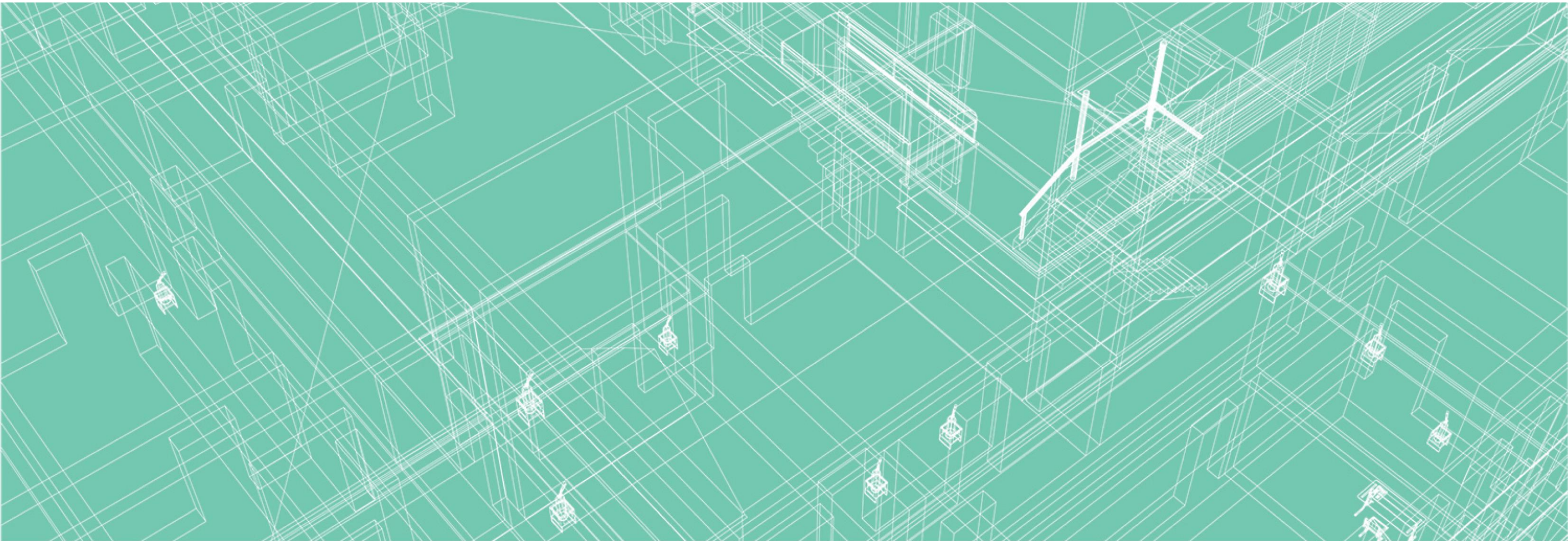
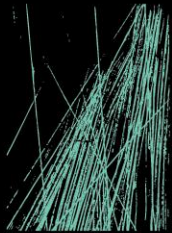




RETURN BRIEF

**UNITING SHELLHARBOUR
SERVICES INFRASTRUCTURE REPORT**

ELECTRICAL, COMMS, SEWER & WATER SERVICES



JHA

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DOCUMENT CONTROL SHEET

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1. EXECUTIVE SUMMARY

This report provides an infrastructure due diligence of the existing in-ground infrastructure surrounding and 171 Wattle Road, Shellharbour. The site is a greenfield site. The proposed works are four off apartment buildings over common basement. The apartments are proposed as seniors living.

JHA have undertaken a desktop review of the information provided from the site Dial Before You Dig (DBYD) search. The report provides an overview the following information relating to each service:

- Existing infrastructure surrounding and serving the site from the following in-ground services:
 - Power (Endeavour Energy)
 - Telecommunications (Telstra and NBN)
 - Sewer (Sydney Water)
 - Water (Sydney Water)
- Estimated new infrastructure works associated with the development.
- A summary of additional infrastructure items to be resolved as part of the project design.

The following information sources have been utilised to prepare this report:

- Dial before you dig (DBYD) information packages.
- