering discipline's specific design outcomes, including any items where additional information is required.

3.6 General Assumptions

As per the BM+G Concept BCA Report dated 16/01/23 , the building characteristics and classifications are as follows (TBC pending final updated DD BCA Report):

BCA Classification	**Class 9a (Health Care)**
National Construction Code	2022
Rise in Storeys	3
Storeys Contained	3
Type of Construction	Type A Construction
Importance Level (Structural)	2
Effective Height	Less than 25m
Max Floor Area	TBC by Architect
Maximum fire compartment size	2000m2 < & < 5000m2

3.7 Stakeholders Consultation

The following consultations have taken place in developing the design to this point:

- Meeting with SLHD held 19th October 2022.
- ERG#1 Architectural and Services Presentation – held 26th October 2022.
- Meeting with SLHD held 15th December 2022.
- RFIs sent to SLHD (refer to OveArup-GCOR-000002 & OveArup-RFI-000001).
- Schematic design ERG Services Meeting Scheduled for 22nd February 2023
- Scheduled Coordination Meetings
- PUG Meetings held on 19/04/2023, 03/05/2023, 17/05/2023
- Developed Design ERG Services meeting held 24/08/23

4. Existing Hydraulic & Fire Services Infrastructure

This section describes existing utility and private infrastructure located in proximity of the new Concord Hospital Forensic Mental Health Unit area. The approximate location of utilities services has been determined based on survey data, dial before you dig information works and As-Built drawings.

4.1 Domestic Cold Water

4.1.1 Existing Authority Infrastructure

Existing Sydney Water's water mains are available running along Hospital Road as follows:

- Hospital Rd – 150mm uPVC main.
- Hospital Rd – 200mm uPVC main.

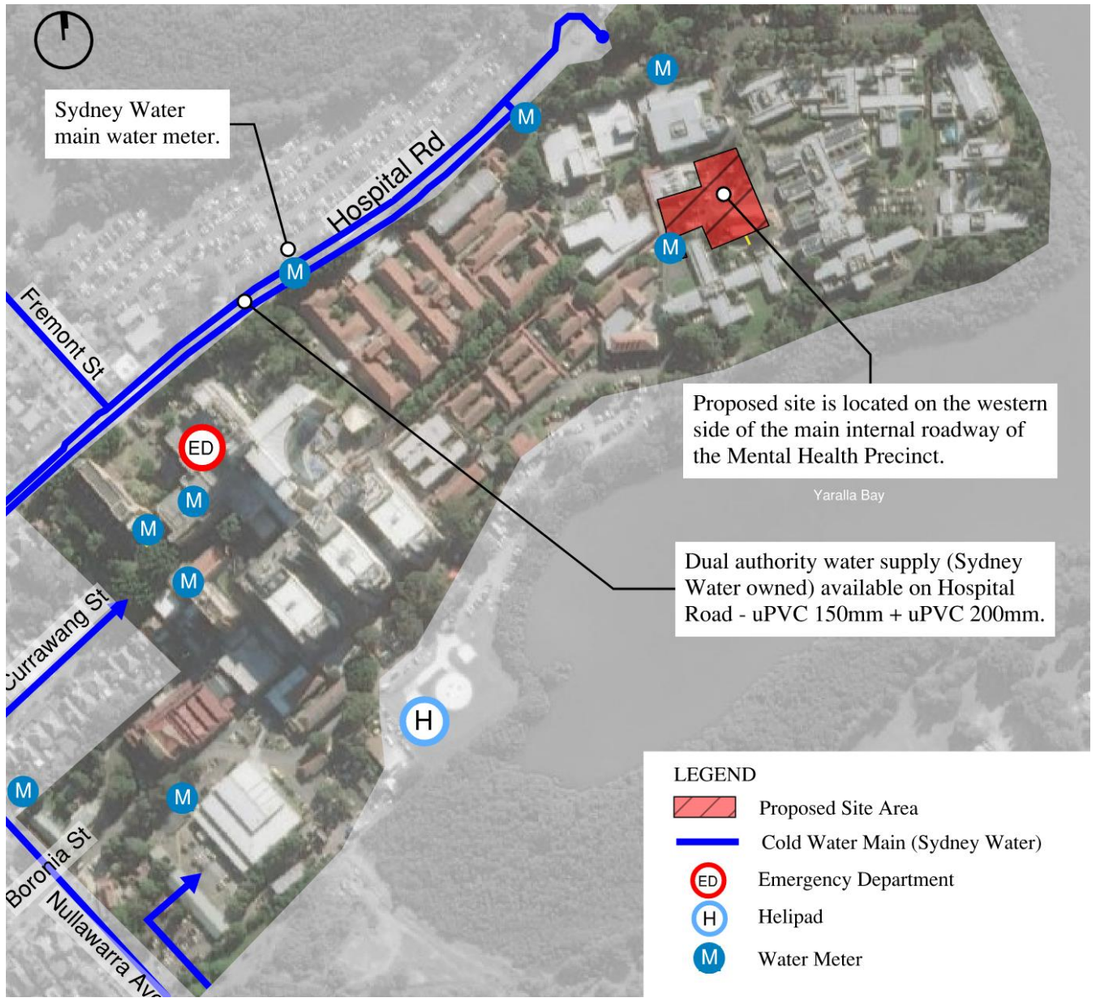


Figure 3 - Cold water authority infrastructure serving the site

Based on onsite pressure and flow testing, it is assumed, the Authority's water main serving the Concord Hospital Campus to be of sufficient size and able to support the new redevelopment. A Water Services Coordinator (WSC) shall be engaged for the project to lodge a feasibility application.

Refer to **Appendix A.4** for pressure & flow results at each of the water mains provided by Sydney Water.

4.1.2 Concord Hospital Infrastructure

The Concord Hospital site has an internal domestic cold-water infrastructure serving the domestic cold water and hydrant services to the site, supplied from dual authority water mains on Hospital Road. Based on site investigations the size of the ring main surrounding the selected site area appears to be 150mm. (This is to be verified on site as it is not documented on the survey results). Arup have received the onsite flow test results which informed the approximate pressure and flow that can be expected through this ring main. Arup have undertaken a load assessment for the proposed CFMH and it is envisaged that the estimated peak water demand can be furnished by the existing private cold water infrastructure. Further information with regards to the pressure and flow of the exact location of connection was requested from SLHD and should be further investigated at the next stage to confirm the suitability for connection to serve the new development.

Refer to **Appendix A.5** for onsite pressure and flow test results.

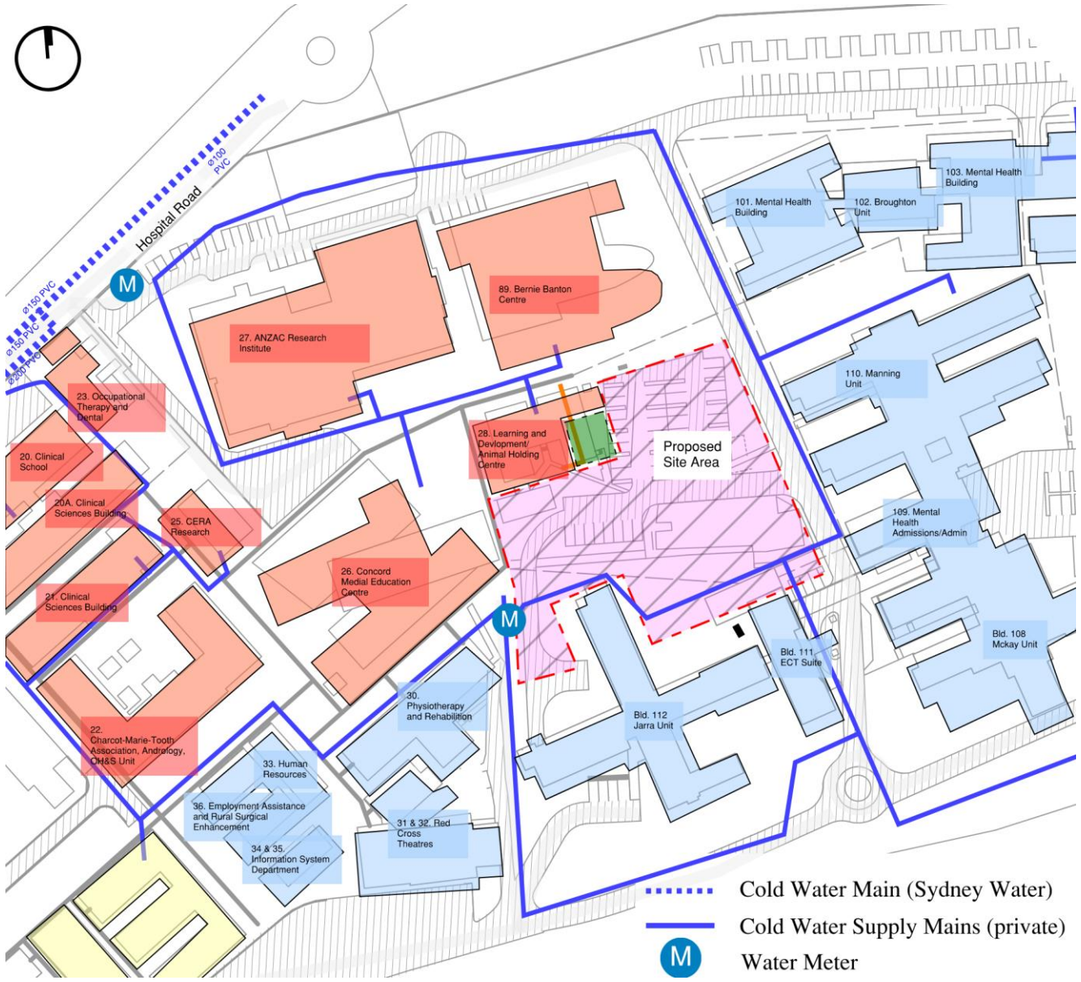


Figure 4 – Concord Hospital campus cold water infrastructure surrounding the site

According to the survey data (33907 020DT), there is an existing water service that seems to intersect with the proposed building footprint. However, it does not seem to supply other buildings, suggesting that demolition may be the only necessary action. The specific invert levels and size of the water main are not clearly defined in this survey. Therefore, further surveying of the existing water mains will be essential in the next phase to ascertain the scope of the demolition work required.

4.2 Sewer Drainage

4.2.1 Existing Authority Infrastructure

Existing Sydney Water's sewer mains are available running along adjacent streets at the locations shown below:

- Hospital Rd – 225mm sewer main.
- Along the southern site boundary – 225/300mm sewer main.

Figure 5 – Sewer drainage authority infrastructure serving the site

Based on discussions with the project team and the SLHD, we understand that upgrades to the Sydney Water's sewer pumping station or the retaining tank have been recently requested by Sydney Water as part of the Concord Hospital Stage 1 works. It is expected that the upgrade works have accounted for extra capacity in the system to serve also other future developments.

However, further investigation will be required to assess expected future capacity of the system after the upgrade works, in order to confirm ability of the authority infrastructure to serve the new mental health building without any further upgrade. Arup have requested SLHD the as-built documentation/reports of the upgrade works to confirm available capacity. Final confirmation with the authority shall be carried out by a Water Services Coordinator (WSC).

4.2.2 Concord Hospital Infrastructure

Existing 150mm sewer infrastructure is available local to the new building site, as shown indicatively on the image below:

Figure 6 – Concord Hospital campus sewer infrastructure surrounding the site

Calculations indicate the increase in sewer demand is minor, and that the existing 150mm sewer line is capable of taking on the additional load from the new CFMH building.

Survey information shows that a gravity connection is achievable.

The survey data (33907 020DT) indicates that existing drainage services will intersect with the proposed building footprint. It is uncertain which buildings these services are currently serving, but it is plausible that they could be connected to the Jarra unit. Therefore, it might be necessary to make minor diversions, particularly since this drainage system needs to be retained (see Figure 6). The precise route of the pipes is not clearly depicted in the survey, so further surveying of the existing sewer mains will be essential in the next phase to determine the extent of the diversion work required.

A CCTV inspection report of the existing drainage pipes servicing the site was provided and the report concludes and confirms that the existing pipework is in an operable condition and is acceptable for continued use.

4.3 Natural Gas

No Natural Gas is to be provided to the building to meet ESD electrification requirements.

4.4 Existing Fire Hydrant System

The Concord Hospital Campus has multiple fire hydrant mains, each servicing a different individual or grouped portions of the site. Several boosters and hydrant landing valves are located around the site as per Figure 7 below. A hydrant pressure and flow test was conducted near the booster next to building 26 as shown in Figure 8. The exact location of the hydrants tested was unclear however results infer that the existing infrastructure is not capable of providing the required flow or pressure to serve the CFMH building.

Refer to **Appendix A.5** for pressure and flow test results.

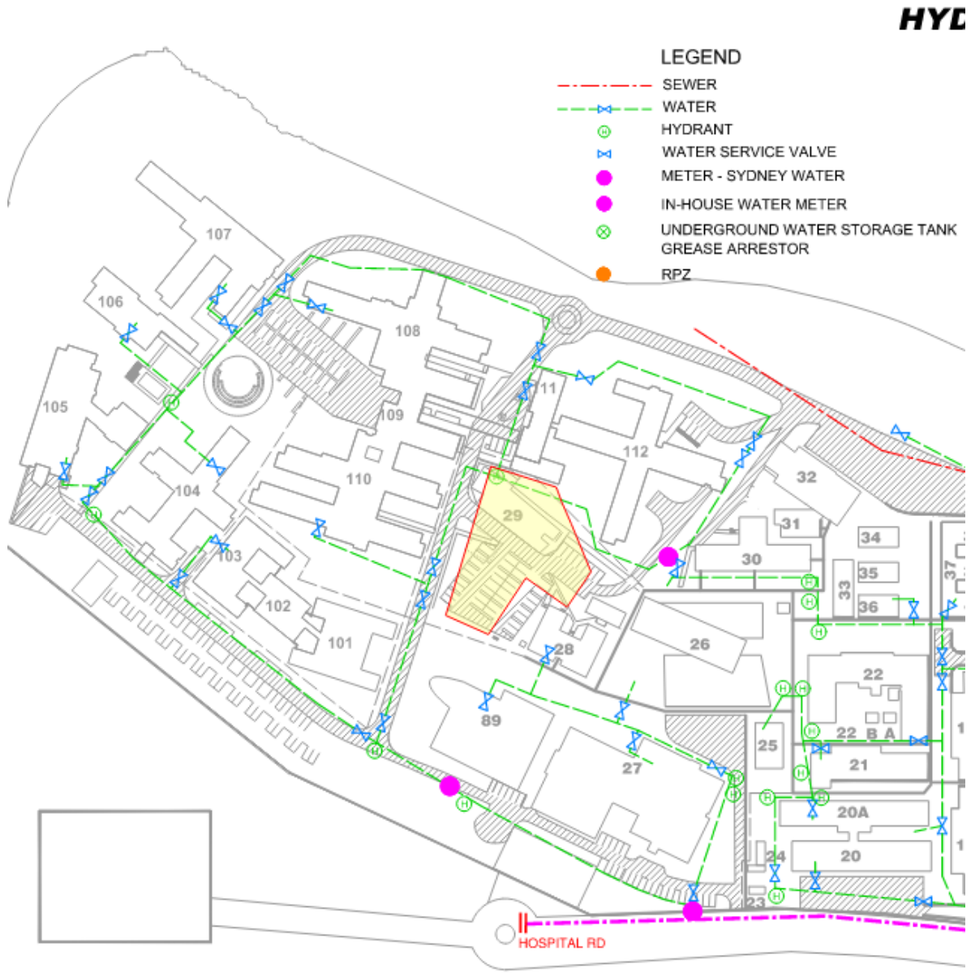


Figure 7 - Existing Cold Water and Fire Hydrant Infrastructure

Figure 8 - FRSNW Hydrant Booster and pump-set serving building 26

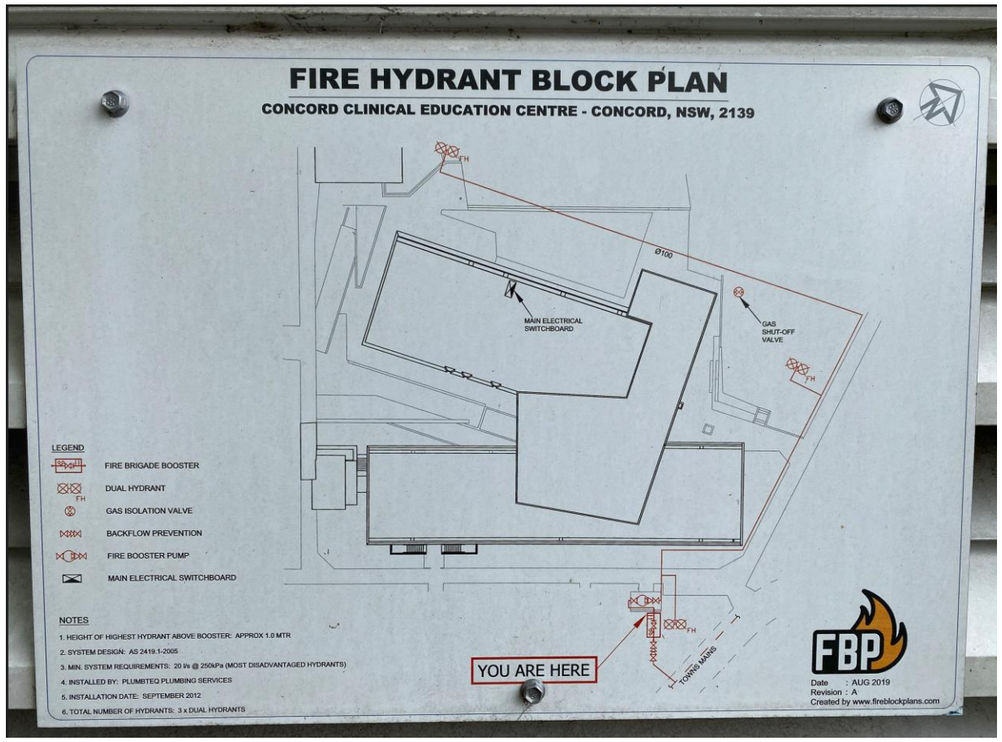


Figure 9 - Fire Hydrant Block Plan, building 26

Figure 9 shows the block plan of building 26 which indicates an existing fire hydrant booster assembly and diesel booster pump also located within the area, It is important to note that 3 separate tests results were provided, one of which was the pressure and flow through the hydrant when the diesel pump was operating. It is assumed that this pump is only used to achieve compliant pressures for building 26 and does not form part of the site wide ring main system. Therefore, the results from the non- aspirated flow condition were considered when reviewing the capacity of the existing system and was deemed to be insufficient to satisfy CFMHU demands. Refer to section 6.4 for further detail on the estimated fire water demand and the proposed fire water supply strategy.

A new hydrant system including booster, pumps and tanks shall be provided to serve the building.

4.5 Existing Dry Fire Services Infrastructure

Arup was provided with a fire systems due diligence report dated 09/05/23 which details the existing dry fire system in place servicing the Concord Hospital Campus. A sitewide dry fire services network is provided between the various existing buildings within the campus, with the main Fire Indicator Panel (FDCIE) located in a dedicated fire control room within building 5.

Based on the report, the mental health precinct has its own main fire indicator panel (FDCIE) and ASE facility within building 109. The buildings to the west of the campus form a sub ring main complete with fire panels within each building as shown in figure 10. Furthermore, the hospital is in the process of upgrading all the fire panels within the mental health precinct to Vigilant MX1 panels, it is assumed that these new panels will have sufficient capacity to integrate the new Mental Health building however further investigations will be required at the next stage to confirm this. The fire panel within the main fire control room has a low level interface to the fire panel located within the mental health precinct. This panel only provides a notification to the LHD team. Brigade call out for the mental health precinct is via the fire panel and ASE located within building 109 .

The existing fire panel communications is achieved via 2 core fire rated copper cables through the communications underground network.

The new CFMH building will be provided with a high level interface to the fire panel within building 109.

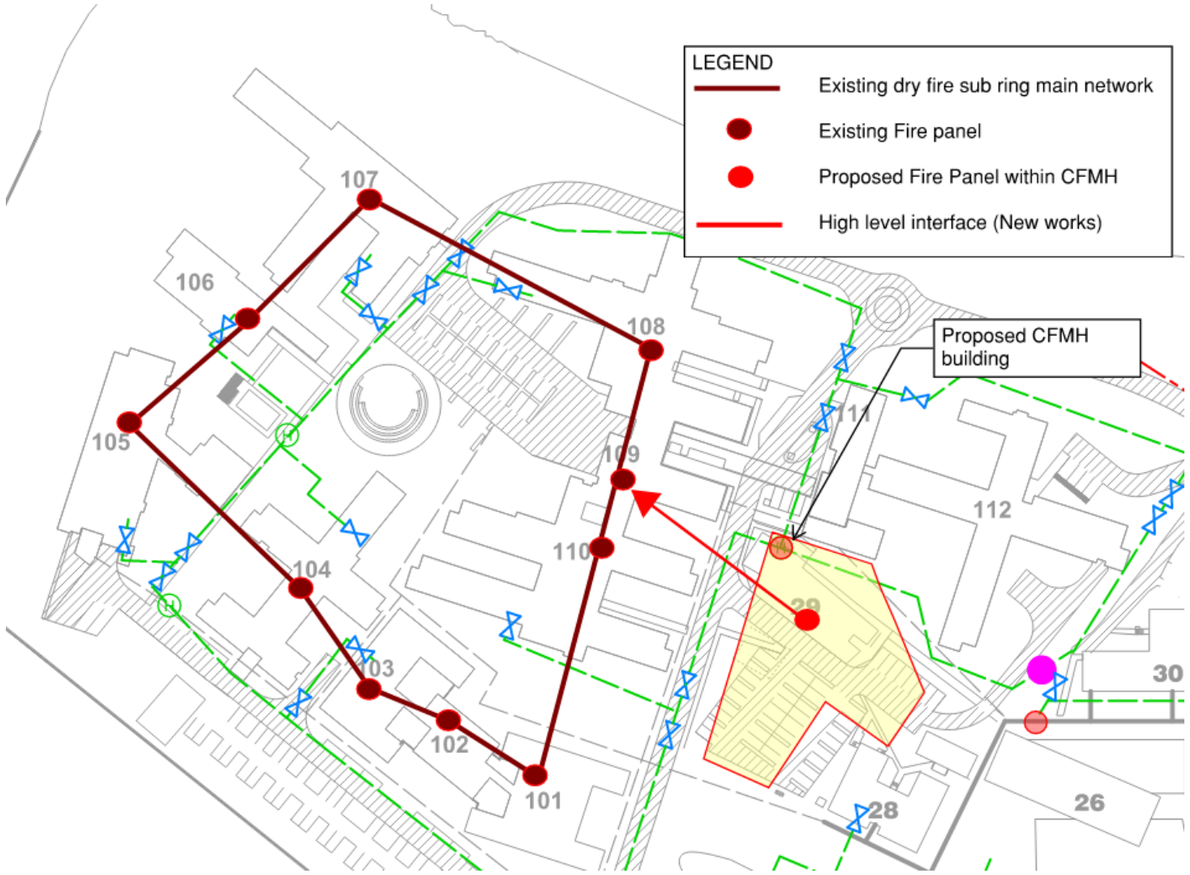


Figure 10 – Existing Dry Fire Network and Proposed Works

5. Hydraulic Services

The following section provides a description of the design criteria, systems and schematic design considerations for hydraulic services.

5.1 Legislative Requirements & Guides

The following codes and standards will form the basis of the hydraulic services design:

a. Building Code of Australia (BCA) / National Construction Code (NCC) 2022
b. Plumbing Code of Australia 2022
c. AS 3500.1:2021 – Plumbing and drainage Part 1: Water Services
d. AS 3500.2:2021 – Plumbing and drainage Part 2: Sanitary plumbing and drainage
e. AS 3500.3:2021 – Plumbing and drainage Part 3: Stormwater drainage
f. AS 3500.4:2021 – Plumbing and drainage Part 4: Heated water services
g. AS 2441- 2005 Installation of Fire Hose Reels
h. Canada Bay City Council requirements
i. NSW Health Infrastructure: Standards, Policies, Procedures and Guidelines (SPPG)
j. NSW Health Infrastructure: Engineering Services Guidelines dated 12 December 2022
k. NSW Health Infrastructure: Design Guidance Note 001 to 040 including No. 006 General Design Principles
l. Australian Health Facility Guidelines Part E: Building Services and Environmental Design 2016 (AusHFG)
m. Hospital acquired infections – Engineering down the risk – Handbook – HB 260 – 2003
n. International Health Facility Guidelines (iHFG)

5.2 Design Criteria

A summary of the key hydraulic design criteria is as follows:

Item	Parameter
Rain water drainage	Intensity: 260mm/hr – 5min 1:100-year event CSIRO report, “Roof drainage” by K.G Martin. Australian Rainfall and Runoff AS3500.3 Local council requirements Gutters to incorporate measures to prevent failure from rubbish, leaves and silt with minimal maintenance. Details of the gutters and safety overflow will be shown on architectural plans and indicated on hydraulic plans, including size and depth of gutters, overflows, etc. Overflows are to provide for 100% free discharge for a 1 in 100 year ARI
Domestic Hot Water Delivery Temperature	Hot water flow and return distribution: 60ºC - 65ºC *Patient use / access areas* • Personal hygiene and hand washing basins: 38 - 40.5 ºC with 43.5 ºC thermal shutoff for children, 40.5 - 45 ºC with 46 ºC thermal shutoff for adults. • Kitchen Sinks and laundry tubs: 45 - 50 ºC with 51 ºC thermal shutoff for adults. • Beverage preparation: boiling water 100 ºC • Automatic clothes washer: Cold water supply only *Non-patient use (staff use only)* • Beverage preparation: boiling 100 ºC • IPU Sinks for manual dishwashing: 50ºC max ** • Cleaner's sink/laundry tub: 60ºC min • Automatic dishwasher: 60 - 70ºC at inlet • Automatic washer/disinfector: 60 ºC min at inlet • Washing machine: cold water only • Personal hygiene: 50ºC max The above temperatures comply to Heath Infrastructure ‘Water – Requirements for the Provision of Cold and Heated Water’.
Working velocities in water services pipes	Max 1.5 m/s due to noise sensitivity for domestic cold water and 0.6 to 1.0 m/s for domestic hot water, based on HI Engineering Services Guidelines.
Maximum operational water pressure	500kPa
Minimum operational water pressure	250 kPa
Cold water average supply temperature	15ºC
Velocities within storm-water drainage	Self-cleansing velocities between 0.75m/s and 2m/s
Hot water plant	Storage vessels – heat loss is not to exceed values within Table A1 of AS4692.2 Primary pipe work between heat source and storage vessels is to have 25mm Rockwool insulation. Heating plant minimum efficiency 80% or Coefficient of Performance (COP) > 4.0
Fire Hose Reels	0.33L/s @ 230kpa minimum, located throughout building to provide full coverage in compliance with AS 2441-2005

5.3 Description of Systems

The following list of systems is described in the subsequent sections:

a. Domestic cold water supply
b. Domestic hot water supply
c. Rainwater re-use supply (Non – potable water)
d. Sanitary plumbing and drainage
e. Rainwater roof drainage (Gravity and Siphonic)
f. Fire hose reel system.

5.4 Domestic Cold-Water

5.4.1 Domestic Cold Water Supply

The domestic cold water (DCW) service will be supplied from a new 80mm connection off the existing Ø150mm campus mains adjacent to the site. Based on onsite test results, it is assumed the existing Ø150mm

incoming main is sufficient to meet the new domestic cold water loads. No new connection is anticipated to be required to the authority water mains on Hospital Road.

5.4.2 Domestic Cold Water System

The incoming domestic cold water will pass through a water meter assembly and backflow prevention devices to serve the building. It will then pass through pressure boosting pumps to deliver water at operable pressures to all fixtures and fittings as required.

The proposed mental health facility does not have any critical acute services and the campus water supply servicing the site is classified as reliable, therefore dedicated water storage is not required and will not be provided.

The cold water booster set along with the RPZD and filters will be collocated with the fire services pumpsets in the plantroom located on ground floor external to the building. Note that the FHR system will be fed from the cold water system and as such it forms part of the fire fighting equipment. All booster pumps (duty and standby) are to be low noise, multi-stage, variable speed based on the load profile.

A cold water Ringmain was considered as per the ESG guidelines however was not adopted as the facility is not considered to have critical services. The design was presented to the ERG for endorsement and encountered no objections. Potable water shall be supplied with a dead leg system that diminishes in size with isolation valves within the ceiling to allow partial shutdowns for future connections. The isolation increments will be 100%, 75%, 50% and 25% of the floor area. These isolation valves will be provided with access panels when a set ceiling is installed below the valve at a future stage.

SLHD have expressed their preference to use Cisternless WC's (flush valves) throughout the new CFMH building to reduce patient tampering and to align with other similar facilities in the SLHD. The cold-water system has therefore been sized to accommodate this additional flow requirement.

The incoming mains water supply will provide water to fixtures, fittings and hose taps requiring potable water, fire protection systems, mechanical cooling systems and make-up to the recycled water systems during times of insufficient rainfall yield. DCW supplied main plant equipment and high use areas will be individually metered and monitored by the BMCS.

Whilst water quality from Sydney Water mains is acceptable for drinking purposes, a 30µm auto-backwash screened filter will be provided due to the extension from a private main and the unknown condition of the mains. This filter will be equipped with pressure gauges at both the inlets and outlets, allowing for easy monitoring of plant operation via the BMCS.

Isolation valves will be provided at each branch line off the main reticulation pipework for each group of fixtures and individual mini stop valves for individual fixtures and tapware shall be provided to allow isolation for maintenance without undue affect to the other fixtures. Refer to section 5.5.1 for the isolation methodology within patient ensuites.

All new fixtures and fittings will be as specified in the architectural documentation. All new pipework is to be copper type B.

Backflow prevention to be provided as per AS3500.1, specifically RPZDs to each plant room area, wash down taps, and connections to mechanical plant and irrigation system. Water downstream of this shall be defined as non-potable water with appropriate signage provided inline with the HI ESG.

5.5 Domestic Hot-Water

5.5.1 Domestic Hot Water Supply

The Domestic Hot Water (DHW) system will be installed in accordance with HI NSW requirements for the provisions of cold and hot water.

Domestic hot water (DHW) will be distributed from the centralised plant located at the south level 02 plantroom via a flow and return system. DHW will be supplied to fixtures and fittings as required via the main hydraulic services riser.

Circulating hot water plant delivery temperatures will be between 60°C - 65°C.

The flow and return mains within the building will be provided with a system that diminishes in size, which allows for flexibility, ease of maintenance and system reliability.

New monitored thermostatic mixing valves (TMVs) will be provided to all new fixtures that require warm water in accordance with the statutory codes. The TMV's shall be mounted at 1500mm AFFL for maintenance purposes. The TMV shall be installed in a rebated lockable, hinged, stainless steel wall boxes recessed into wall or built-into cupboards to facilitate servicing and accessible from corridors or staff areas. Monitoring is to be accessed via a web-based interface for temperature monitoring and linked to BMCS.

A method for manual water shut-off/isolation to patient ensuites is required, in line with AusHFG guidelines. This is to reduce the risk of inappropriate use and/or flooding. The shut-off method is proposed to be via the thermostatic mixing valves, each of which will shut-off up to 2 x ensuites. The water supplies will be configured such that both the hot and cold water services to the ensuite(s) can be isolated by a staff member solely from the thermostatic mixing valve cabinet. This will require accessing the locked cabinets and manually switching the valves off. We understand this has been the approach in other mental health facilities and is the preferred method.

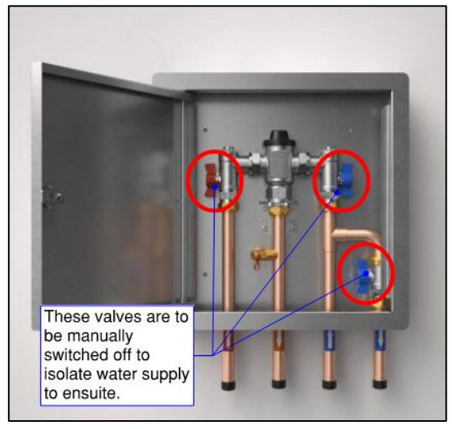


Figure 11 – Mental health Water Shut-off Arrangement

All hot water pipework is to be thermally insulated with at least 25mm of Rockwool insulation, flow and return. Return branches are to be provided on each floor to minimise dead legs. Dead legs are to be kept to vertical drops to fixtures where possible and generally contain less than 2L of water as per ESG requirements. Secondary flow meters will be provided on return pipework needed due to dead legs to ensure accurate usage is recorded.

Balancing valves on return branches are to be automatic thermostatically self-regulating type equal to 'TA-Therm".

5.5.2 Domestic Hot Water Plant

Domestic hot water (DHW) will be distributed from the L02 centralised hot water plant via a flow and return system. The DHW system will be fed from the DCW supply. The driving factor in selection of the hot water plant is the ESD / Sustainability requirements to move away from fossil fuels (gas) and utilise high efficiency electrical plant.

Heat pumps are the most cost effective in the long term and are the most efficient option; however, this comes with the compromise of increased space requirements and significant extended recovery times.

In line with the desire to electrify the new building, a new air to water heat pump system will be provided, with hot water storage and booster heating units if required. Examples of air to water heat pumps and storage cylinders are shown below.

Commercial Heat Pump unit

Storage Tanks

Recirculation Pumps

5.5.3 Custodian Control System

As part of the mental health facility guidelines, an Enware custodian control system or equal shall be integrated into each High risk IPU shower to assist staff in their normal activities with time control and lock-out functions for each fixture within individual High risk room ensuites.

5.6 Rainwater Re-use (Non-Potable)

The building will be provided with a rainwater harvesting system to capture and treat rainwater from non-trafficable roof areas. Water will be collected in storage tanks, treated and pumped into a dedicated non potable reticulation within the building to serve landscape irrigation.

The size of the rainwater harvesting system and the collected roof areas shall be optimised to maximise water re-use without oversizing the system.

Water collected in the in-ground rainwater harvesting tank located below ground is to be pressurised by a fixed speed duplex duty/standby submersible pump set and treated via a 4 stage filtration system comprised of 3 off auto backwash screened filters (100 micron, 50 micron, 5 micron) and ultraviolet light disinfection. A recycled capped water connection will be provided for landscape irrigation. The treatment train shall be provided with pressure gauges at the inlets and outlets to facilitate monitoring of the plant operation via the BMCS.

5.7 Sanitary Plumbing and Drainage

The new building will be provided with a sewer drainage system in accordance with the requirements of the NCC, HI ESG, Plumbing Code of Australia and AS3500.2, including referenced documents. Based on site survey results a gravity connection can be achieved to the existing site infrastructure. A new sanitary drainage service is proposed for the facility with final connection to the 150mm existing Private Sewer Asset .

No new Authority major/minor works connection is anticipated to be required to the authority sewer main on Hospital Road or at the southern boundary of the Campus.

Generally, the sanitary system will be design to aerial drainage principles with a minimum pipe size of 100mm will be used to drain both waste and soil fixtures, which allows future flexibility for the installation of additional soil fixtures during refurbishments without the need to upgrade pipe sizes.

Stacks shall be positioned against columns and penetrations cast into the slab with fire stop collars. Any back vents will generally rise up within partition walls on the floor plate. This will ensure the position of the drainage pipe is as high in the ceiling void as possible.

At every level, sanitary stack risers shall be provided with vandal-proof and tamper-resistant access hatches and inspection openings nominally 300 – 600mm above finished floor level, to allow access and maintenance. These shall be accessible from corridors, staff areas and shared areas (i.e. not accessible from patient bedrooms or sensitive spaces). Inspection openings shall also be provided adjacent each WC to allow for maintenance from above; the removal of a toilet pan shall not be accepted as a method to clear a blockage.

An overflow gully shall be provided at building boundary to allow surcharging sewage to drain freely from the building in the event of a blockage, complete with a hose tap installed above the overflow gully.

Horizontal pipe runs will be installed with sufficient gradients to achieve self-cleansing velocities to avoid potential problems with blockage. Each ensuite shall be provided with a minimum of 2 x floor drains (1 x for the shower and 1 x adjacent the hand basin). Sanitary drainage within ensuites shall be configured such that blocking a single drain does not cause flooding (i.e., the shower floor drain and basin floor drain shall be on separate branch pipes). A PVC or S/S plaster arrestor shall be provided to nominated plaster or treatment rooms to trap solids, located in a convenient position under the sink.

All pipework installed within noise sensitive areas will be acoustically treated to the satisfaction of the acoustic consultant’s specification.

All new fixtures and fittings are to be as specified in the architectural documentation. All in ground pipework to be minimum 100mm diameter.

All sanitary plumbing and sewer vents are to terminate above roof level to atmosphere in accordance with AS3500.2.

Clear outs and inspection openings with circular vinyl clamp non-slip covers are to be installed at the end of each drainage run and all changes of direction to allow sufficient access to the drainage network for fast repair of blockages. Clear-out covers shall have security screws and located to ensure consumer access is eliminated wherever possible.

We are proposing to deviate from HI’s Design Guidance Note No. 1, as the stack and relief vents will be cast in with fire stop collars in lieu of a fire rated shaft. This is a better solution for the contractor as it is cost-effective and simple.

Rodding eyes and inspection openings are to be installed at the end of each drainage run and all changes of direction to allow sufficient access to the drainage network for fast repair of blockages. Clear-outs are to be provided in amenities areas to allow for maintenance from above.

Where floor wastes are not charged by wash hand basins, they shall be fitted with a flexible insert non return valve insert equal to grate seal. All floor wastes fitted with grate seals are to be also charged in accordance with AS3500 requirements.

Drainage and water pipework serving wet areas above sensitive areas such as sleeping areas and main electrical rooms are to be avoided.

Tundishes and floor drains will be coordinated to suit the final mechanical plant/equipment locations. Condensate drains shall be piped from the mechanical plant/equipment to the tundish and or floor waste by the Mechanical Contractor.

5.7.1 Grease Waste

A trade waste system will be provided to serve the kitchen and servery as per ERG discussions.

Wastewater from these areas shall be collected via a dedicated gravity grease waste drainage system and pass through a 1000L grease arrestor prior to connection to the sewer infrastructure. The grease arrestor shall be located externally, in-ground, with access from the main road. The cleaning of grease arrestors is routinely scheduled after hours (typically in the early hours of the morning) to ensure odours do not affect building occupants.

The area where the grease arrestor is located shall be provided with cold water (via RPZD) for clean-up operations in accordance with the Liquid Trade Waste Management Guidelines. Grease arrestors are to be provided with chamber vents in accordance with the requirements of the Plumbing Code of Australia, chamber vents are to rise and offset through the building to terminate to atmosphere above the roof.

Due to the long run to the grease arrestor the grease waste line shall be wrapped with insulation and provided with self-regulating heat trace cable to maintain appropriate temperatures within the grease line to avoid solidification.

A grease pump out line capped with airtight galvanised mild steel, 80mm camlock connection shall be provided at the grease arrestors terminated external to the loading dock to facilitate remote grease pump out by a grease arrestor maintenance contractor.

Typically, all grease vents shall be a minimum 100mm in diameter to reduce the impact of grease laden vapours on the pipe cross-section.

Air admittance valves are neither suitable for grease drainage nor permitted on grease drainage by Sydney Water and therefore shall not be used.

Once treated, downstream of the grease arrestor shall be discharged to the sewer system via a gravity drainage exiting beneath the loading dock.

All vents are to terminate above roof level to atmosphere in accordance with AS3500.2. Typically, all grease vents shall be a minimum 100mm in diameter to reduce the impact of grease laden vapours on the pipe cross-section.

Rodding eyes and inspection openings are to be installed at the end of each drainage run and all changes of direction to allow sufficient access to the drainage network for fast repair of blockages.

5.8 Rainwater Roof Drainage

The stormwater system will comply with NCC, HI ESG and AS3500.3 however alternative solutions may be pursued to preserve architectural intent (e.g., siphonic, British standards or CSIRO guides).

The building shall be provided with roof drainage design consisting of siphonic and gravity drainage systems and full flow emergency overflows discharging to a visible place.

Rainwater shall be collected from roof gutters and outlets via siphonic & gravity downpipes, and from courtyards via gravity downpipes. A siphonic system is proposed for the concrete deck roofs open deck plantroom areas as this allows longer pipe runs and smaller pipe sizes.

Rainwater outlets on courtyards shall be affixed with anti-tamper screws.

Each roof shall be provided with a single siphonic downpipe external to the building fabric, concealed by a thickened architectural wall.

Gutter guard outlets shall be provided on the eaves gutters to minimise the risk of blockages. The gutter guard system shall be removable to allow flushing of the gutters if required.

Downpipe locations shall be coordinated with the floor layout and shall typically be located against columns. All internal rainwater downpipes shall be located within dedicated risers and sound attenuated within habitable areas. Downpipe offsets shall be kept to a minimum. At every level, risers shall be provided with vandal-proof and tamper-resistant access hatches and inspection openings nominally 300 – 600mm above finished floor level, to allow access and maintenance.

Where rainwater is collected for reuse, it shall be directed to 36kL rainwater harvesting tank (as per ESD requirements) via an inground first flush diverter sized to divert 10L per 100m² of collected roof areas.

Otherwise, rainwater shall connect directly to the external stormwater drainage network (by Civil) via stormwater pits. Roof water harvesting for non-potable use (WC flushing, mechanical systems etc) has been investigated and omitted under the AHFG's sustainability guidelines

The Contractor is responsible for developing the water proofing, surface gradients, building thresholds, gutters and overflow devices based on the confirmed capacities and compliance.

Rodding eyes, inspection openings and inspection chambers are to be installed in the gravity stormwater system at changes of direction to allow sufficient access to the drainage network for fast repair of blockages.

Building rainwater drainage shall terminate in an open grate stormwater water inspection chamber located outside the building's footprint prior to connection to the civil stormwater drainage network.

All below ground drainage is to be installed with long radius or maximum 45° bends and access at not more than 25m to allow future pipe relining.

The hydraulic scope will only extend to stormwater and roof water drainage within the building. External in-ground drainage is to be coordinated and provided by the civil engineer. All courtyard drainage on ground floor and any external stormwater drainage will be documented by the Civil Engineer.

All external downpipes will be installed by the Roofing Contractor, however designed and certified by the hydraulic consultant. Note that the siphonic system will be ultimately designed and signed off by the siphonic contractor. There is to be only one siphonic contractor involved as per the ESG.There are a number of locations with awning and balconies that protrude from the building façade. These awnings and balconies will be drained by a gravity system to Civil.

Overflows to roof drainage and terrace drainage systems shall be provided to protect the building in the event of a downpipe blockage or a greater than 1:100 year storm event. Local council's water quality recruitments are provided by Civil package.

Stormwater will be collected from all roofed and paved areas to authority requirements and Australia Rainfall and Runoff, and based on the following minimum criteria:

- Box Gutters – 1 in 100 year 5 minute storm event
- Eaves Gutters – 1 in 100 year 5 minute storm event
- Bunded Terrace / Roof Areas – 1 in 100 year 5 minute storm event (separate overflow equal capacity)
- Perimeter planters - 1 in 100 year 5 minute storm event (minimum 2x outlets per section)
- 10% additional capacity in response to climate adaptation.

A stormwater pit and drain capable of discharging the total flow of the fire test will be provided within the fire services pumproom discharging to the rainwater tank for harvesting re-use.

5.9 Fire Hose Reel System

A new hose reel system will be provided to the new building in accordance with Part E1.4 of the National Construction Code of Australia, AS2441, the Fire Engineered Strategy, the requirements of AS3500.1 and Sydney Water.

The fire hose reel system will be supplied from the metered domestic cold water system. A dedicated fire hose reel service shall branch off the domestic cold water service in the hydraulic plant room. An RPZD will be provided immediately downstream of the connection.

Fire hose reels will be located within 4m of an exit as required to provide coverage to each fire compartment. Where additional hose reels are required they will be located next to fire hydrants.

The system is to be compliant with the deemed to satisfy provisions of the NCC except where non-conventional elements have been addressed in the Fire engineering strategy. These currently include:

- Fire hose reels cupboards shall be secured to prevent patient tampering.

After commissioning of the installation submit a certificate to the Managing Contractor certifying the installation as required in Clause 27 (Certification of Essential Services) division 4 of the Local Government (Approvals) Regulation 1993. Provide a flow test certificate to comply to AS1221 section 3.2.4.

At the completion of the commissioning procedure, a record of the disposition and location of the fire hose reels shall be made in accordance with AS2441.

5.10 Sanitary Fixtures and Taps

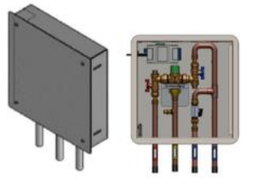
Sanitary fixtures and tapware throughout the new facility will be selected and prepared by NBRS (Architect) in line with NSW Health Guidelines and User Group requirements.

5.10.1 Anti-ligature Requirements

Careful consideration should be given to anti ligature design including reference to Australian Health Facility Guidelines – mental health for specific requirements including:

- Anti-ligature tapware to the vanity.
- Anti-ligature shower and associated tapware.
- No exposed waste or other pipes.
- Tamper proof closures to ceiling access hatches.
- Anti-ligature shower curtain.
- Toilet with concealed cistern inspection hatch for waste.
- Tamper proof RPZD and TMV access boxes (non-typical recessed hinged door boxes).
- Anti-ligature hardware to the fire hose reel/fire hydrant doors including anti – ligature hinge to the door.
- Fire hose reels to be located in recessed cabinets with lockable doors.

Anti ligature Floor grate – polished stainless steel



Anti- vandal Torx screws securing TMV lid.

Sub Acute care ensuite WC - GalvinAssist or Simialr wall faced close coupled WC, Cleanflush rimless Contemporary style, wall faced, Soft close/quick release seat,

Chrome plated brass heavy duty wall mounted basin Set Complete with Vandal Resistant outlet

Anti Vandal Jumper Valve Washing Machine Tap, with cover dome

hands free wall mounted anti ligature sensor tap or standard tapware

Vandal Resistant wall Mixer set, Jumper Valve , with Deluxe upswept outlet 225mm

Ezy-Grip Basin Set Complete with Standard Hob Basin Outlet

In wall cistern (90mm cavity) with raised dual flush buttons, round pneumatic connection, Slimline cistern and Dual Flush Plate

6. Fire Services

The following section provides a description of the design criteria, systems and design considerations for fire services.

6.1 Legislative Requirements, Codes, Standards, Reports & Guides

The following codes and standards will form the basis of the fire services design:

a. Fire Engineering Brief Questionnaire (FEBQ) / Fire Engineering Report (FER)

b. Building Code of Australia (BCA) / National Construction Code (NCC) 2022

c. AS 1670.1:2018 Fire Detection, Warning, Control and Intercom Systems – System Design, Installation and Commissioning – Fire

d. AS1670.4:2018 Fire Detection, Warning, Control and Intercom Systems – System Design, Installation and Commissioning – Emergency warning and intercom systems

e. AS 2118.1:2017 Automatic Fire Sprinkler Systems Part 1: General Requirements

f. AS 2118.6:2012 Automatic Fire Sprinkler Systems Part 6: Combined sprinkler and hydrant systems in multistorey buildings

g. AS 2419.1-2021 Fire hydrant installations Part 1: System design, installation and commissioning

h. AS2941 – 2013 Fixed fire protection installations – Pump set systems

i. AS2444 – 2001 Portable fire extinguishers and fire blankets

j. Fire and Rescue NSW requirements

k. NSW Health Infrastructure: Engineering Services Guidelines dated 12 December 2022

l. NSW Health Infrastructure: Design Guidance Note 001 to 040

6.2 Design Criteria

A summary of the key design criteria is as follows:

Item	Parameter
Fire hydrants type	Attack Hydrants
Fire hydrants flow rate	2 x hose streams @ 5 L/s each when boosted by on-site pumps 2 x hose streams @ 10 L/s each when boosted by fire brigade pumps (As per AS 2419.1-2005)
Fire hydrants flow velocity through pipes (after booster)	≤ 4 m/s in compliance with AS 2419.1
Residual Pressure at Hydrant outlets	700 – 1200 kPa, in compliance with AS 2419.1
Largest Fire Compartment	TBC by BCA Consultant, assuming <10,000sqm
Fire Sprinklers Hazard Classifications	Hospital/Patient Care – Light Hazard Plant rooms – Ordinary Hazard 1 (OH1)
Fire Sprinkler spray densities	Light Hazard – 70kPa and K=8.0 or larger for 6 x most hydraulically unfavourable sprinklers OH1 – 6 sprinkler heads at 60L/min each Wall-wetting sprinklers/drenchers for exposure protection – 75 L/min per drencher. (As per AS 2118.1-2017 sections 9, 10 & 3)
Fire alarm and detection systems	To AS 1670.1 – 2018 Thermal detectors shall be used within areas to avoid spurious alarms
Emergency Warning and Intercom system	To AS1670.4 – 2018 Speakers shall be omitted from sleeping areas under fire engineered alternate solution
Extinguishers and blankets	To Part E1D14 of the NCC 2022 & AS2444-2001

6.3 Description of Systems

The following list of systems is described in the subsequent sections:

a. Fire Hydrant System

b. Fire Sprinkler System

c. Automatic Smoke Detection System

d. Emergency Warning and Intercom System.

e. Portable Fire Extinguishers.

6.4 Fire Water Supply Strategy

A review of existing drawings does not indicate a site wide Fire Hydrant tank and booster pump.

The fire services requirement for the CFMH building has been summarised as per below :

Service	Demand (L/s)
Hydrants	20 (2 x hose streams @ 10 L/s each)
Sprinklers	7.8 L/s (OH1 – 6 sprinkler heads at 60L/min each + 30%)
Drenchers	9.8 L/s (6 Drenchers operating at 75 L/min each + 30%)
Total requirement	37.6 L/s

Based on the assessment of the latest hydrant pressure and flow test results received, the existing private infrastructure is not capable of meeting the required demand. As such a combined fire hydrant and sprinkler tank will be provided to furnish the fire flows. The full sprinkler and drencher demand will be supplied from the tank. A portion of the hydrant demand will be fed from the main and the remainder will be supplied from the tank. The following table summarises the fire tank storage requirements for the building:

Service	Tank capacity
Hydrant	72,000 L (Based on 5 L/s of 4 hrs storage) Note: 15L/s to be provided from the mains
Sprinklers	17,000 L (Based on sprinkler operation for 1 hour and as per requirements set out in section 10.3.1.2 of AS2118.1)
Drenchers	32,000 L (Based on drencher operation for 1 hour) (Note that a 2/3rd reduction has not been applied to drenchers)

Service	Tank capacity
Total requirement	122,000 L

In addition to the combined storage tank, the building will be provided with a combined hydrant sprinkler booster assembly, suction, and fire pumps to achieve compliant pressures to the most remote areas.

A booster pump shall be provided to boost the mains supply into the fire tank located in the plantroom on level 02. A suction line will reticulate from the tank to the suction outlets located next to the booster. Downstream of the tank a diesel electric fire pumpset shall be provided to serve the sprinkler and hydrant system. Downstream of the fire pumps the hydrant and sprinkler system will split before entering the building as separate systems.

The fire and cold water pump room will include one diesel electric pump, one booster pump, one jockey pump and a single sprinkler alarm valve complete with pressure reduction.

6.5 Fire Hydrant System

The fire hydrant system to the new building will comprise of internal fire hydrants compliant with requirements of Clause E1D14 of the National Construction Code of Australia, AS2419.1, the Fire Engineering Performance solutions, and the requirements of AS3500.1 and Sydney Water. Where required, additional internal hydrants will be located to provide adequate coverage. Each level of the building will be fitted with a monitored subsidiary stop valve to permit alterations without affecting other floors.

Fire Hydrant coverage will be provided throughout the building, ensuring all areas of the building can be adequately reached with a 30m hose length and 10m nozzle spray from a fire hydrant outlet. Additional hydrants will be provided where adequate coverage cannot be achieved from hydrant outlets in the fire stairs.

Supply and install internal landing valve hydrants in approved locations in accordance with the requirements in AS2419. Install hydrants clear of fire egress path.

Install each external hydrant on a 100mm riser complete with a 600mm diameter x 100mm thick concrete base finished 25mm above ground level. Locate hydrants at least 10m away from building unless protected by a fire rated surround up to 2.5m each side and 3m above. Two hydrant valves shall be provided on each external hydrant standpipe riser. Hydrant outlets to be 750mm above ground, fitted with a brass cap and chain and angled down at 35° to the horizontal.

The systems main distribution pipework will be reticulated within the designated fire stairs and interconnect on ground floor.

The design outcome shall meet the compliance and operational requirements of FRNSW and the PCA

The combined booster assembly is currently nominated in a non-compliant location and will require approval by Fire Brigade through FEBQ as the sited location of the booster assemblies are not within sight of the main entrance of the building.

6.6 Fire Sprinkler System

NSW Health Infrastructure guideline prefers to have sprinkler systems installed on all projects irrespective of building height or other means of achieving NCC compliance as this is a proactive way of providing life and safety operation instead of relying on escape facilitation.

The sprinkler system shall be served from the combined fire tank and pump system outlined in Section **Error! Reference source not found.**

Each floor will be provided with a flow switch(s) with flow check facility to provide indication of the fire affected level at the fire indicator panel and allow remote testing of the system. Zone check devices will be installed on each flow switch to reduce undue water wastage during testing.

The combined booster assembly is currently nominated in a non-compliant location and will require approval by Fire Brigade through FEBQ as the sited location of the booster assemblies are not within sight of the main entrance of the building.

Downstream of the fire pumpset the sprinkler system will be separated by providing a sprinkler alarm valve complete with pressure reduction.

The type of sprinkler heads used will comply with AS 2118.1 and NSW Health Infrastructure guidelines for the relevant hazard class and environment. In patient-accessible areas, sprinkler heads are to be anti-ligature and tamper-resistant, equal to Tyco Raven 5.6K model. Sprinkler heads within staff-only areas shall not be anti-ligature.

Light hazard protection shall be provided to hospital areas, ordinary hazard 1 protection shall be provided to plantrooms.

Generally, semi-recessed pendent sprinkler heads shall be provided for below-ceiling protection and exposed pendent/upright sprinkler heads shall be provided for concealed (in-ceiling) spaces.

Sprinkler heads shall be omitted from all electrical rooms and EDB cupboards.

Sprinkler heads shall be provided to all covered courtyards, in accordance with AS 2118.1-2017.

6.7 Automatic Smoke Detection System

A new, dedicated fire indicator panel (FDCIE) will be provided for the CFMH building, with high level interface with the existing mental health precinct dry fire network. The new fire panel shall be a vigilant MX1 panel in order to be compatible with the campus wide dry fire system.

In order to be inline with the existing campus wide strategy for the mental health precinct the brigade call out for the proposed mental health building is via the fire panel and ASE located within building 109. A high level interface will be provided between the proposed fire panel in CFMH and existing fire panel within building 109 to achieve this.

Fire protection devices which will be monitored by the fire indicator panel and emergency warning and intercom system (EWIS) include but not limited to sprinkler flow switches, monitored isolation valves, break-glass manual call point, smoke and heat detectors, input/output modules, speakers, fire pumps status, fire water tank levels, etc.

The system shall incorporate smoke detection throughout and where applicable to initiate the smoke control system within the building. Thermal detectors shall be installed to shower rooms (if required) and areas where nuisance tripping of smoke detectors may exist.

Smoke detectors in ward quiet/calming and sleeping areas will be configured so that the LED indicator does not pole (flash) during normal operations.

MASDS may be provided on top of lift shafts for ease of maintenance.

Fire protection devices which will be monitored by the fire indicator panel and emergency warning and intercom system (EWIS) include but not limited to sprinkler flow switches, monitored isolation valves, break-glass manual call point, smoke and heat detectors, input/output modules, speakers, fire pumps status, fire water tank levels, etc.

The system shall incorporate addressable smoke detection throughout. Thermal detectors shall be installed to areas where spurious alarms from smoke detectors may occur.

Mimic panels shall be provided to nursing stations to meet HI requirements.

The detectors will be positioned to suit the final reflected ceiling plans, including all remote-control equipment for interfacing with the base building addressable / distributed detection loops / circuits for the correct operation of the fire detection and alarm system. Visual warning devices will be provided where audio warnings will cause disruptions to hospital operations and areas with high ambient sound levels.

Mimic panels will be provided in the nurse station together with visual indication and audio annunciation with mute facility on Mimic panel.

Fire alarm detection and EWIS speakers are to have limited ligature points with ceiling fixings that fail under min. weight requirements of AUS. & NSW health guidelines as required.

Fire trips will be provided to interface with the mechanical equipment switchboard and security doors for the fire mode operation.

6.8 Emergency Warning and Intercom System

An Emergency Warning and Intercom System (EWIS) will be installed throughout the building.

The Emergency Warning Control and Indicating Equipment (EWCIE) panel will be located next to the new FDCIE.

The system will incorporate break glass alarm points on each floor for use by the occupants for early warning, speakers for emergency broadcasting and warden intercom phones for fire.

The EWIS system will be divided into several zones or as determined by the fire engineered solution; each shall have its own messages directing occupants to the nearest exit.

All speakers will be recessed within the ceiling where possible. Sound systems and intercom systems for emergency purposes will be configured to minimise patient trauma in inpatient areas.

Where speakers are removed from inpatient areas to minimise patient trauma, remote display units and mimic panels will be provided in the nurses' station together with visual indication with T3 strobe and audio annunciation with mute facilities at the mimic panel.

Manual call point and WIP will only be provided within the Fire Indicator & EWIS panel cupboard, admin staff and nurse reception. WIP and Manual call points to be removed from the rest of the building.

Visual Alarms (Strobes) will be provided in areas with high ambient noise level.

6.9 Portable Fire Extinguishers

Portable fire extinguishers and fire blankets will be provided in accordance with Table E1.6 of the NCC 2019 and located and distributed in accordance with AS2444 and the Health NSW guidelines.

In general, portable fire extinguishers shall be distributed throughout the levels in staffed areas of specific hazard, and within locked FHR cupboards whenever possible.

Typically, ABE extinguishers should not be permitted to cover electrical and comms rooms. CO2 or vaporising liquid to be used (to avoid collateral damage) in conjunction with water extinguishers.

Parking and loading docks shall include foam extinguishers.

Fire blankets shall be located within kitchen areas with cooking facilities.

Portable fire extinguisher shall be wall mounted exposed to view within hazard spaces such as EDB Cupboards, switch rooms, plant spaces and nurse stations, or installed within lockable fire hose reel / fire hydrant cabinet complete with mounting brackets.

Fire extinguishers shall be mounted no less than 100mm from finished floor level and with the handle accessible from maximum of 1200mm above finished floor level.

6.10 Fire Brigade Access

The fire brigade access to the new and existing boosters around the site shall be maintained throughout construction and after completion of the new building throughout operation.

This requirement is essential as, in the event of a fire, fire fighters will need to be able to park the fire truck on a hardstand within 8m from the booster in order to connect into it.

6.11 Consideration on Fire Brigade Hardstand Area and Access

There are multiple entries and internal roadways around the campus that FRNSW appliance access around the site can be maintained at all times and need to be designed with civil vehicular swepth paths taking into consideration future buildings and other emergency vehicles operating simultaneously in the vicinity of a singular event.

Any *hardstand* serving a *suction-connection outlet* is to have a working space which extends a minimum of 18 m from the point of connection to allow semi-rigid suction hose to be connected to the rear of the *fire appliance* (see Figure 14).

Note: *Fire appliances* typically use three x 2.4 m or two x 3.6 m long suction hoses (i.e. combined length of 7.2 m). Some FRNSW 'aerial pumpers' have a mid-mounted pump where the suction hose is connected to the side of the vehicle.

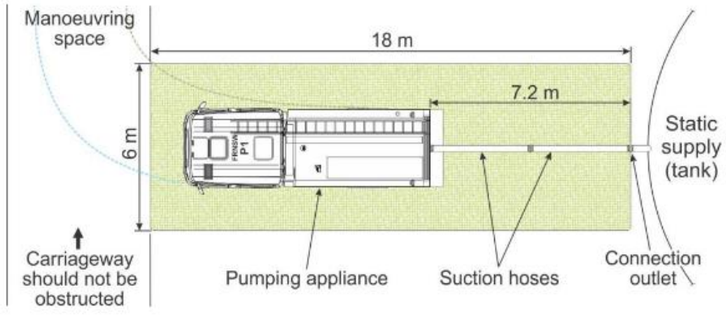


Figure 14 Hardstand area serving a suction-connection outlet

8.2 Hardstand locations

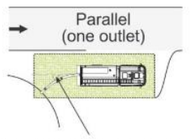
8.2.1 A *hardstand* is to be provided as required by *AS 2419.1—2005 Fire hydrant installations – System design, installation and commissioning*, and as otherwise nominated by the relevant authority having jurisdiction, including:

- within 20 m of any feed fire hydrant
- within 8 m of any fire hydrant booster assembly
- within 50 m of an external attack fire hydrant
- within 20 m of the access door to any external fire pumproom
- in front of any *suction-connection outlet* (e.g. tank, river, lake, dam, sea).

Note: The location must also consider other required factors such as firefighter access to the building and maximum hose coverage requirements.

Any *hardstand* area serving a *suction-connection outlet* is to be positioned at an angle not greater than 45° from the outlet's longitudinal direction (see Figure 15).

Note: Suction hoses are semi-rigid and only allow slight bending, therefore the *fire appliance* must be positioned relative to the connection outlet. The working space must be kept unobstructed at all times.



Outlet not more than 45° to centreline of fire appliance

The proposed configuration of the hardstand will be the parallel one outlet with the suction connection outlet and booster assemblies angled at 45 degrees as per above image.

6.12 Consideration on turn around area

An FRNSW appliance (fire truck) must have a suitable turn around area when accessing the site and due consideration has been given to accommodate this with the boosters sited along the existing roadway to the east of the new facility, facilitating multiple open carriageway turn around options.

The proposed location of the booster complies with the FRNSW guidelines as follows .

7.2 Turnaround area

7.2.1 Any carriageway that extends longer than 120 m from an intersection and does not lead directly to an exit or connecting *carriageway* (i.e. dead end) is to have a suitable turnaround area so that a *fire appliance* does not need to reverse out (see Figure 6).

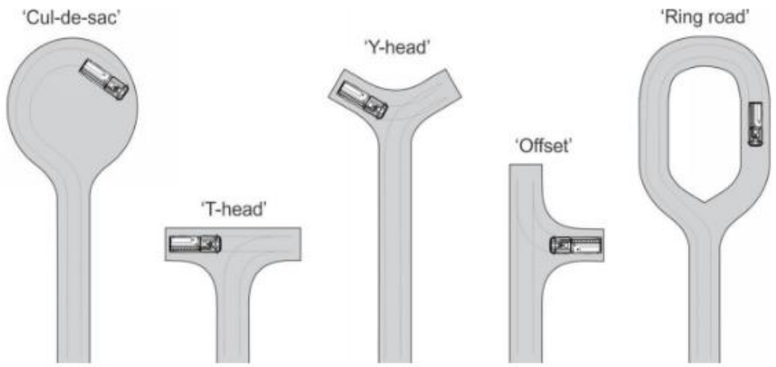


Figure 6 Examples of typical turnaround area configurations

Refer to the document "*Fire safety guideline - Access for fire brigade vehicles and firefighters*" issued by Fire and Rescue NSW for the full requirements of the fire brigade booster location and access options.

6.13 Summary of Performance Solutions

The system is to be compliant with the deemed to satisfy provisions of the NCC except where non-conventional elements will be addressed in the Fire engineering strategy. These currently include:

- Booster is not within site of the main entry
- MCP and WIPS shall be provided to FIP and EWIS Panel cupboard, admin staff , nurse reception and within locked FHR cupboards.
- Omission of fire sprinklers to electrical rooms including Comms rooms and EDB cupboards.
- Omission of EWIS speakers from patient bedrooms. (Remote display units and mimic panels will be provided in the nurses' station together with visual indication with T3 strobe and audio annunciation with mute facilities at the mimic panel)
- Fire hydrant and hose reel cupboards to be secured throughout patient accessible areas.
- Allow the omission of FHR protection to interview room on ground floor which is fire isolated. Extinguisher to be provided within room in lieu of fire hose reel.

6.14 Anti-ligature Requirements

Careful consideration should be given to anti ligature design including reference to Australian Health Facility Guidelines – mental health for specific requirements including:

- No exposed waste or other pipes.
- Tamper proof closures to ceiling access hatches.
- Anti-ligature hardware to the fire hose reel/fire hydrant doors including anti – ligature hinge to the door.
- Recessed tamper proof type fire sprinkler.
- Detectors should be anti-ligature type and tamper proof or located as to be inaccessible to patients.
- Fire hose reels located in recessed lockable cabinets.


Anti-ligature detector


Anti-ligature sprinkler


Nurse Station MIMIC panel

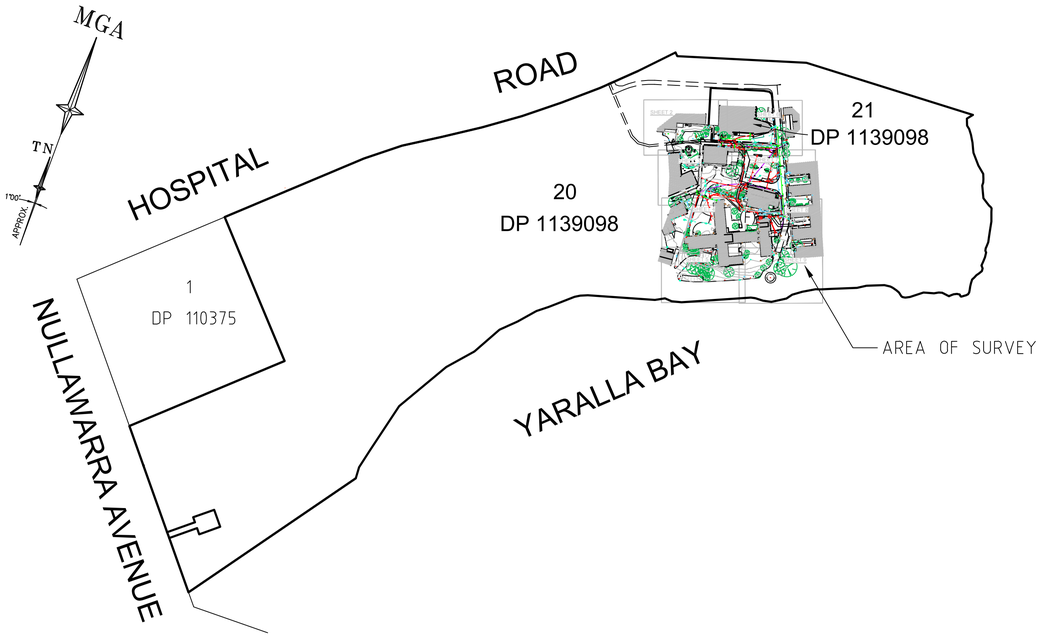

Anti-ligature speakers

7. Key Outstanding Items

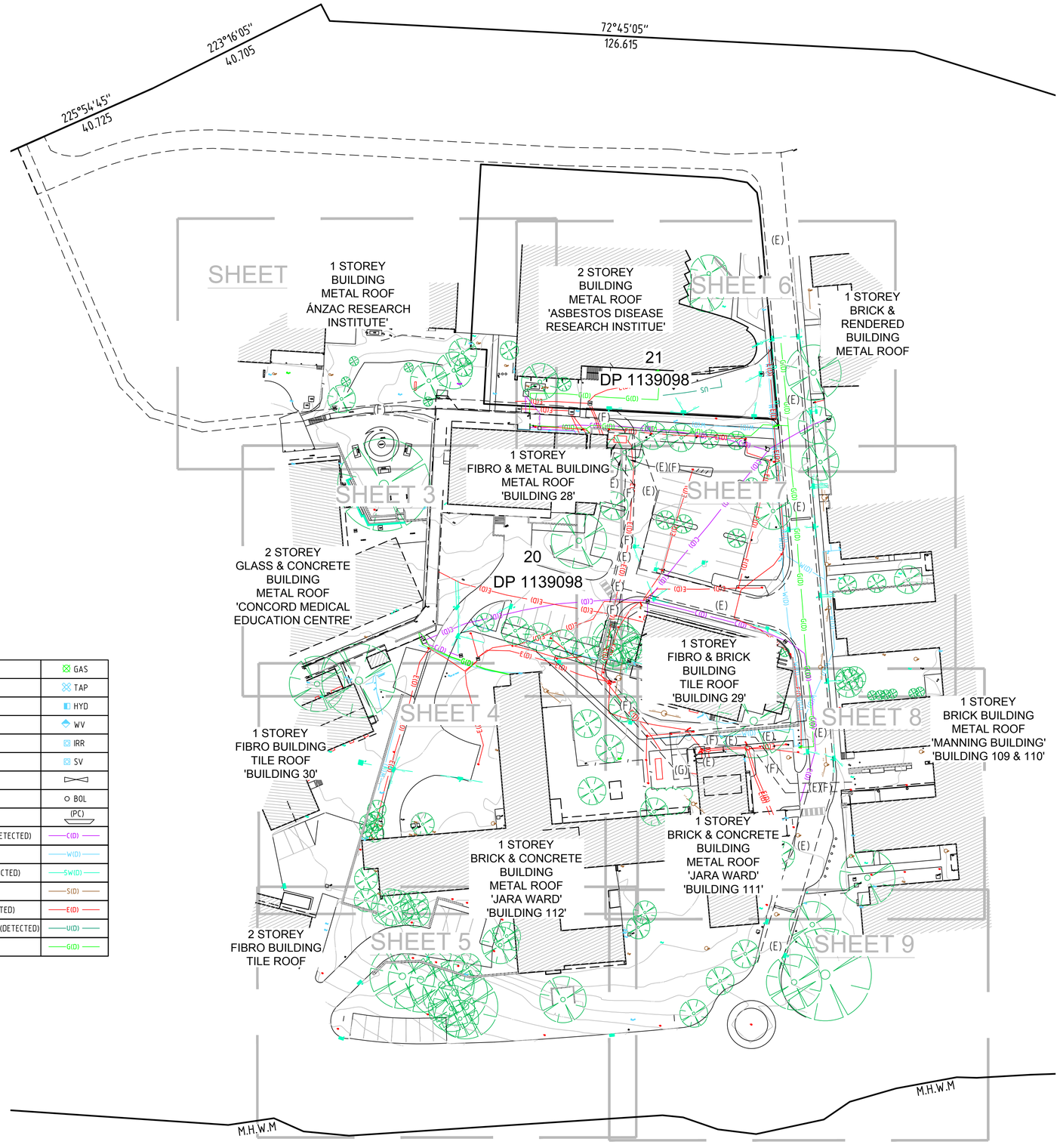
The following areas of consideration and design issues across the main works will require resolution and agreement during the next stage of work. This list is not exhaustive and includes (but not limited to):

- As of the time of composing this report, the updated DD BCA report and FEBQ/FER have not yet been issued. It will be essential to conduct a thorough review and assessment of both documents once they are made available to ensure alignment with the proposed design.
- The current fire system design strategy relies on the hydrant pressure and flow test results conducted on March 25, 2023. It is important to emphasize that when determining the pressures for the hydrant system design, it should adhere to the methodologies outlined in Appendix L of AS2419.1 2021. The residual pressures available for the design will need to be acquired through a compliant testing procedure in the next stage to provide the necessary information for refining the fire supply design strategy.
- While the fire water supply strategy has been discussed and agreed with the fire engineer, it will still necessitate approval from the brigade due to its departure from the typical normative approach. To secure this approval, a meeting should be scheduled with the brigade for further discussion and endorsement.
- The private water main size of 150mm has been determined based on site investigations only. Water main sizes have not been documented on site survey data (33907 020DT) and therefore it is important to conduct further investigations to verify this on site at the next stage.
- The private main serves as the source of hydrant and water supply for the precinct. The design of the cold-water system is based on the pressure and flow data derived from the hydrant's performance, as no other information was accessible. The pressure and flow at proposed connection point into the private water infrastructure remains unknown at this stage. Therefore, further investigation will be necessary in the next phase to confirm the suitability and pump duty requirements.
- The survey data (33907 020DT) indicates that existing drainage services will intersect with the proposed building footprint. It is uncertain which buildings these services are currently serving, but it is plausible that they could be connected to the Jarra unit. Therefore, it might be necessary to make minor diversions, particularly since this drainage system needs to be retained. Similarly, there is an existing water service that seems to intersect with the proposed building footprint. However, it does not seem to supply other buildings, suggesting that demolition may be the only necessary action. The precise route of the pipes, invert level and sizes are not clearly depicted in the survey, so further surveying of the existing mains will be essential in the next phase to determine the extent of the diversion and demolition works required.
- Arup was provided with a fire systems due diligence report dated 09/05/23 which details the existing dry fire system in place servicing the Concord Hospital Campus. The hospital is in the process of upgrading all the fire panels within the mental health precinct to Vigilant MX1 panels, it is assumed that these new panels will have sufficient capacity to integrate the new Mental Health building however further investigations will be required at the next stage to confirm this.
- Arup has received late advice indicating limited capacity within the electrical supply network for the building. As a proactive measure to alleviate the overall electrical load of the fire system, consideration of operating the fire pumpset exclusively on diesel fuel should be included in the next stage.
- Any available documents/reports providing information on upgrade works to the Sydney Water sewer infrastructure as part of the Concord Hospital Stage 1 will be required and need to be investigated at the next stage to verify allowance for future developments and available spare capacity in the Authority network.
- An application with Sydney Water will need to be submitted to establish any system issues that could impact the CFMH development. Section 73 (pending development approval) shall be lodged following planning approval to assess the capacity within the Sydney Water sewer main and water main assets. A Sydney Water Coordinator will be required to be engaged to lodge the applications as per Sydney Water requirements.
- The as-built documentation/reports of the Sydney Water's sewer pumping station asset upgrade works will need to be reviewed at the next stage to confirm available capacity.
- The CFMH building will need to interface with existing building 109 and therefore the following documents will be required at the next stage to complete the works:
  - Annual Fire Safety Statements (AFSS)
  - Fire Engineering Reports for the building.
  - As-built drawings.

A.1 Survey dated 15/08/2022 (33907 020DT)



LOCATION DIAGRAM



EASEMENTS

(E) DENOTES RIGHT OF CARRIAGER WAY VARIABLE WIDTH (DP1158616)
(VIDE SURVEY BY MR SURVEYOR - STEPHEN R EMERY DATED 13-11-07)
(F) DENOTES EASEMENT FOR ELECTRICITY AND OTHER PURPOSES 2 WIDE AND VARIABLE WIDTH (DP1158616)
(VIDE SURVEY BY MR SURVEYOR - STEPHEN R EMERY DATED 13-11-07)
(G) DENOTES PROPOSED EASEMENT FOR ELECTRICITY AND OTHER OTHER PURPOSES 3.3 WIDE (DP1158616)
(VIDE SURVEY BY MR SURVEYOR - STEPHEN R EMERY DATED 13-11-07)

NOTES

1. THE BOUNDARIES HAVE NOT BEEN MARKED ON GROUND
2. THE BOUNDARY SURVEY (DIMENSIONS AND AREA) HAVE BEEN SURVEYED IN ACCORDANCE WITH SURVEYING AND SPATIAL INFORMATION REGULATION 2017 CLAUSE 10 "IDENTIFICATION SURVEYS" AND ARE SUBJECT TO FINAL SURVEY
3. ORIGIN OF **MGA2020** COORDINATES IS TAKEN FROM **SSM 114207** - E:**323428.773**, N:**6254260.312** IN HOSPITAL ROAD **(14/05/2021)**
4. ORIGIN OF LEVELS ON A.H.D. IS TAKEN FROM **SSM 114207** R.L. **11.775** (A.H.D.) IN HOSPITAL ROAD
5. CONTOUR INTERVAL **0.5 m**
6. CONTOURS ARE INDICATIVE ONLY. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION
7. KERB LEVELS ARE TO THE TOP OF KERB UNLESS SHOWN OTHERWISE
8. FLOOR LEVELS SHOWN ARE THRESHOLD LEVELS. NO INVESTIGATION OF INTERNAL FLOOR LEVELS HAS BEEN UNDERTAKEN
9. AN INVESTIGATION OF UNDERGROUND SERVICES HAS BEEN MADE. UNDERGROUND SERVICES HAVE BEEN DETECTED BY "QASAR " AND ARE APPROXIMATE ONLY. SOME SERVICES SUCH AS FIRE&WATER SUPPLY, GAS AND OPTICAL FIBRE CABLING DO NOT HAVE METALLIC TRACING WIRES OR METAL PIPES AND MAY NOT HAVE BEEN DETECTED.
10. 8/.4/7 DENOTES TREE SPREAD OF 8m, TRUNK DIAMETER OF 0.4m & APPROX HEIGHT OF 7m
11. SHOWS APPROXIMATE POSITION OF ROAD LINEMARKING AND IS INDICATIVE ONLY
12. BEARINGS SHOWN ARE MGA (MAP GRID OF AUSTRALIA) ADD APPROX. 1°00' FOR TRUE NORTH

LEGEND

BENCH MARK	▲	GAS VALVE	GAS
INSPECTION PIT	IP	WATER TAP	TAP
PIT WITH CONCRETE LID	CLID	HYDRANT	HYD
PIT WITH METAL LID	MLID	WATER VALVE	WV
COMMS PIT	COM	IRRIGATION	IRR
ELECTRICITY PIT	EPIT	STOP VALVE	SV
POWER POLE	PP	GATE	
ELECTRIC LIGHT BOLLARD	LB	BOLLARD	BOL
ELECTRIC LIGHT POLE	ELP	PRAM CROSSING	(PC)
SEWER MANHOLE	SMH	COMMUNICATIONS (DETECTED)	C(D)
SEWER INSPECTION POINT	SIP	WATER (DETECTED)	W(D)
GIPD DRAIN		STORMWATER (DETECTED)	SW(D)
GIPD DRAIN	GD	SEWER (DETECTED)	S(D)
GIPD INLET PIT	GIP	ELECTRICITY (DETECTED)	E(D)
DOWNPIPE	DP	UNKNOWN SERVICE (DETECTED)	U(D)
		GAS (DETECTED)	G(D)

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.....
Registered Surveyor NSW

Client - HEALTH INFRASTRUCTURE
Drawing title
PLAN OF DETAIL AND LEVELS OVER PART LOT 20 IN DP1139098 KNOWN AS CONCORD HOSPITAL, CONCORD WEST

datum AHD
site Area N/A
LGA CANADA BAY

reference number 33907 020DT
scale 1:500 @A1
date of survey 15/08/2022
SHEET 1 OF 11

MGA

TN

100° APPROX.

1 STOREY
BUILDING
METAL ROOF
ÁNZAC RESEARCH INSTITUTE'

20
DP 1139098

20
DP 1139098

PLANT
CONCRETE PLINTH

CONCRETE LOADING DOCK

STEPS

GRASS

CONCRETE

BITUMEN TURNING BAY

GRAVEL

FOOTPATH

BOTTOM OF BANK

TOP OF BANK

CLID

MLID

SWITCHB

METAL AWNING

METAL FENCE

PARAPET 17.66

PARAPET 16.84

PAVERS

BLOCK

TILED

FIREPIT

SEAT

GRAVEL

CONCRETE

TOP OF GUTTER 11.95

METAL AWNING OVER

1 STOREY
FIBRO &
METAL
BUILDING
METAL ROOF
'BUILDING 28'

ADJOINS

ADJOINS

SHEET 6

SHEET 3

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SHEET 2 OF 11

ADJOINS

SHEET 2

MGA

TN

APPROX.

2 STOREY
GLASS & CONCRETE BUILDING
METAL ROOF
'CONCORD MEDICAL EDUCATION CENTRE'

20
DP 1139098

1 STOREY
FIBRO &
METAL
BUILDING
METAL ROOF
'BUILDING 28'

PLANT
INACCESIBLE

PLANT
INACCESIBLE

METAL
SHED

METAL
SHED

GARAGE

SEE ELEVATIONS FOR PARAPET LEVELS

SEE SHEET 1 FOR LEGEND & NOTES

ADJOINS

SHEET 4

SHEET 7

ADJOINS

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site Area	N/A	scale	1:100 @A1
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ADJOINS

SHEET 3

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ADJOINS

SHEET 5

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date of survey 15/08/2022

SHEET 4 OF 11

ADJOINS

SHEET 4

CONTAINER

TOP OF GUTTER 10.88

RIDGE 14.11

2 STOREY FIBRO BUILDING TILE ROOF

GARDEN

BRICK RET WALL

KERB

GRASS

ROAD

ACCESS

BITUMEN

PAVED

FOOTPATH

BRICK RET

WALL

GARDEN

SIGN

PAVED

PARKING

(PC)

GARDEN

GARDEN

MGA

TN

APPROX. 1°00'

METAL AWNING

RETAIN WALL

GARDEN

PARAPET 11.59

GRASS

WALL

TIMBER RET

GRASS

BITUMEN

PARKING

TOP

OF

KERB

ROAD

ACCESS

BITUMEN

SHEET 9

ADJOINS

20

DP 1139098

H.W.M

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SHEET 5 OF 11

MGA

TN

APPROX. 1000

SHEET 2

ADJOINS

2 STOREY
BUILDING
METAL ROOF
'ASBESTOS DISEASE RESEARCH INSTITUE'

21

DP 1139098

1 STOREY
BRICK &
RENDERED
BUILDING
METAL ROOF

1 STOREY
FIBRO &
METAL
BUILDING
METAL ROOF
'BUILDING 28'

METAL
SHED

PLANT

(E)

(F)

(G)

WALL

FOOTPATH

GRAVEL

GARDEN

CONCRETE

BITUMEN

ACCESS

METAL FENCE

PARAPET 14.36

PARAPET 14.60

PARAPET 14.70

CONCRETE FOOTPATH

AWNING OVER

AWNING 13.21

RENDERED WALL

PARAPET 14.61

PARAPET 14.38

GATE

STEPS

PARAPET 17.66

TOP REND WALL 17.66

GRASS

LOADING

DOCK

ROAD

BRICK RET WALL

SUBSTATION KIOSK

TOP OF GUTTER 12.23

TOP OF GUTTER 12.69

BITUMEN CARPARK

FOOTPATH

KERB

TOP

OF

SEE SHEET 1 FOR LEGEND & NOTES

ADJOINS

SHEET 7

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LGA CANADA BAY

reference number 33907 020DT
scale 1:100 @A1
date of survey 15/08/2022
SHEET 6 OF 11

ADJOINS
SHEET 6

MGA
TN
1°00'
APPROX.

PLANT INACCESIBLE
METAL SHED
BITUMEN CARPARK
GRASS
CONCRETE
FOOTPATH
ROAD
ACCESS
PAVED
RENDERED WALL
FENCE
GATE
METAL
KERB
TOP OF GUT
BANK
EDGE OF BITUMEN
BIKE RACKS
SPEED BUMP
SIGN
AWNING
RAMP
STEPS
WALL
PALING FENCE
CONCRETE DISH DRAIN
PALING TOP OF GUTTER 11.75
CONCRETE TOP OF GUTTER 11.77
RIDGE 15.13
RIDGE 14.05
AWNING 11.15
PARAPET 12.59

1 STOREY
FIBRO & BRICK
BUILDING
TILE ROOF
'BUILDING 29'

1 STOREY
BRICK BUILDING
METAL ROOF
'MANNING BUILDING'
'BUILDING 109 & 110'

20
DP 1139098

SHEET 3
ADJOINS
SHEET 8

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LGA	CANADA BAY
reference number	33907 020DT
scale	1:100 @A1
date of survey	15/08/2022
SHEET	7
OF	11

ADJOINS

SHEET 7

SHEET 4

ADJOINS

1 STOREY FIBRO & BRICK BUILDING TILE ROOF 'BUILDING 29'

1 STOREY BRICK & CONCRETE BUILDING METAL ROOF 'JARA WARD' 'BUILDING 111'

1 STOREY BRICK BUILDING METAL ROOF 'MANNING BUILDING' 'BUILDING 109 & 110'

1 STOREY BRICK BUILDING METAL ROOF 'MANNING BUILDING' 'BUILDING 109 & 110'

1 STOREY BRICK BUILDING METAL ROOF 'MANNING BUILDING' 'BUILDING 109 & 110'

20
DP 1139098

MGA

TN

APPROX

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ADJOINS

SHEET 9

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LGA CANADA BAY

reference number 33907 020DT
scale 1:100 @A1
date of survey 15/08/2022
SHEET 8 OF 11

ADJOINS

SHEET 8

SHEET 5

ADJOINS

METAL AWNING

REND WALL

GRASS

GRASS

GRASS

GARDEN

GARDEN

(E)

ROAD

KERB

SPEED BUMP

CONCRETE

PAVERS

ACCESS

SIGN

TOP

BITUMEN

FENCE

1 STOREY
BRICK BUILDING
METAL ROOF
'MANNING BUILDING'
'BUILDING 109 & 110'

20

DP 1139098

M.H.W.M

MGA

TN

APPROX. 10.0°

SEE SHEET 1 FOR LEGEND & NOTES

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GDA2020

0 2 4 6 8 10

SCALE 1:100 @ A1

Revision	Date	Description	Reference
H	00/00/00	-	00
G	00/00/00	-	00
F	00/00/00	-	00
E	00/00/00	-	00
D	00/00/00	-	00
C	00/00/00	-	00
B	00/00/00	-	00
A	00/00/00	-	00

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www.ltsl.com.au | P 1300 587 000

THIS IS THE PLAN REFERRED TO IN MY LETTER DATED:

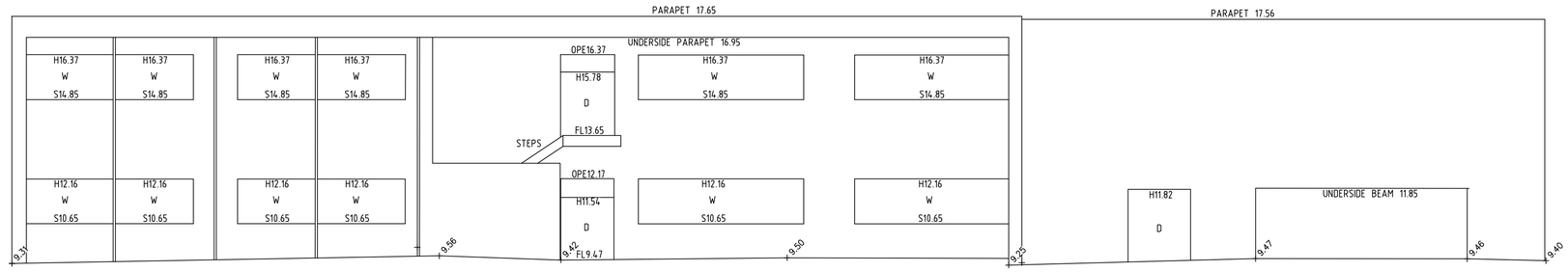
.....
Registered Surveyor NSW

Client - HEALTH INFRASTRUCTURE

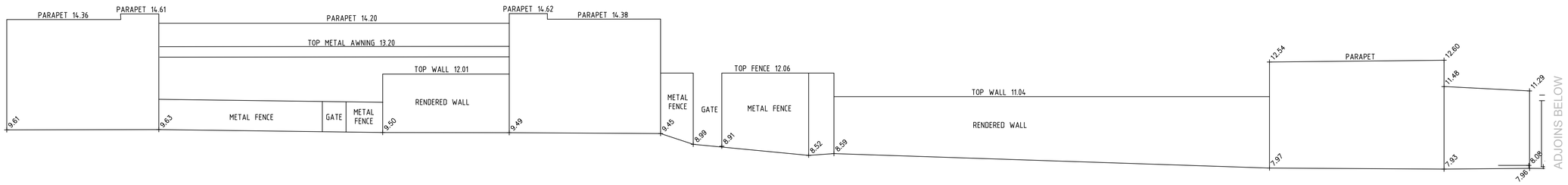
Drawing title
PLAN OF DETAIL AND LEVELS OVER PART LOT 20 IN DP1139098 KNOWN AS CONCORD HOSPITAL, CONCORD WEST

datum AHD
site Area N/A
LGA CANADA BAY

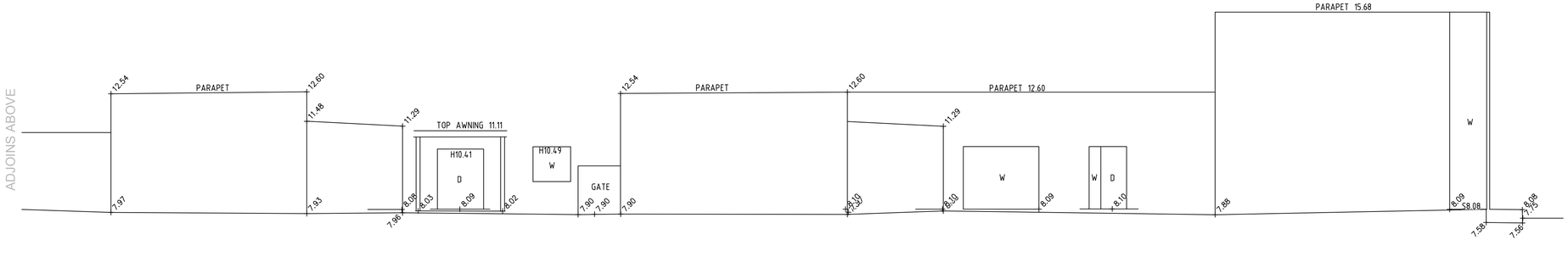
reference number 33907 020DT
scale 1:100 @A1
date of survey 15/08/2022
SHEET 9 OF 11



ASBESTOS DISEASE RESEARCH INSTITUTE
SOUTHERRN ELEVATION



MANNING BUILDING & STREETSCAPE - BUILDING No. 109 & 110
WESTERN ELEVATION



MANNING BUILDING & STREETSCAPE - BUILDING No. 109 & 110
WESTERN ELEVATION

DIAL BEFORE YOU DIG www.1100.com.au

GDA2020

0 10 20 30 40 50

SCALE 1:500 @ A1

Revision	Date	Description	Reference
H	00/00/00	-	00
G	00/00/00	-	00
F	00/00/00	-	00
E	00/00/00	-	00

Revision	Date	Description	Reference
D	00/00/00	-	00
C	00/00/00	-	00
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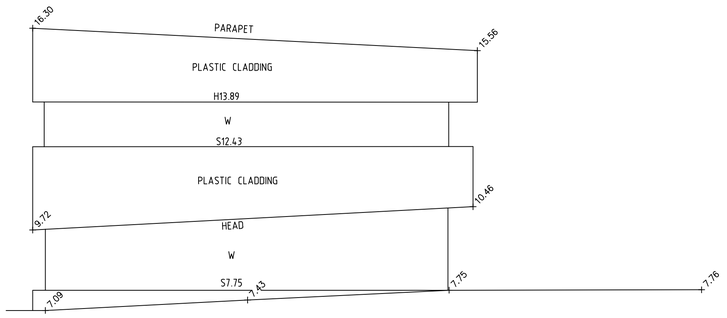
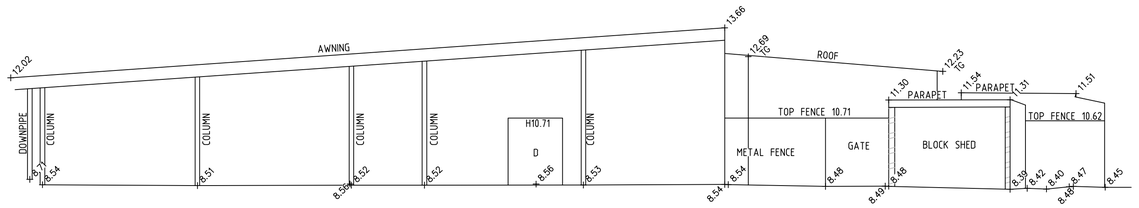
site Area N/A
LGA CANADA BAY

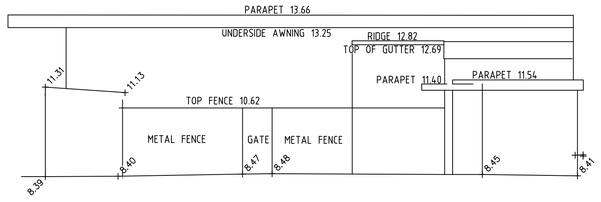
reference number 33907 020DT
scale 1:100 @A1
date of survey 15/08/2022
SHEET 10 OF 11



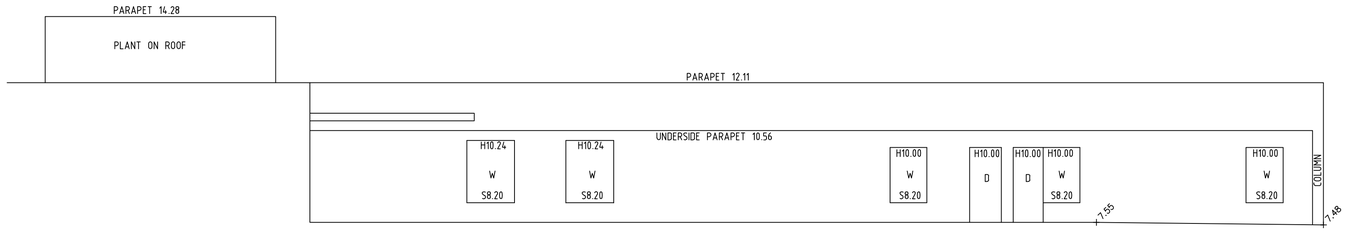
CONCORD MEDICAL EDUCATION CENTRE
EASTERN ELEVATION



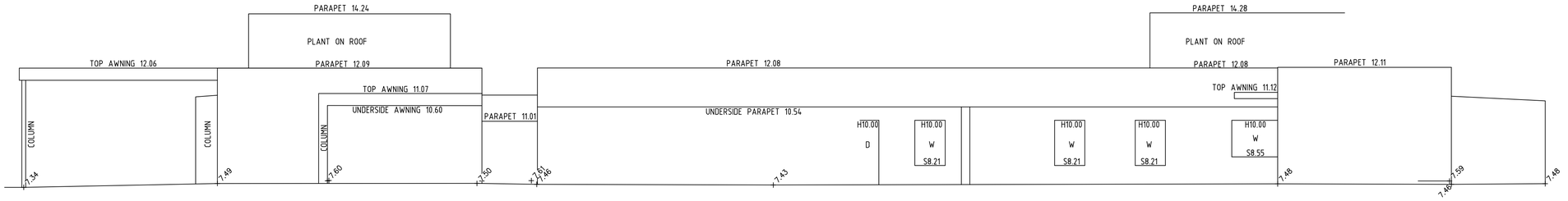
BUILDING No 28
SOUTHERN ELEVATION



BUILDING No 28
SOUTHERN ELEVATION



JARA WARD BUILDING No 112)
EASTERN ELEVATION



JARA WARD BUILDING No 111 + 112)
NORTHERN ELEVATION

DIAL BEFORE YOU DIG www.1100.com.au

GDA2020

0 10 20 30 40 50

SCALE 1:500 @ A1

Revision	Date	Description	Reference
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G	00/00/00	-	00
F	00/00/00	-	00
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datum AHD
site Area N/A
LGA CANADA BAY

reference number 33907 020DT
scale 1:100 @A1
date of survey 15/08/2022
SHEET 11 OF 11

A.2 DBYD Drawings

A0

DBYD Address:
27 Fremont Street
Concord West NSW 2138

DBYD Job No: 32313822

DBYD Sequence No: 213549010

SYDNEY WATER CORPORATION

Scale: 1:2000

Date of Production: 12/07/2022

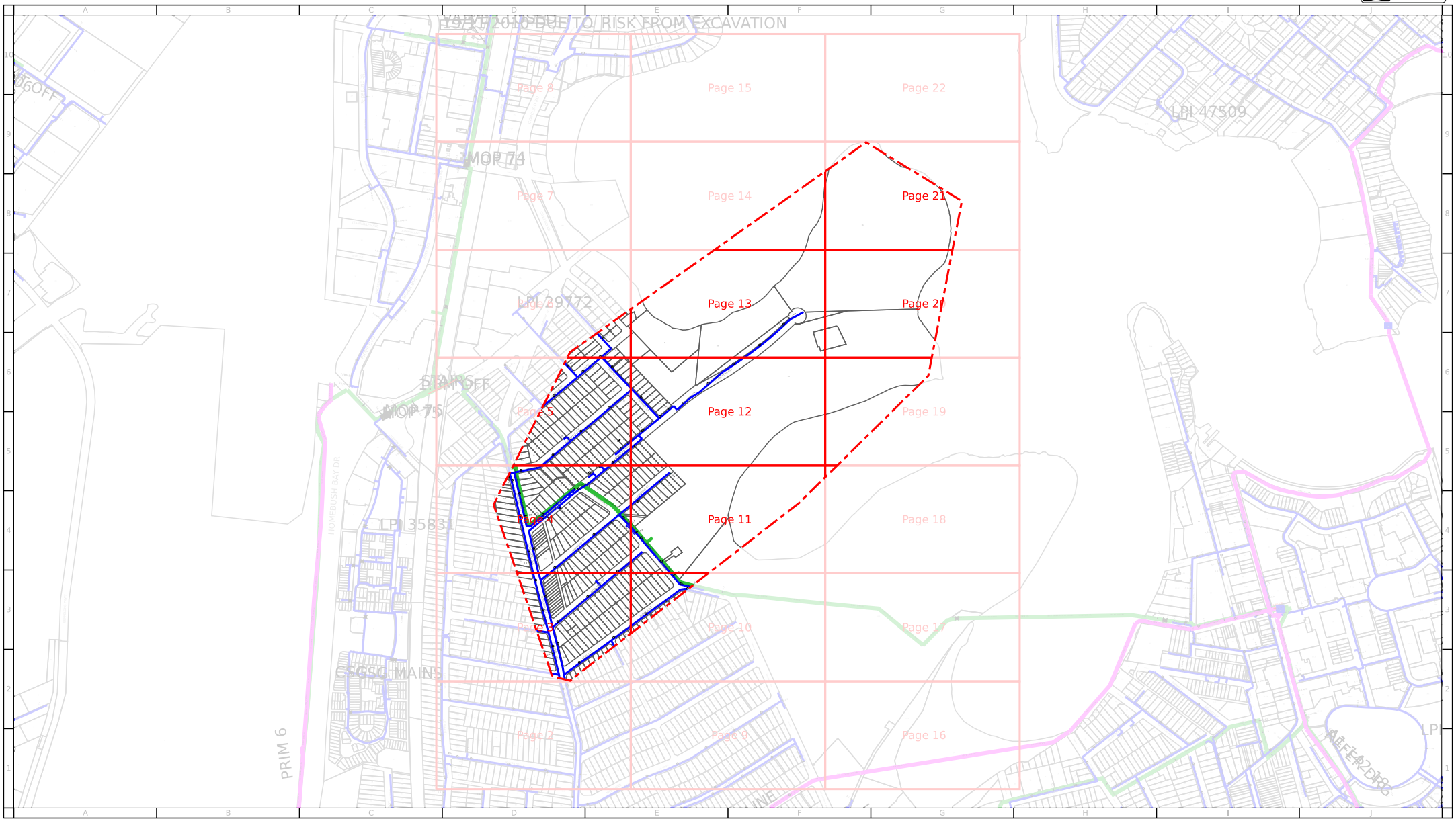
Plan 1 of 1

N

0m 30m 60m 90m 120m 150m

DBYD Authority: Jemena Gas Networks (NSW)

DBYD Location: 27 Fremont Street Concord West NSW, 2138



Jemena
ABN 87 003 004 322

For legend details, please refer to the Coversheet attachment provided as part of this DBYD response.

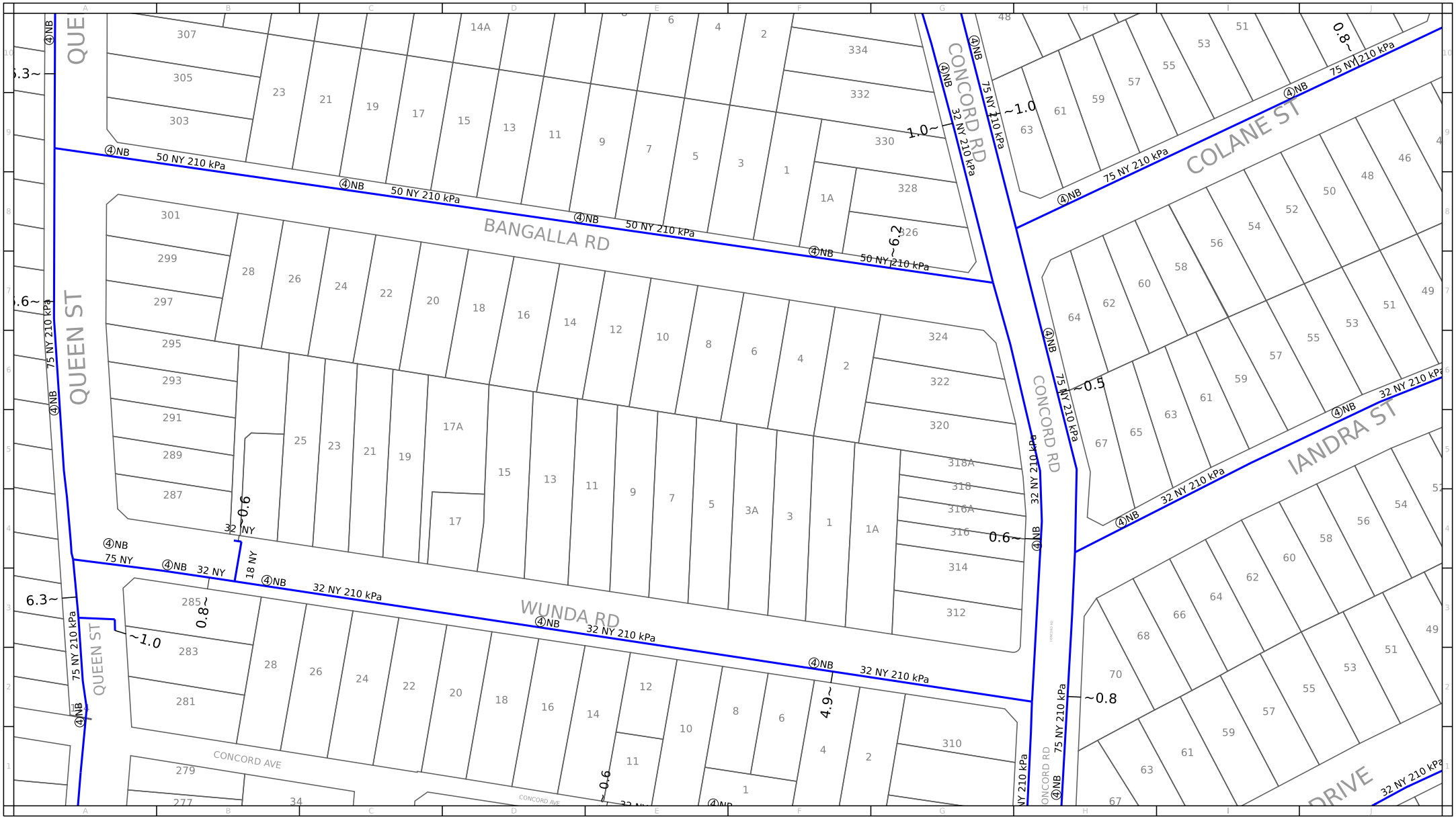
Scale: 1:14702

Issue Date: 12/07/2022
DBYD Seq No: 213549006
DBYD Job No: 32313822
Overview Page:

WARNING: This is a representation of Jemena Gas Networks underground assets only and may not indicate all assets in the area. It must not be used for the purpose of exact asset location in order to undertake any type of excavation. Please read all conditions and information on the attached information sheet. This extract is subject to those conditions.
The information contained on this plan is only valid for 28 days from the date of issue.

DBYD Authority: Jemena Gas Networks (NSW)

DBYD Location: 27 Fremont Street Concord West NSW, 2138



Jemena
ABN 87 003 004 322

For legend details, please refer to the Coversheet attachment provided as part of this DBYD response.

Scale: 1:2000

Issue Date: 12/07/2022
DBYD Seq No: 213549006
DBYD Job No: 32313822

0m 10m 20m 30m 40m 50m 60m 70m 80m

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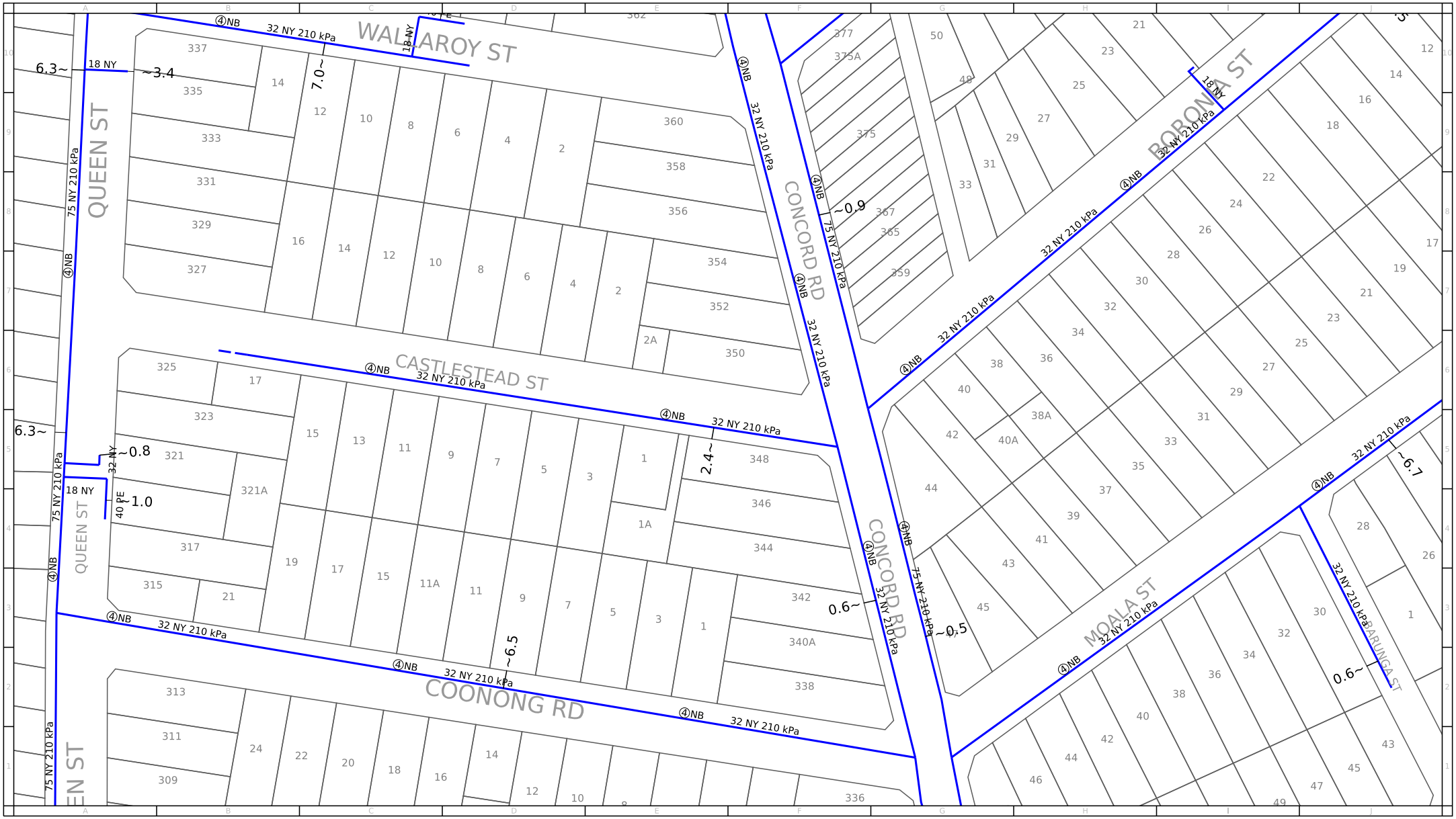
DBYD Location: 27 Fremont Street Concord West NSW, 2138



Jemena
ABN 87 003 004 322

For legend details, please refer to the Coversheet attachment provided as part of this DBYD response.

Scale: 1:2000

Issue Date: 12/07/2022
DBYD Seq No: 213549006
DBYD Job No: 32313822

0m 10m 20m 30m 40m 50m 60m 70m 80m

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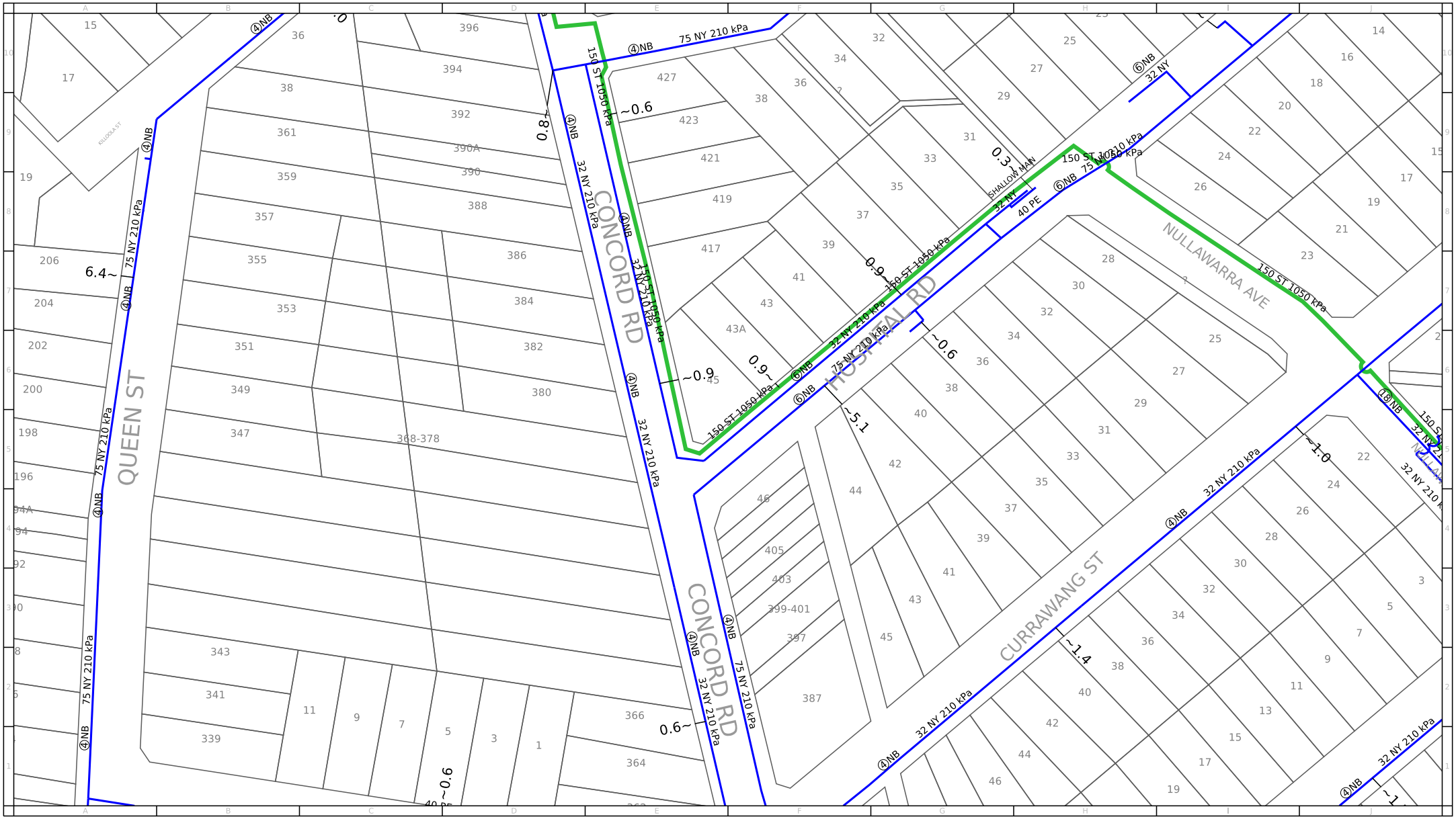

Jemena
ABN 87 003 004 322

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Scale: 1:2000

Issue Date: 12/07/2022
DBYD Seq No: 213549006
DBYD Job No: 32313822

0m 10m 20m 30m 40m 50m 60m 70m 80m

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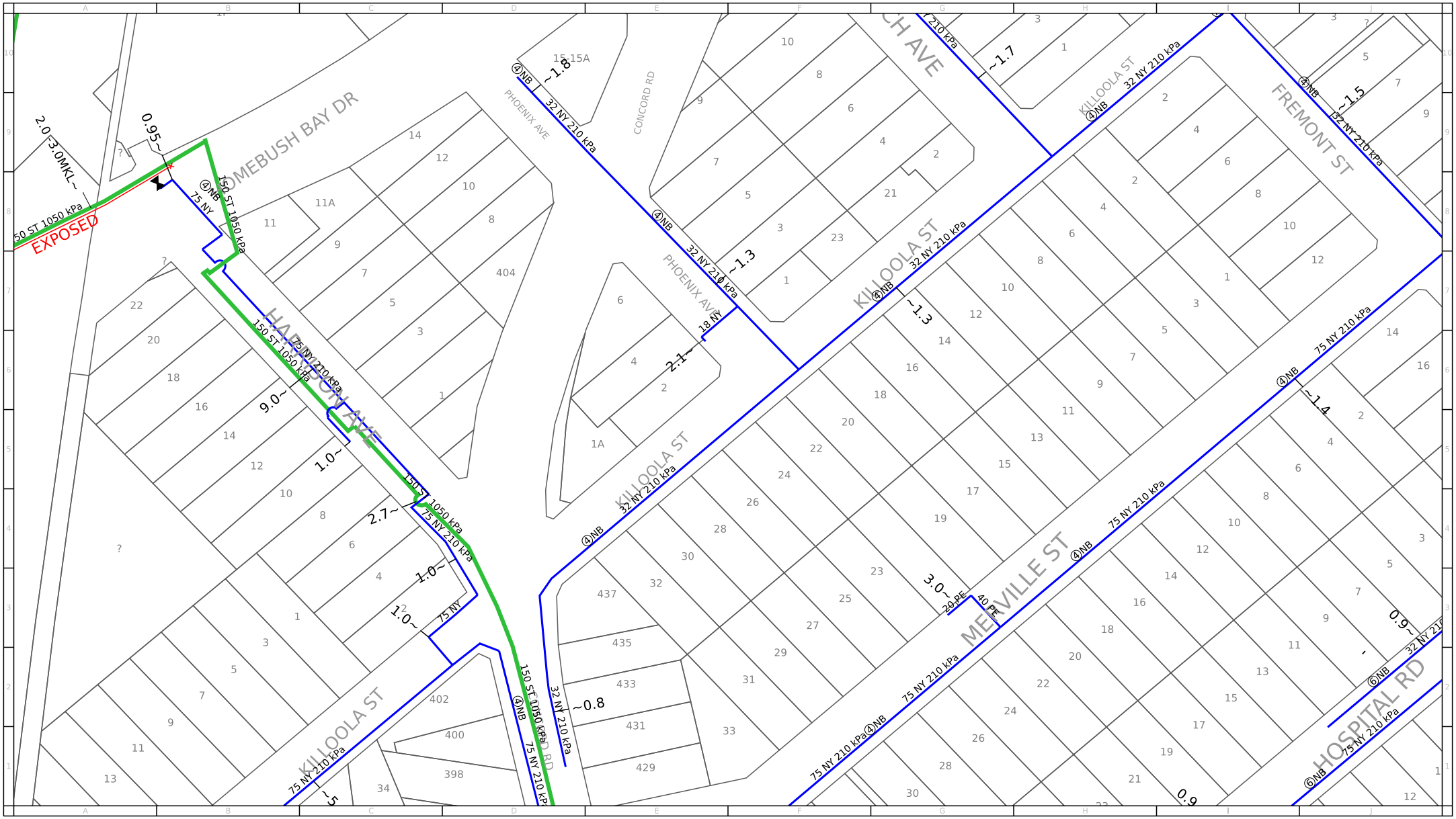
DBYD Location: 27 Fremont Street Concord West NSW, 2138



Jemena
ABN 87 003 004 322

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Scale: 1:2000

Issue Date: 12/07/2022
DBYD Seq No: 213549006
DBYD Job No: 32313822

0m 10m 20m 30m 40m 50m 60m 70m 80m

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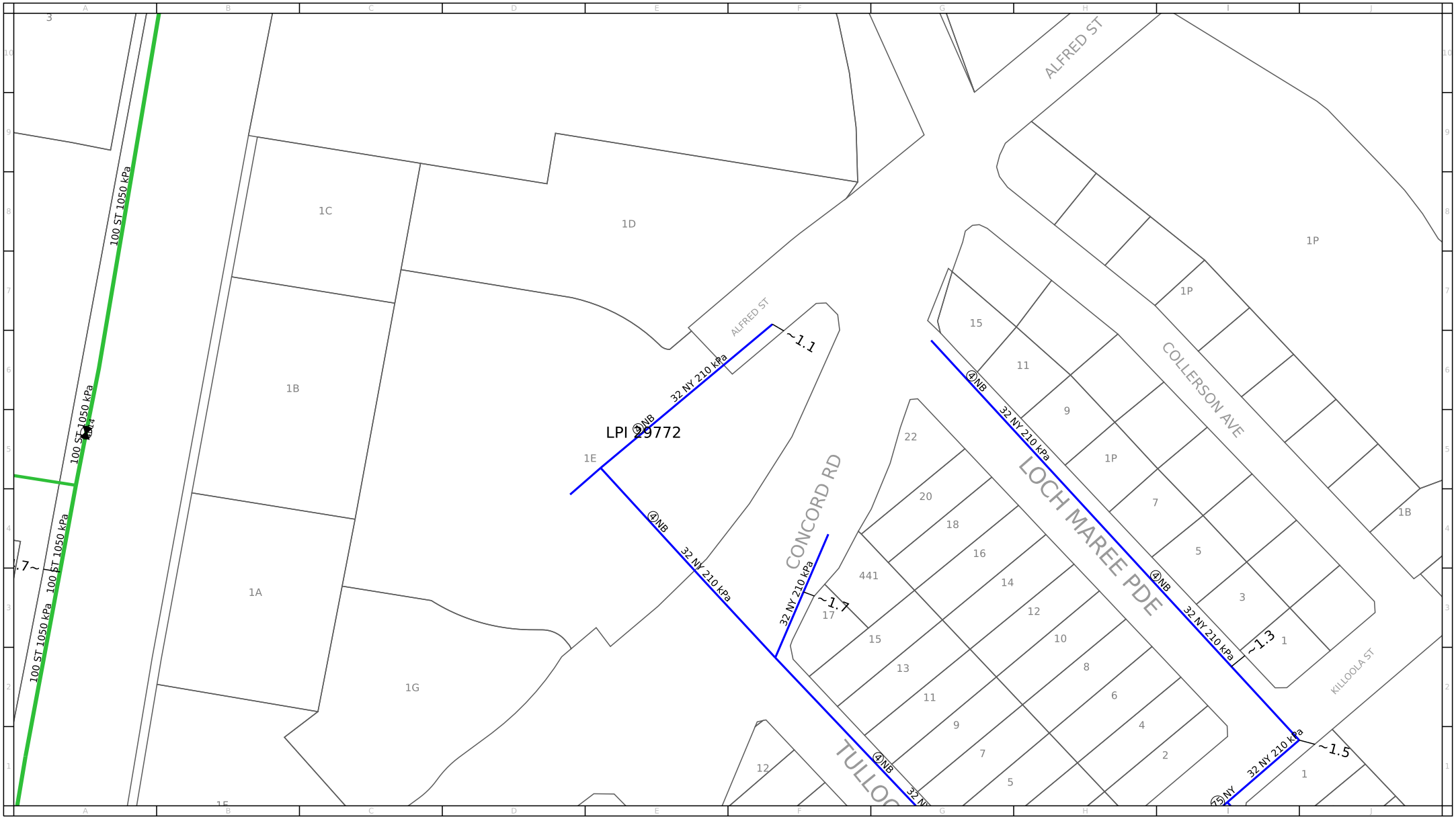

Jemena
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Jemena
ABN 87 003 004 322

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N W E S

Issue Date: 12/07/2022
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DBYD Job No: 32313822

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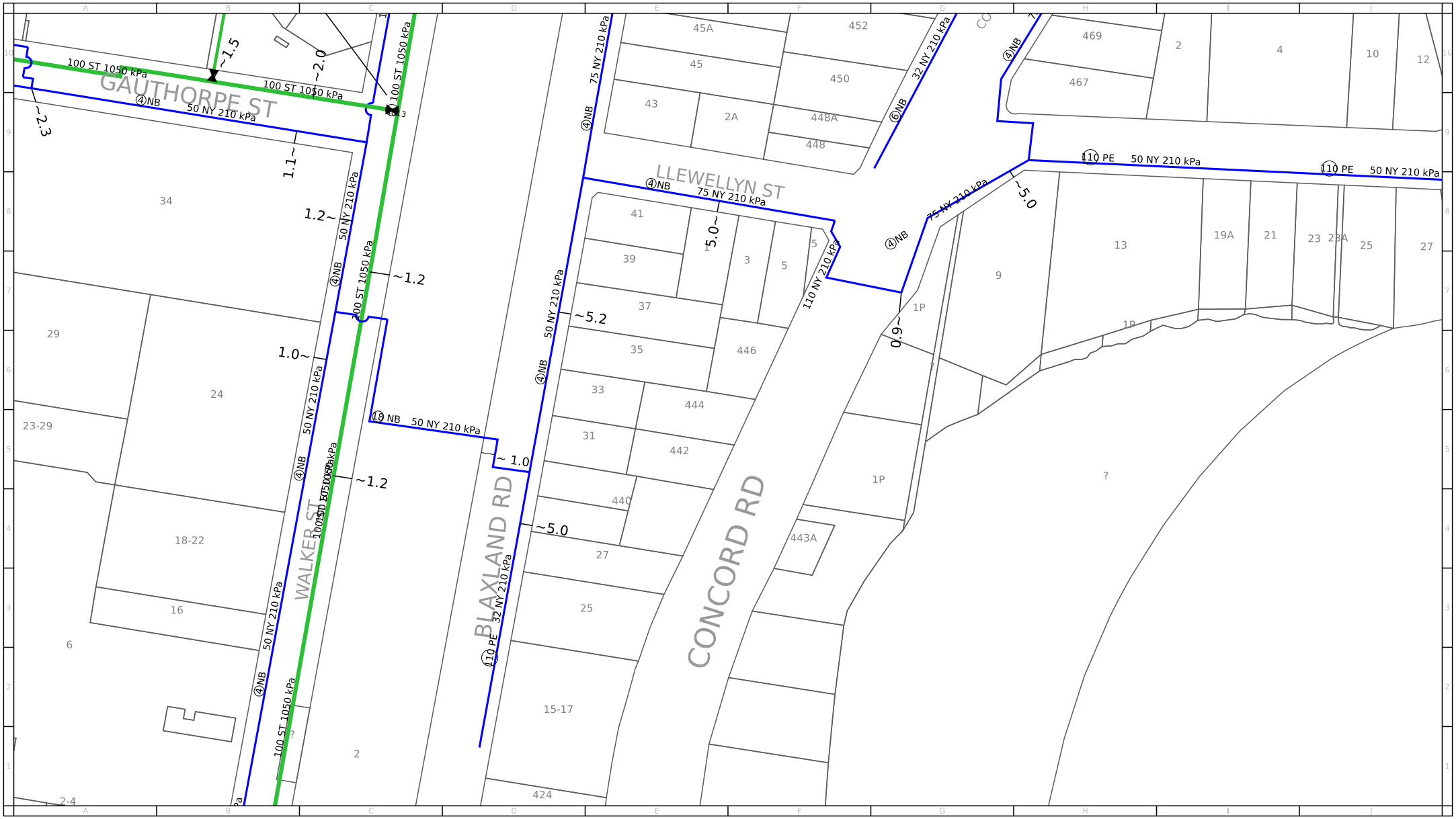

Jemena
ABN 87 003 004 322

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N W E S

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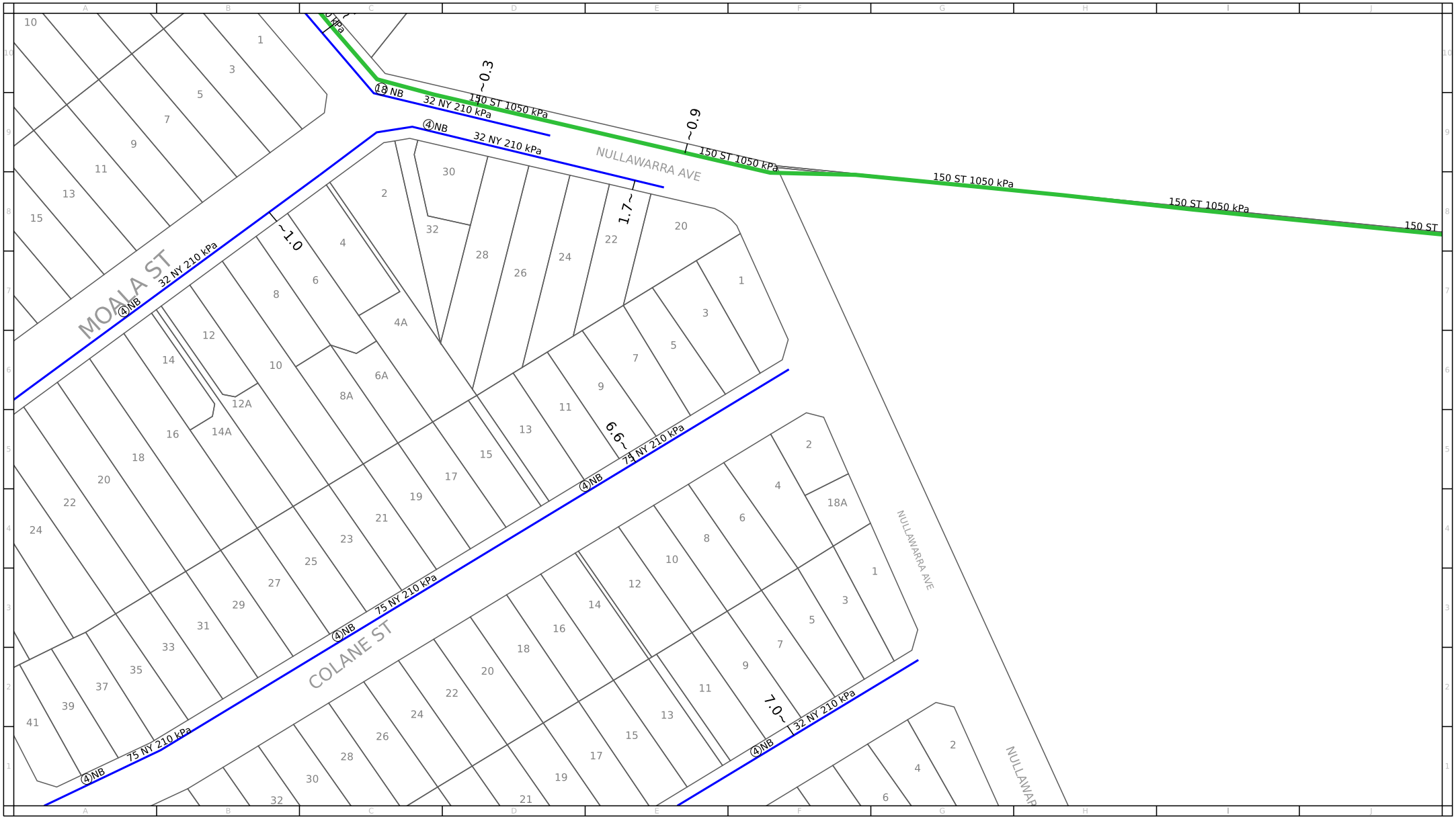

Jemena
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Issue Date: 12/07/2022
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DBYD Job No: 32313822

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Jemena
ABN 87 003 004 322

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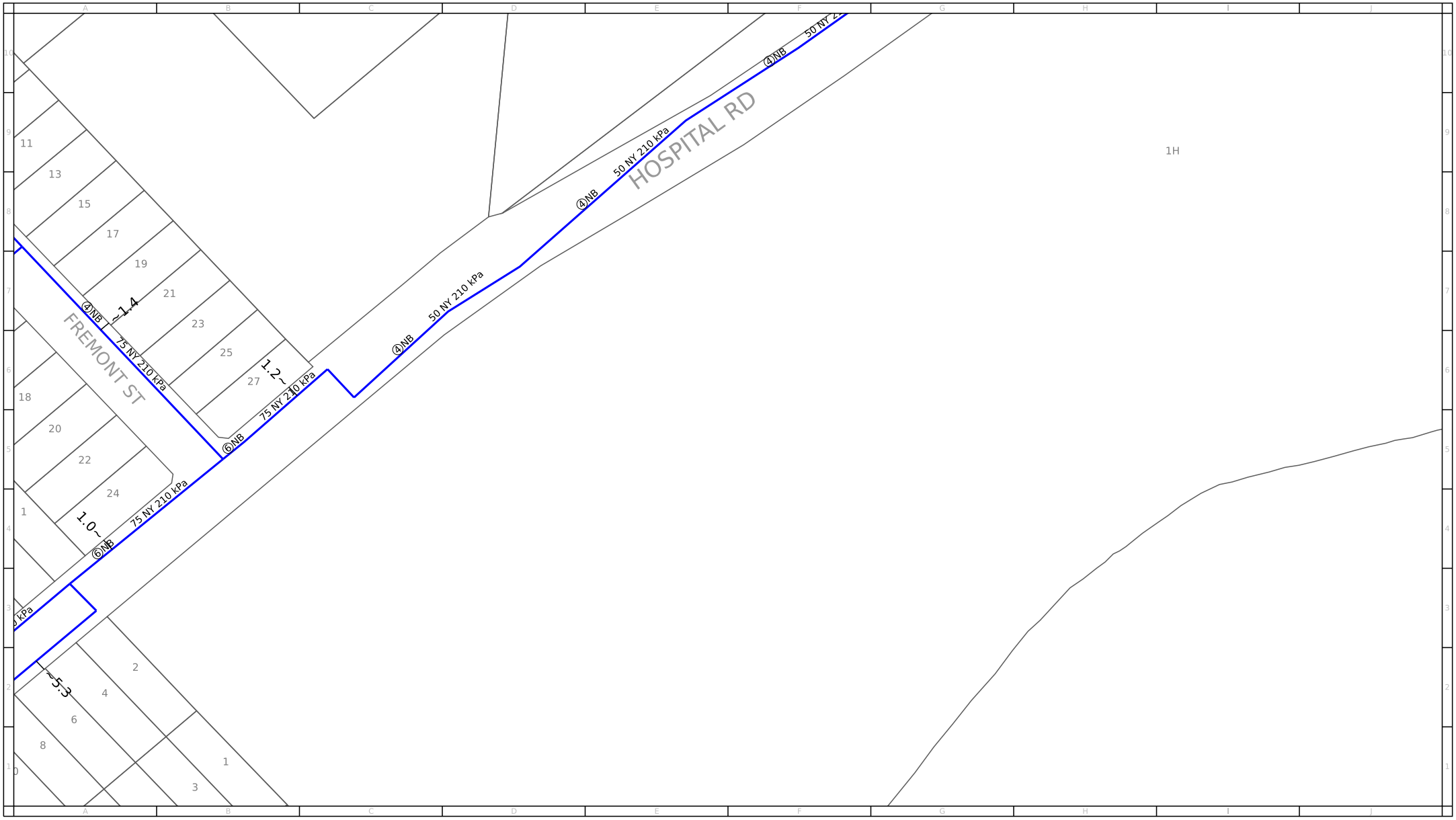

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ABN 87 003 004 322

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N W E S

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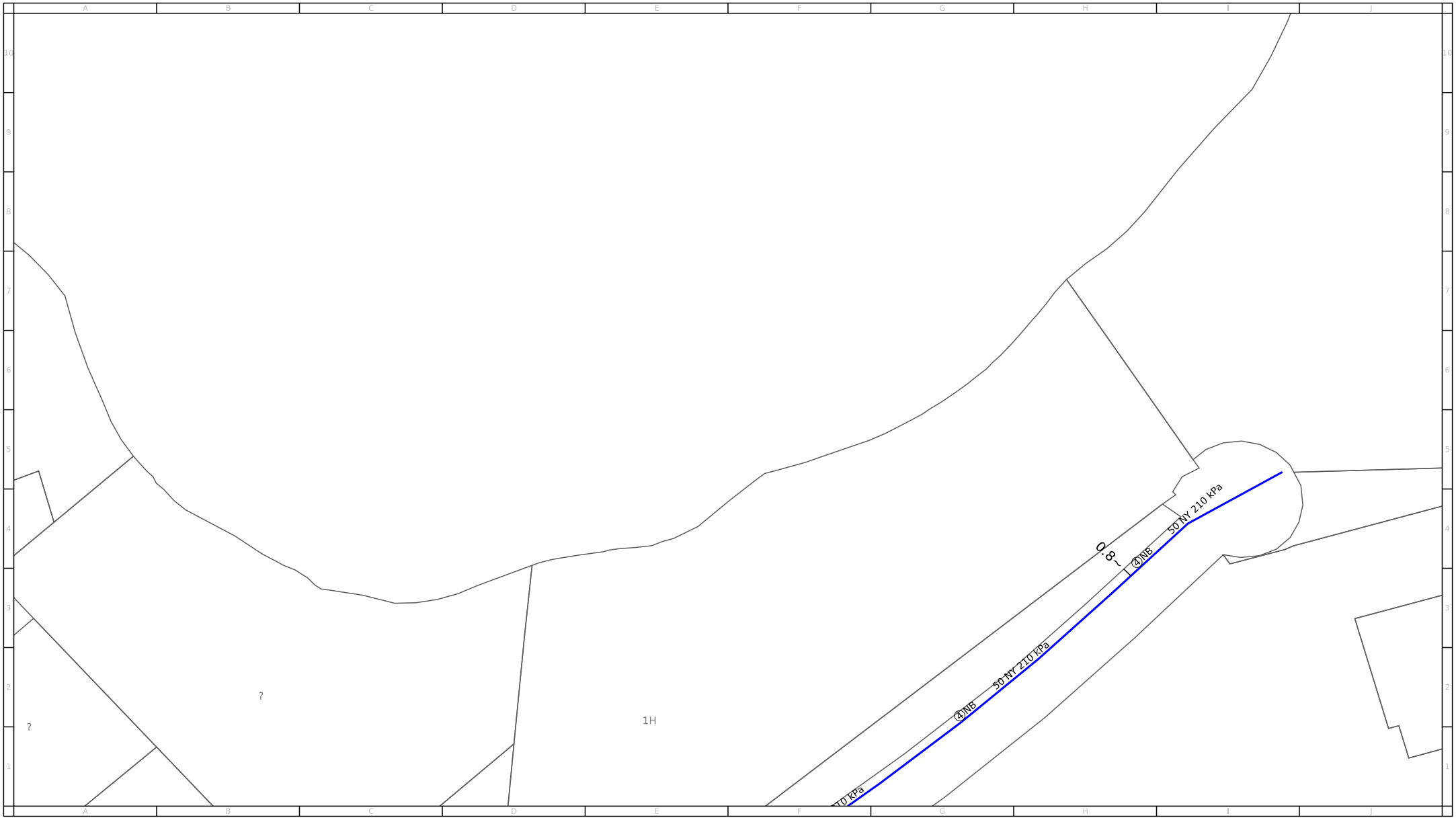

Jemena
ABN 87 003 004 322

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Scale: 1:2000

Issue Date: 12/07/2022
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DBYD Job No: 32313822

0m 10m 20m 30m 40m 50m 60m 70m 80m

DBYD Authority: Jemena Gas Networks (NSW)

DBYD Location: 27 Fremont Street Concord West NSW, 2138

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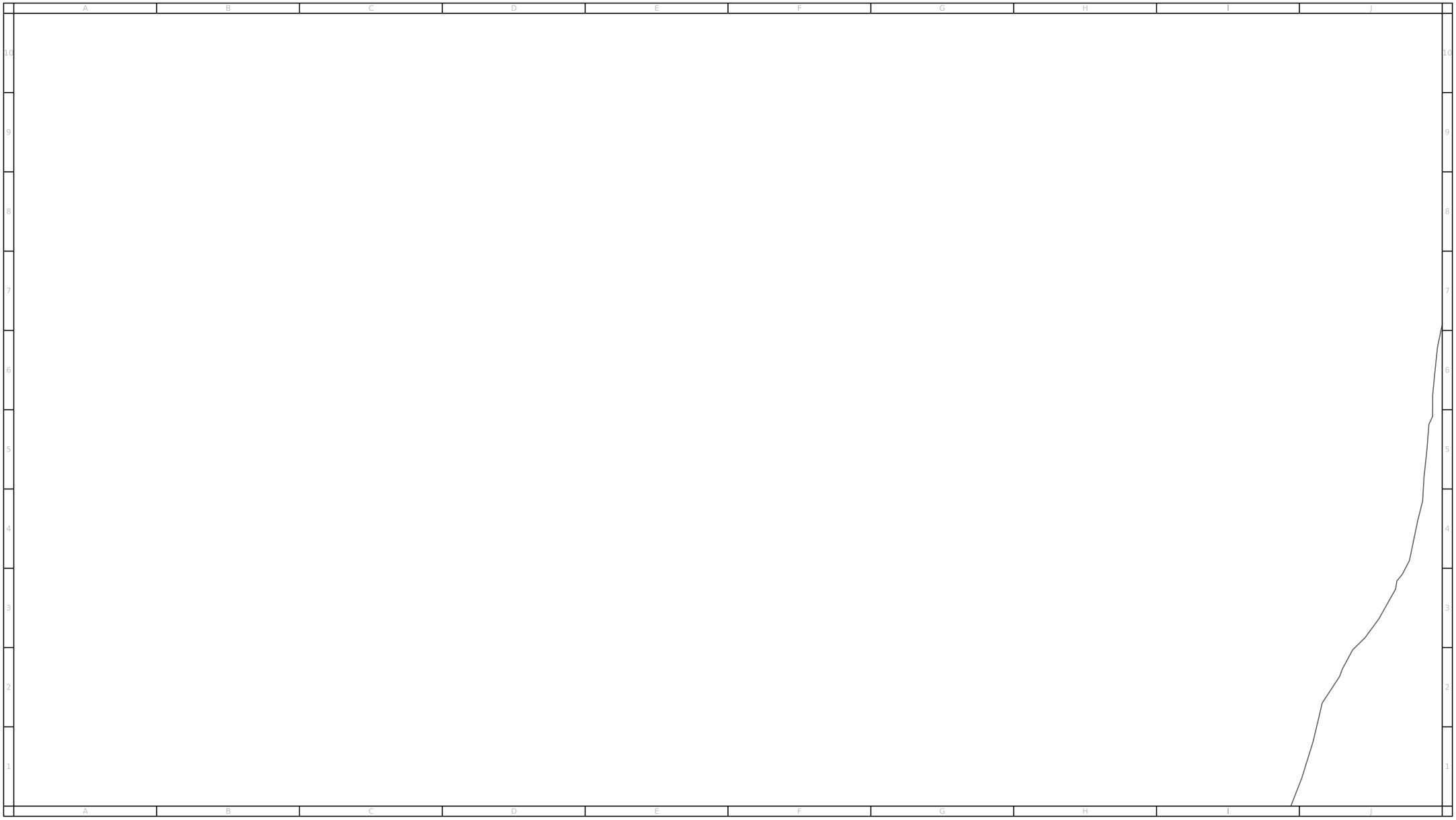

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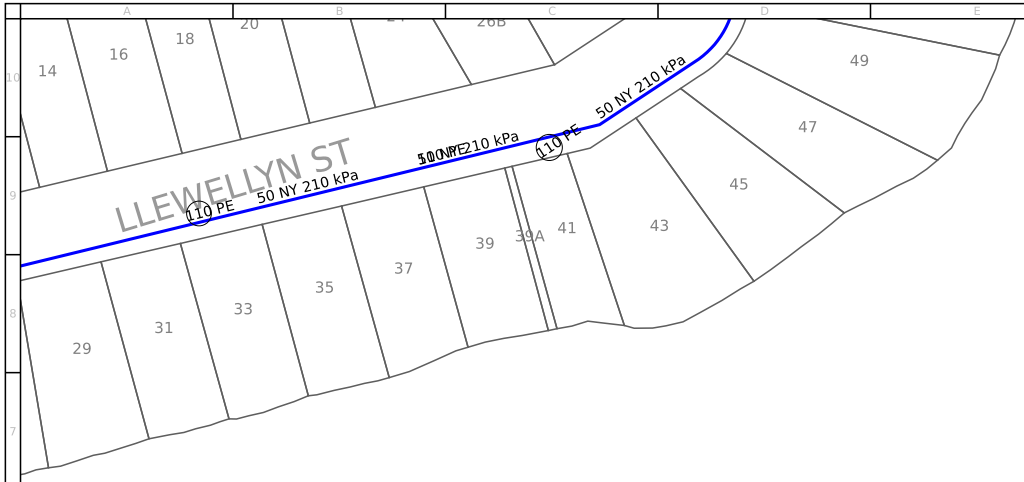

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DBYD Job No: 32313822

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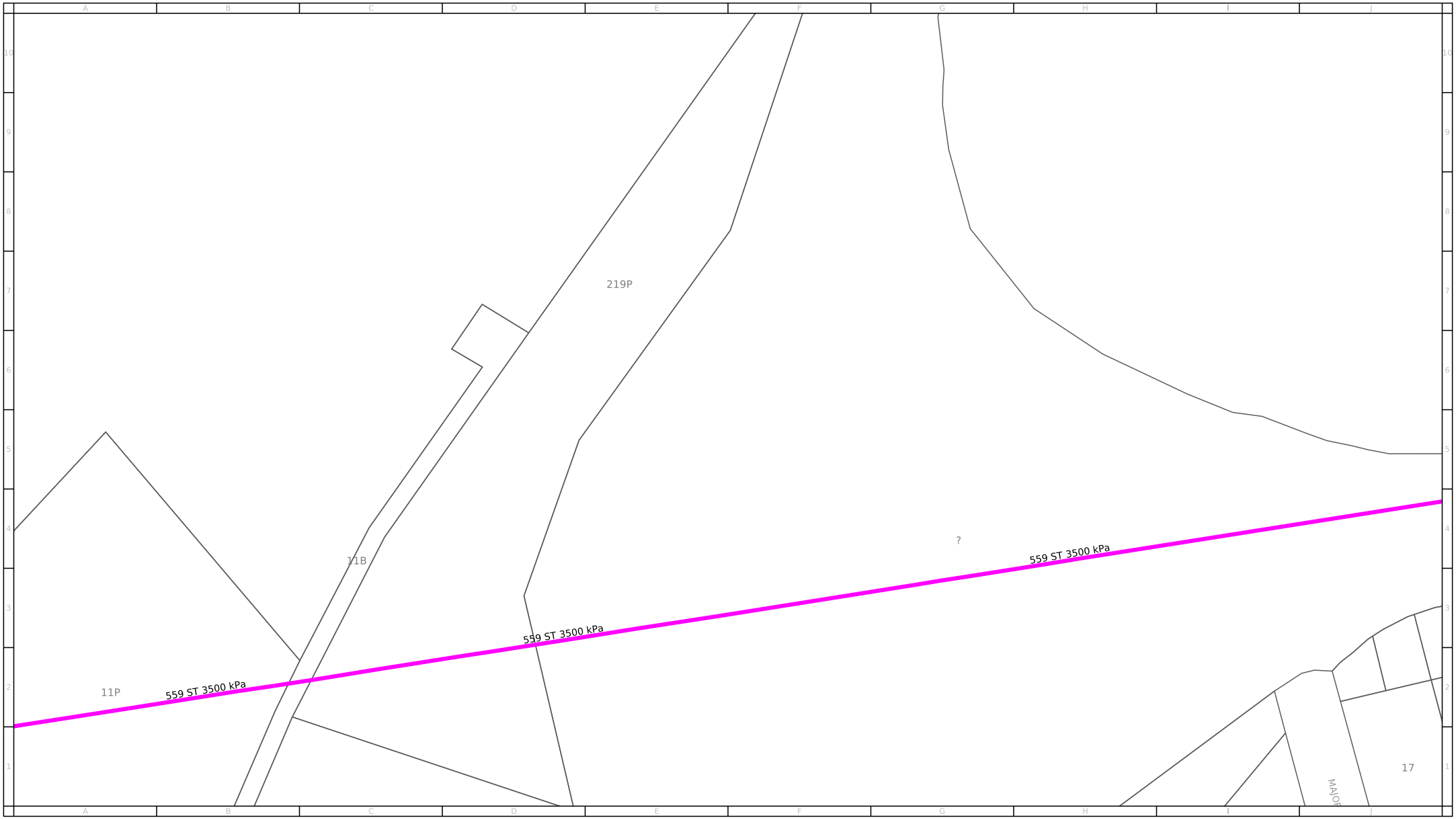

Jemena
ABN 87 003 004 322

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Scale: 1:2000

Issue Date: 12/07/2022
DBYD Seq No: 213549006
DBYD Job No: 32313822

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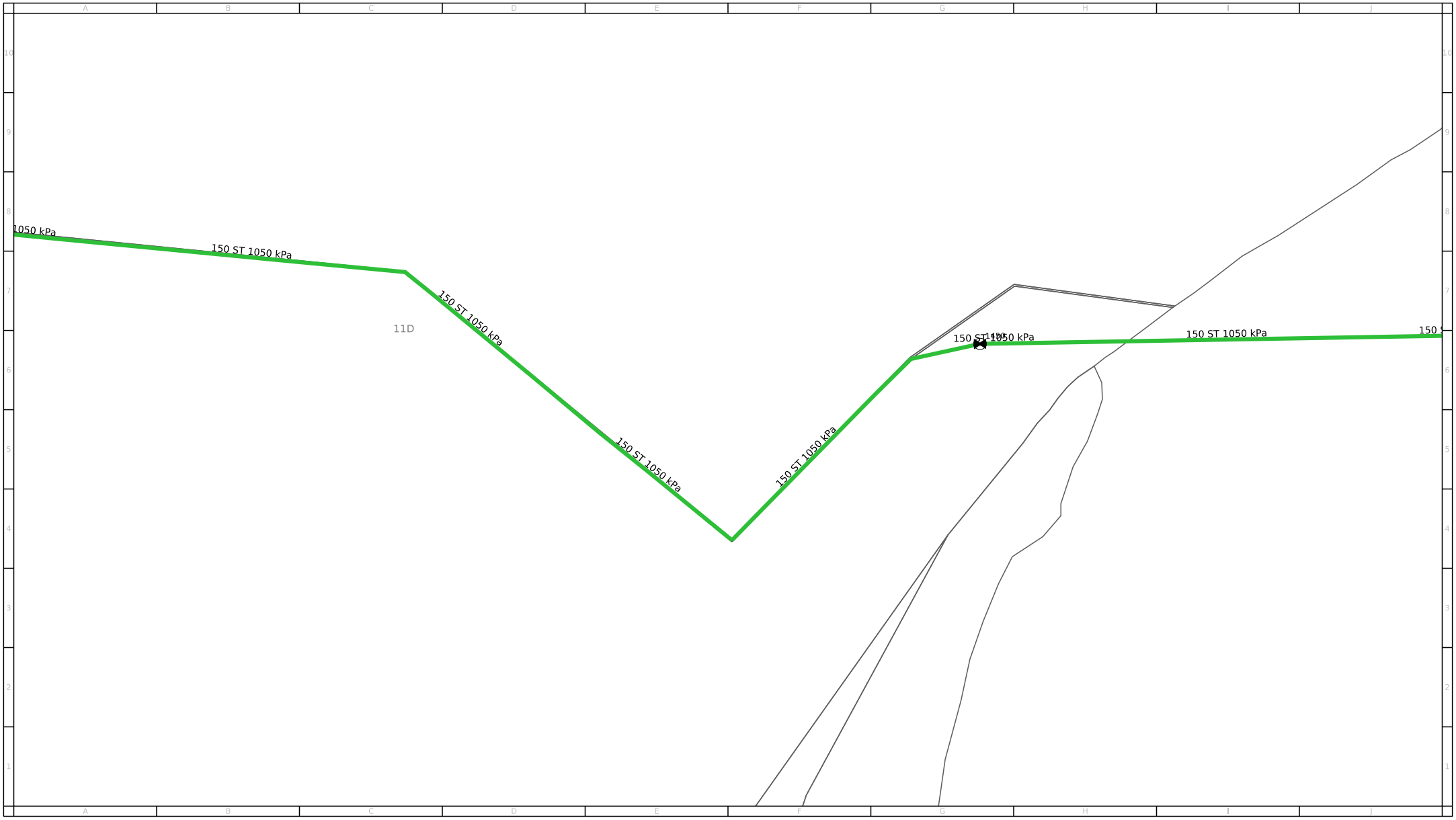

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N
W E
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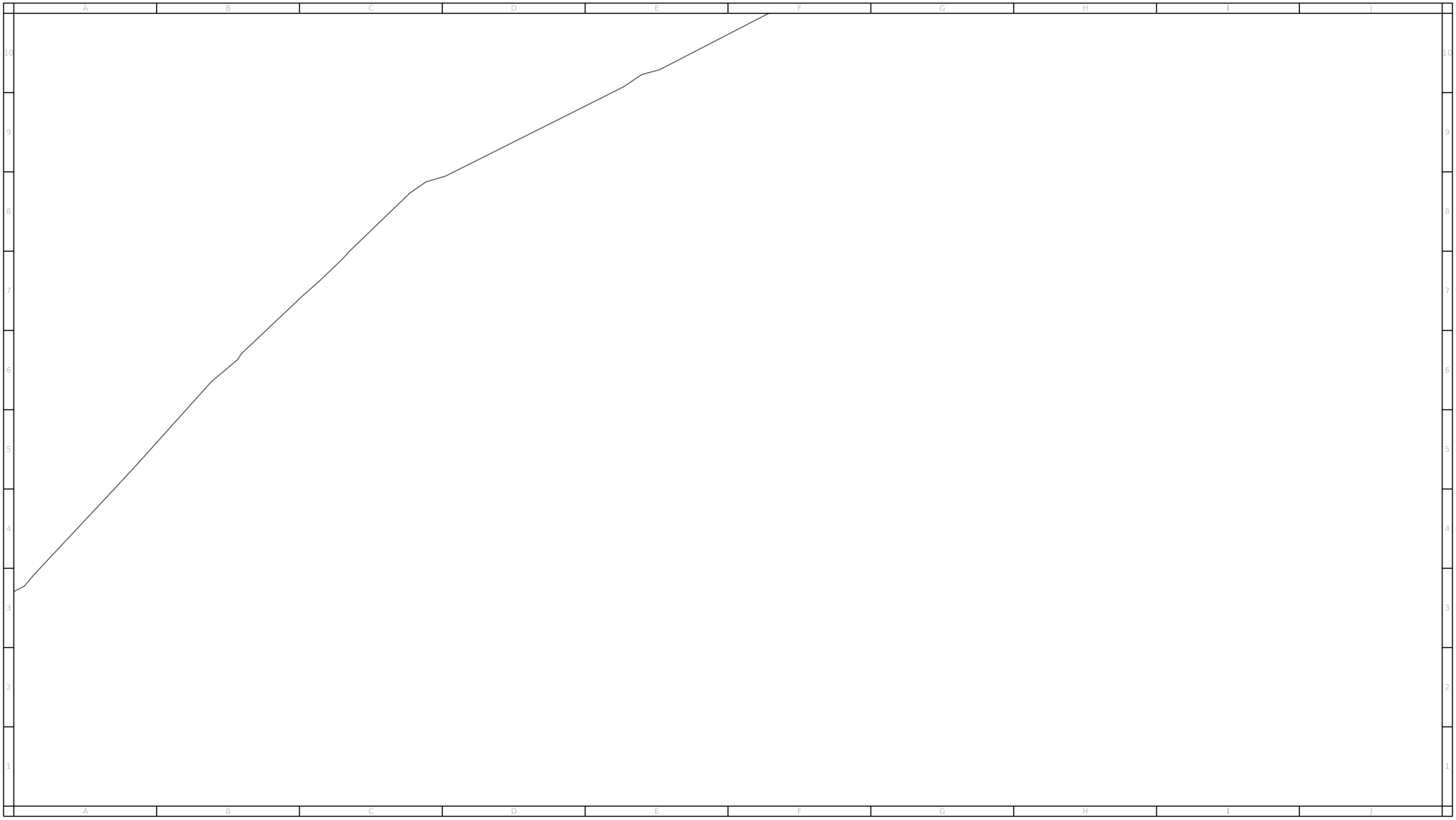

Jemena

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N W E S

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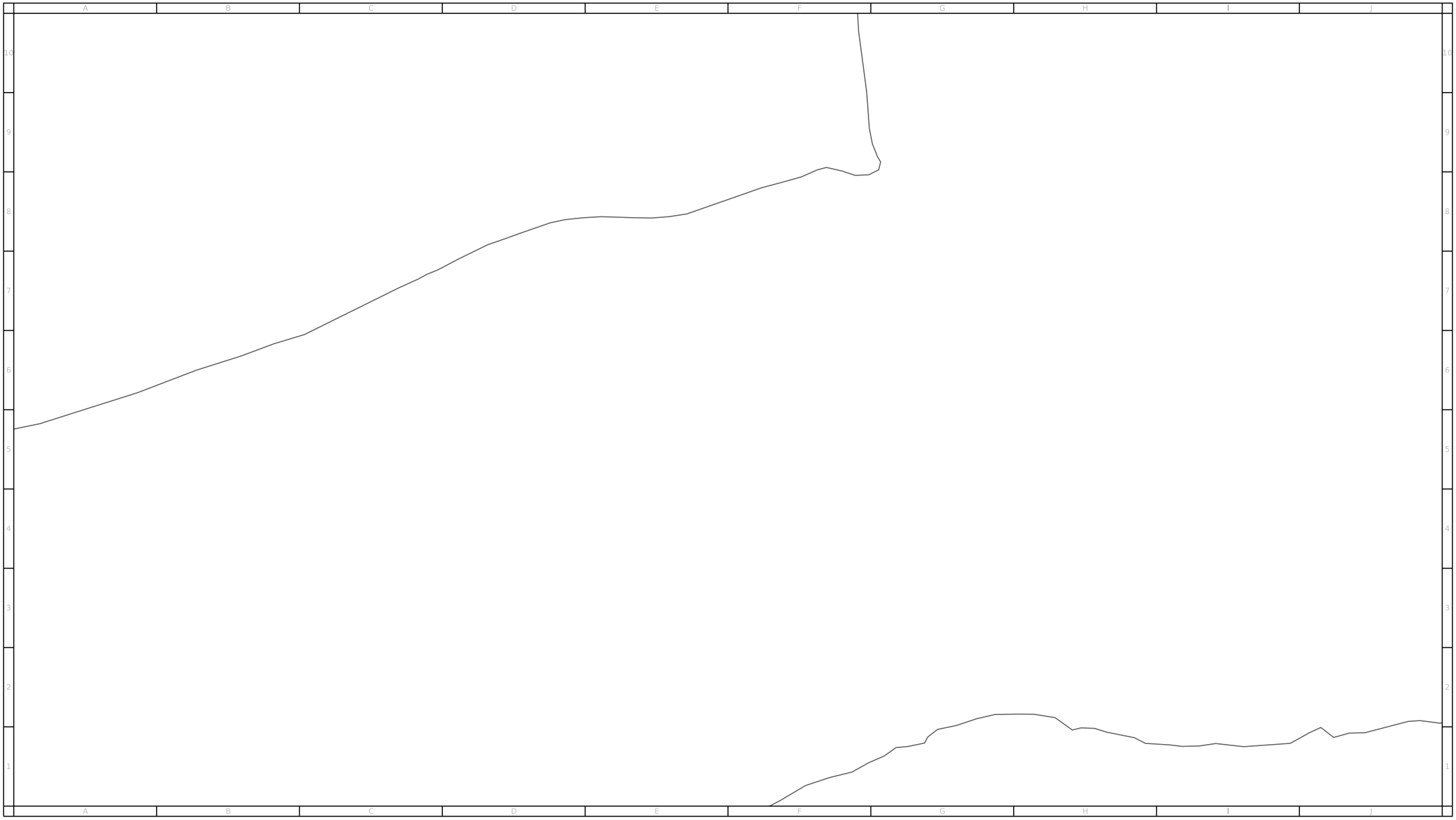
DBYD Job No: 32313822

0m 10m 20m 30m 40m 50m 60m 70m 80m

WARNING: This is a representation of Jemena Gas Networks underground assets only and may not indicate all assets in the area. It must not be used for the purpose of exact asset location in order to undertake any type of excavation. This plan is diagramatic only, and distances scaled from this plan may not be accurate. Please read all conditions and information on the attached information sheet. This extract is subject to those conditions. The information contained on this plan is only valid for 28 days from the date of issue.

DBYD Authority: Jemena Gas Networks (NSW)

DBYD Location: 27 Fremont Street Concord West NSW, 2138



Jemena
ABN 87 003 004 322

For legend details, please refer to the Coversheet attachment provided as part of this DBYD response.

N
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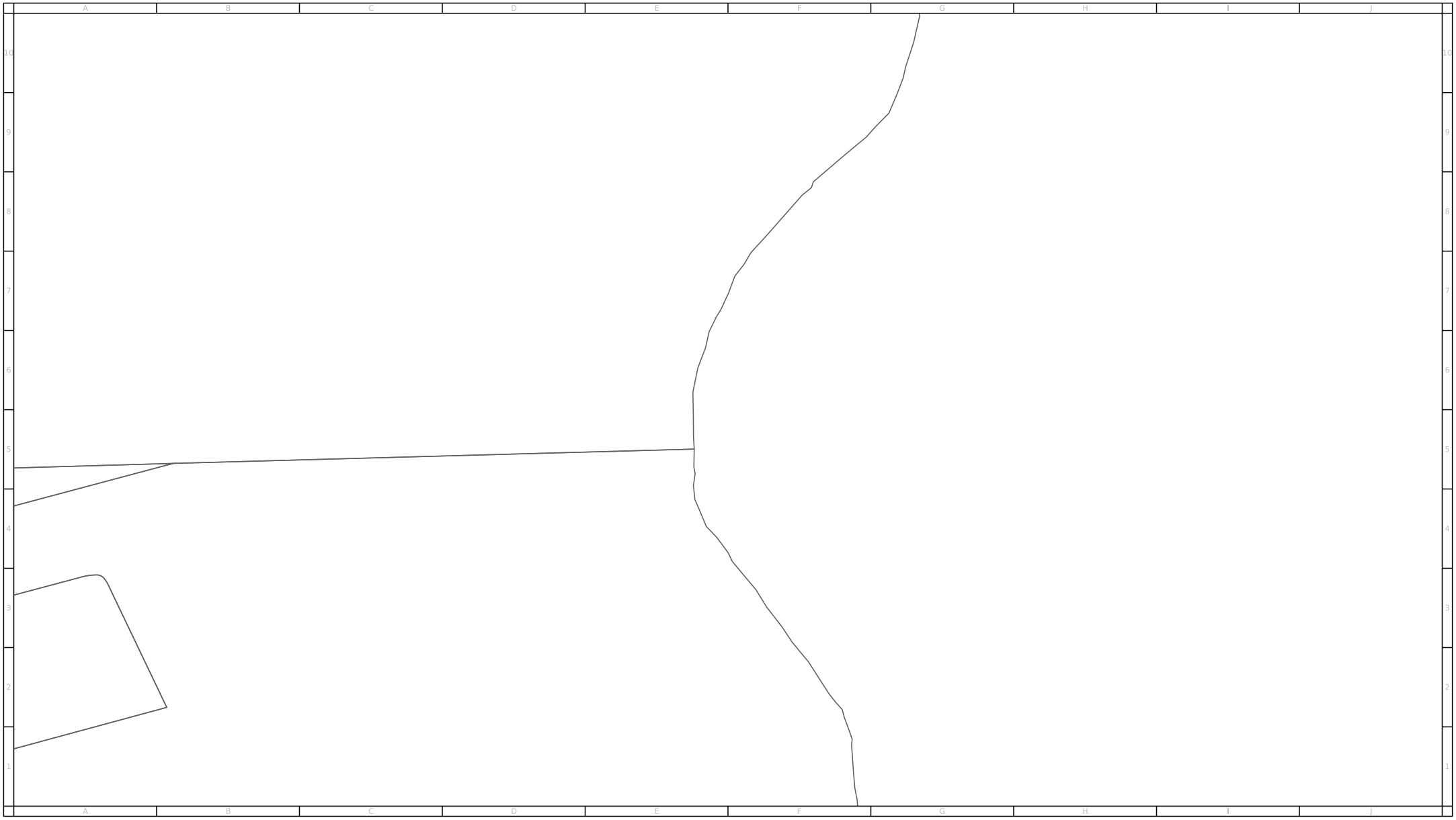
Scale: 1:2000

Issue Date: 12/07/2022
DBYD Seq No: 213549006
DBYD Job No: 32313822

0m 10m 20m 30m 40m 50m 60m 70m 80m

DBYD Authority: Jemena Gas Networks (NSW)

DBYD Location: 27 Fremont Street Concord West NSW, 2138



Jemena
ABN 87 003 004 322

For legend details, please refer to the Coversheet attachment provided as part of this DBYD response.

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Scale: 1:2000

Issue Date: 12/07/2022
DBYD Seq No: 213549006
DBYD Job No: 32313822

0m 10m 20m 30m 40m 50m 60m 70m 80m

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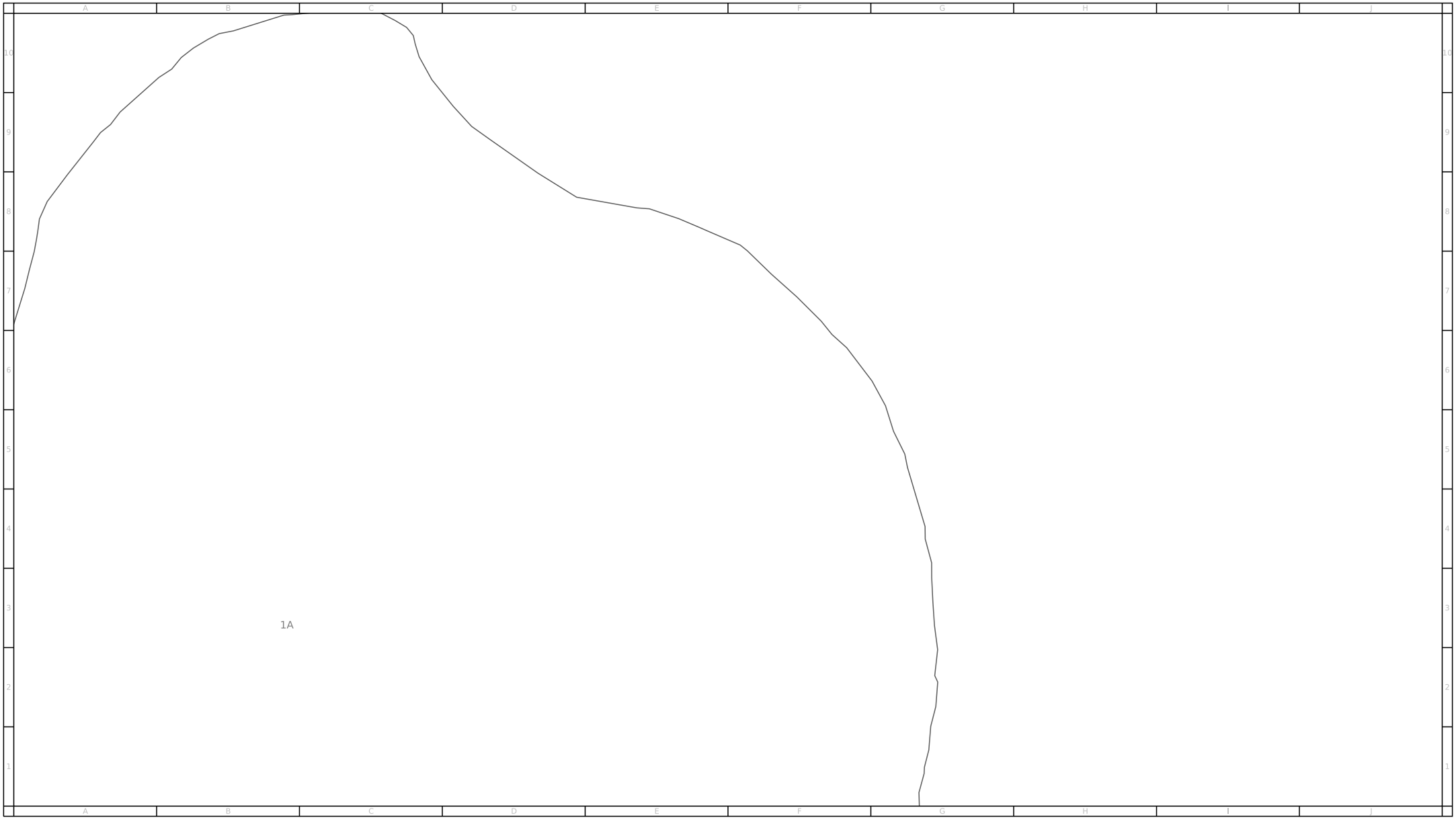
DBYD Authority: Jemena Gas Networks (NSW)

DBYD Location: 27 Fremont Street Concord West NSW, 2138



Jemena
ABN 87 003 004 322

For legend details, please refer to the Coversheet attachment provided as part of this DBYD response.

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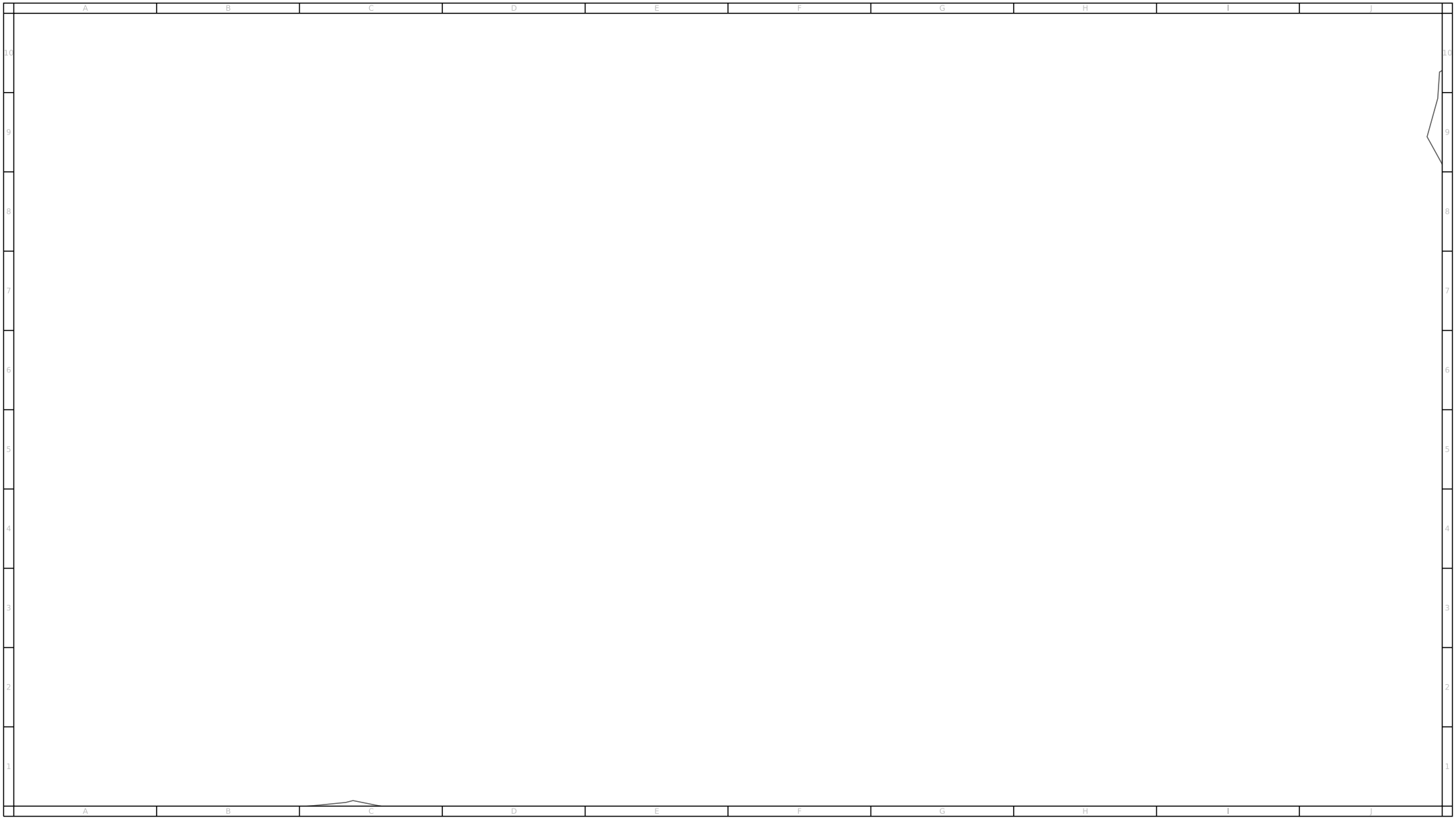
Scale: 1:2000

Issue Date: 12/07/2022
DBYD Seq No: 213549006
DBYD Job No: 32313822

0m 10m 20m 30m 40m 50m 60m 70m 80m

DBYD Authority: Jemena Gas Networks (NSW)

DBYD Location: 27 Fremont Street Concord West NSW, 2138



Jemena
ABN 87 003 004 322

For legend details, please refer to the Coversheet attachment provided as part of this DBYD response.

N
W E
S

Scale: 1:2000

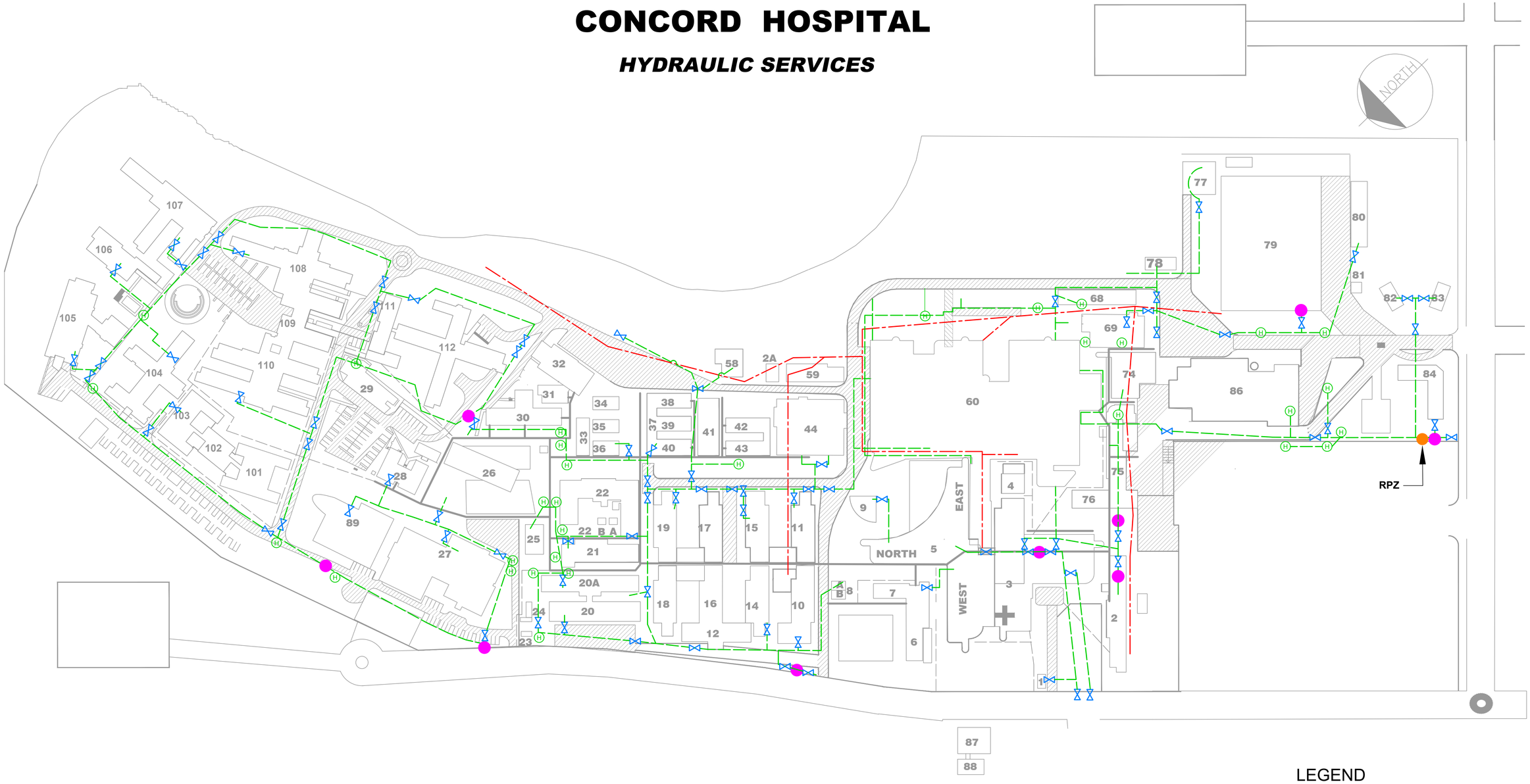
Issue Date: 12/07/2022
DBYD Seq No: 213549006
DBYD Job No: 32313822

0m 10m 20m 30m 40m 50m 60m 70m 80m

A.3 Existing Cold Water and Hydrant Infrastructure

CONCORD HOSPITAL

HYDRAULIC SERVICES



LEGEND

- SEWER
- WATER
- HYDRANT
- WATER SERVICE VALVE
- METER - SYDNEY WATER
- IN-HOUSE WATER METER
- UNDERGROUND WATER STORAGE TANK GREASE ARRESTOR
- RPZ

0 50m 100m

CONCORD HOSPITAL
ENGINEERING SERVICES
RESIDENTIAL QUARTERS
BUILDING 75
CONCORD HOSPITAL
HOSPITAL ROAD
CONCORD NSW 2139

PH : 9767-6376
FAX: 9767-8020

DRAWING TITLE
CONCORD HOSPITAL
SITE SERVICES PLAN

HYDRAULIC SERVICES
WATER AND SEWER RETICULATION

DRAWN BY: KSG	SCALE @ A1: AS SHOWN
APPROVED FOR ISSUE:	
DATE: 25-11-19	JOB No.: A1
DRAWING No: CON WATER AND SEWER – 1	Revision: AB

A.4 Sydney Water Mains Pressure and Flow Results

Statement of Available Pressure and Flow

Natasha Goonewardene
151 Barrack Place
Sydney, 2000

Attention: Natasha Goonewardene Date: 13/12/2022

Pressure & Flow Application Number: 1553676
Your Pressure Inquiry Dated: 2022-12-05
Property Address: 1H Hospital Road, Concord West 2138

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: Hospital Road	Side of Street: North
Distance & Direction from Nearest Cross Street	340 metres East from Fremont Street
Approximate Ground Level (AHD):	7 metres
Nominal Size of Water Main (DN):	150 mm (Target Point as per sketch provided)

EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure	68 metre head
Minimum Pressure	36 metre head

WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	36
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	5 10 15 20 26 30 40 50	41 40 39 38 37 36 33 29
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the water main) Maximum Permissible Flow	5 10 15 20 26 30 40 50 67	35 35 34 32 31 30 26 22 13

(Please refer to reverse side for Notes)

For any further inquiries regarding this application please email :

swtapin@sydneywater.com.au

General Notes

This report is provided on the understanding that (i) the applicant has fully and correctly supplied the information necessary to produce and deliver the report and (ii) the following information is to be read and understood in conjunction with the results provided.

1. Under its Act and Operating Licence, Sydney Water is not required to design the water supply specifically for fire fighting. The applicant is therefore required to ensure that the actual performance of a fire fighting system, drawing water from the supply, satisfies the fire fighting requirements.

2. Due to short-term unavoidable operational incidents, such as main breaks, the regular supply and pressure may not be available all of the time.

3. To improve supply and/or water quality in the water supply system, limited areas are occasionally removed from the primary water supply zone and put onto another zone for short periods or even indefinitely. This could affect the supply pressures and flows given in this letter. This ongoing possibility of supply zone changes etc, means that the validity of this report is limited to one (1) year from the date of issue. It is the property owner's responsibility to periodically reassess the capability of the hydraulic systems of the building to determine whether they continue to meet their original design requirements.

4. Sydney Water will provide a pressure report to applicants regardless of whether there is or will be an approved connection. Apparent suitable pressures are not in any way an indication that a connection would be approved without developer funded improvements to the water supply system. These improvements are implemented under the Sydney Water 'Urban Development Process'.

5. Pumps that are to be directly connected to the water supply require approval of both the pump and the connection. Applications are to be lodged online via Sydney Water Tap in™ system -
Sydney Water Website – www.sydneywater.com.au/tapin/index.htm. Where possible, on-site recycling tanks are recommended for pump testing to reduce water waste and allow higher pump test rates.

6. Periodic testing of boosted fire fighting installations is a requirement of the Australian Standards. To avoid the risk of a possible 'breach' of the Operating Licence, flows generated during testing of fire fighting installations are to be limited so that the pressure in Sydney Water's System is not reduced below 15 metres. Pumps that can cause a breach of the Operating Licence anywhere in the supply zone during testing will not be approved. This requirement should be carefully considered for installed pumps that can be tested to 150% of rated flow.

Notes on Models

1. Calibrated computer models are used to simulate maximum demand conditions experienced in each supply zone. Results have not been determined by customised field measurement and testing at the particular location of the application.

2. Regular updates of the models are conducted to account for issues such a urban consolidation, demand management or zone change.

3. Demand factors are selected to suit the type of fire-fighting installation. Factor 1 indicates pressures due to system demands as required under Australian Standards for fire hydrant installations. Factor 2 indicates pressures due to peak system demands.

4. When fire-fighting flows are included in the report, they are added to the applicable demand factor at the nominated location during a customised model run for a single fire. If adjacent properties become involved with a coincident fire, the pressures quoted may be substantially reduced.

5. Modelling of the requested fire fighting flows may indicate that local system capacity is exceeded and that negative pressures may occur in the supply system. Due to the risk of water contamination and the endangering of public health, Sydney Water reserves the right to refuse or limit the amount of flow requested in the report and, as a consequence, limit the size of connection and/or pump.

6. The pressures indicated by the modelling, at the specified location, are provided without consideration of pressure losses due to the connection method to Sydney Water's mains.

Statement of Available Pressure and Flow

Sydney WATER

Natasha Goonewardene
151 Barrack Place
Sydney, 2000

Attention: Natasha Goonewardene Date: 13/12/2022

Pressure & Flow Application Number: 1553655
Your Pressure Inquiry Dated: 2022-12-05
Property Address: 1H Hospital Road, Concord West 2138

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: Hospital Road	Side of Street: South
Distance & Direction from Nearest Cross Street	340 metres East from Fremont Street
Approximate Ground Level (AHD):	7 metres
Nominal Size of Water Main (DN):	200 mm

EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure	68 metre head
Minimum Pressure	36 metre head

WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	36
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	5 10 15 20 26 30 40 50	40 40 39 38 37 36 33 29
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the water main) Maximum Permissible Flow	5 10 20 20 26 30 40 50 84	35 34 32 32 31 29 26 22 4

(Please refer to reverse side for Notes)

For any further inquiries regarding this application please email :

swtapin@sydneywater.com.au

General Notes

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2. Due to short-term unavoidable operational incidents, such as main breaks, the regular supply and pressure may not be available all of the time.

3. To improve supply and/or water quality in the water supply system, limited areas are occasionally removed from the primary water supply zone and put onto another zone for short periods or even indefinitely. This could affect the supply pressures and flows given in this letter. This ongoing possibility of supply zone changes etc, means that the validity of this report is limited to one (1) year from the date of issue. It is the property owner's responsibility to periodically reassess the capability of the hydraulic systems of the building to determine whether they continue to meet their original design requirements.

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1. Calibrated computer models are used to simulate maximum demand conditions experienced in each supply zone. Results have not been determined by customised field measurement and testing at the particular location of the application.

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6. The pressures indicated by the modelling, at the specified location, are provided without consideration of pressure losses due to the connection method to Sydney Water's mains.

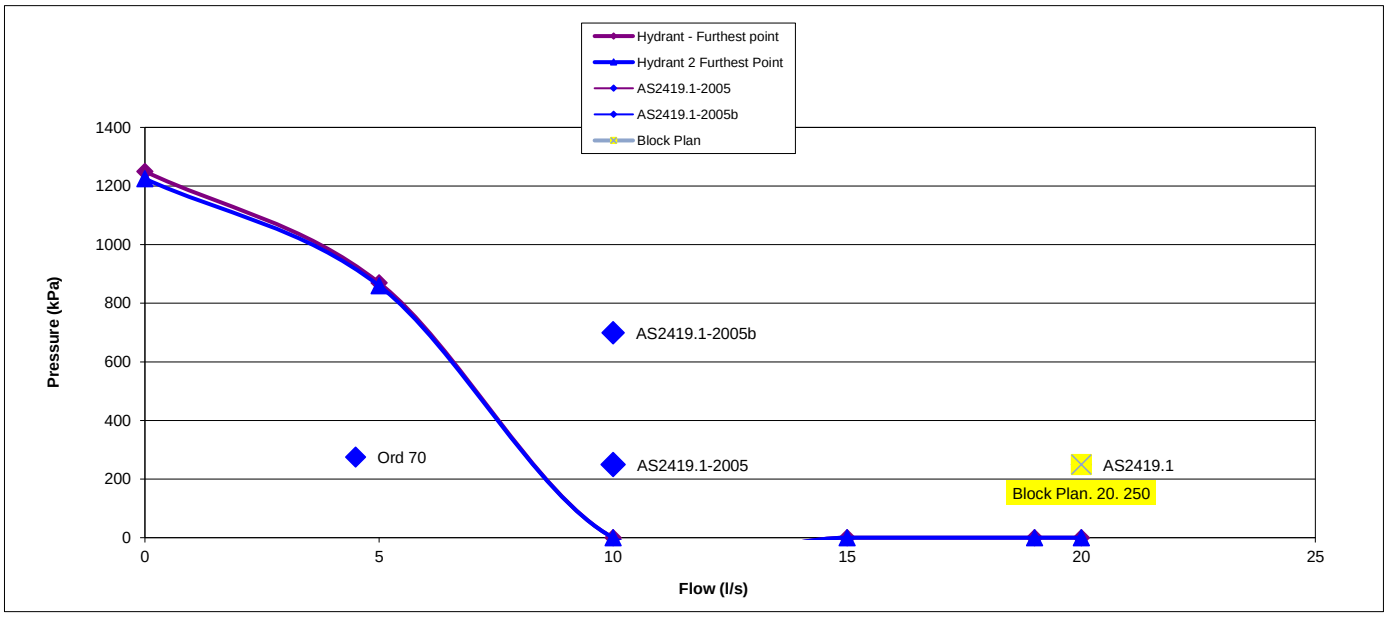
A.5 Onsite Testing Pressure and Flow Results

CONCORD HOSPITAL - HYDRANT FLOW TEST RESULTS

Location: Building 26 - Rotork Shut - Diesel Pump Running
Date: 30-Mar-23
Test Equip: Ambit PF-1D
Pump Size: 27kw - 264 Impeller
PumpsetType: Diesel

Results	Hydrant - Furthest point	Hydrant 2 Furthest Point
Flow Rate (l/s)	Discharge Pressure (kPa)	Discharge Pressure (kPa)
0	1250	1225
5	870	860
10	0	0
15	0	0
19	0	0
20	0	0

System Requirements		
	Flow (l/s)	Pressure (kPa)
AS2419.1	20	250
Ordinance 70	4.5	275
AS2419.1-2005a	10	250
AS2419.1-2005b	10	700
Block Plan	20	250



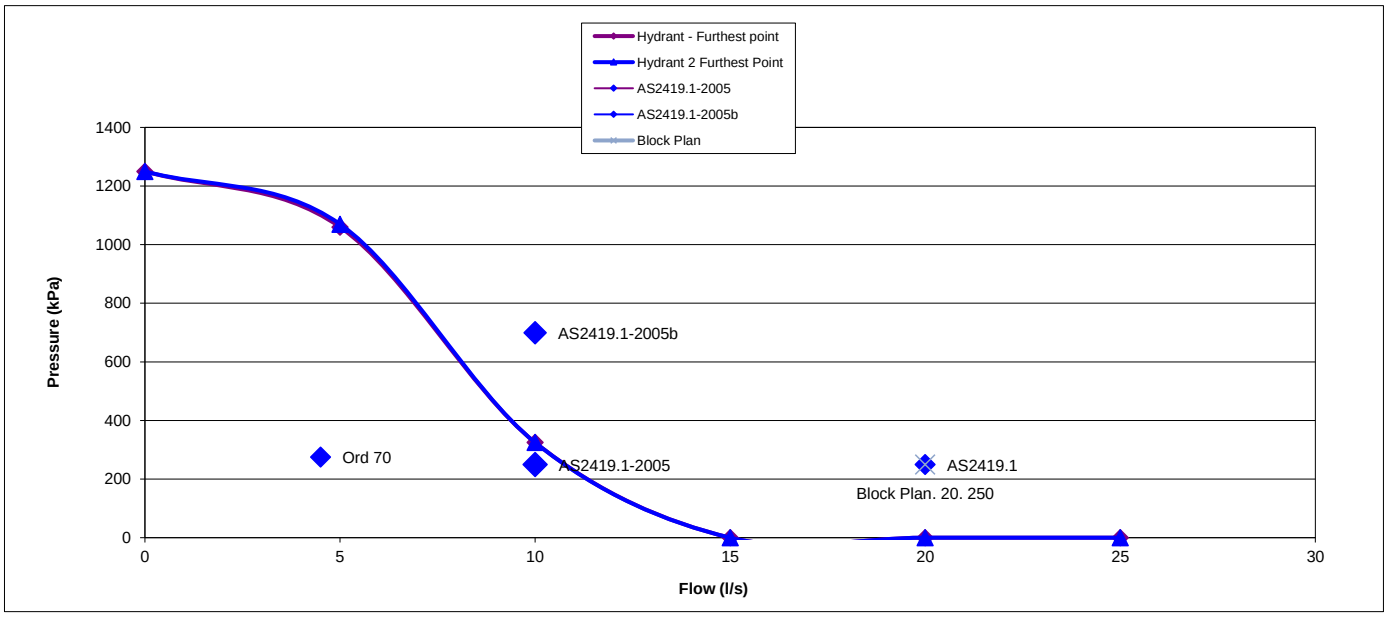
Conclusion: **FAIL: System requirements 20 Litres per second @250kPa - 2x Hydrant Flow Points simutaneously @10L/sec - 250kPa**

CONCORD HOSPITAL - HYDRANT FLOW TEST RESULTS

Location: Building 26 - Rotork Open - Diesel Pump Running
Date: 30-Mar-23
Test Equip: Ambit PF-1D
Pump Size: 27kw - 264 Impeller
PumpsetType: Diesel

Results	Hydrant - Furthest point	Hydrant 2 Furthest Point
Flow Rate (l/s)	Discharge Pressure (kPa)	Discharge Pressure (kPa)
0	1250	1250
5	1060	1070
10	325	325
15	0	0
20	0	0
25	0	0

System Requirements		
	Flow (l/s)	Pressure (kPa)
AS2419.1	20	250
Ordinance 70	4.5	275
AS2419.1-2005a	10	250
AS2419.1-2005b	10	700
Block Plan	20	250



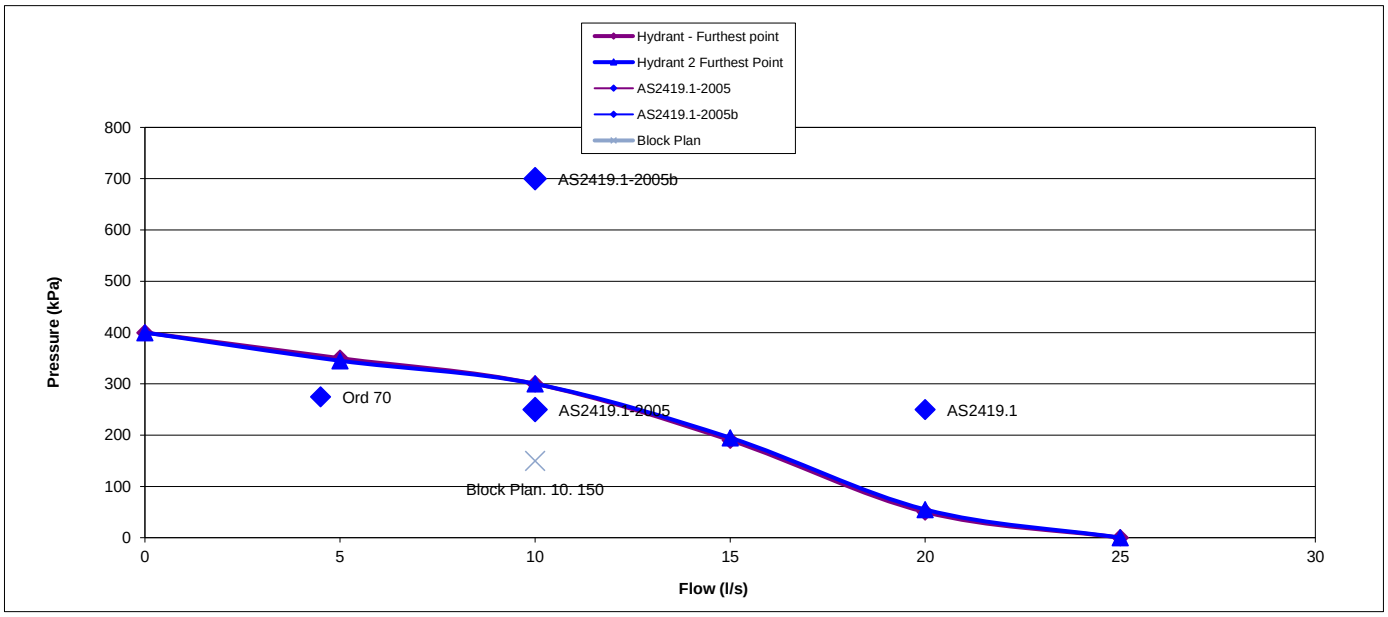
Conclusion: **Pass: System requirements 20 Litres per second @250kPa - 2x Hydrant Flow Points simutaneously @10L/sec - 250kPa Flow test achieved 20L/second @325kPa**

CONCORD HOSPITAL - HYDRANT FLOW TEST RESULTS

Location: CCMH - Rotork Open - Non-Aspirated Flow
Date: 25-Mar-23
Test Equip: Ambit PF-1D
Pump Size: N/A
PumpsetType: N/A

Results	Hydrant - Furthest point	Hydrant 2 Furthest Point
Flow Rate (l/s)	Discharge Pressure (kPa)	Discharge Pressure (kPa)
0	400	400
5	350	345
10	300	300
15	190	195
20	50	55
25	0	0

System Requirements		
	Flow (l/s)	Pressure (kPa)
AS2419.1	20	250
Ordinance 70	4.5	275
AS2419.1-2005a	10	250
AS2419.1-2005b	10	700
Block Plan	10	150



Conclusion: **Pass: System requirements 10 Litres per second @150kPa - 2x Hydrant Flow Points simutaneously @5L/sec - 350kPa Flow test achieved 10L/second @350kPa**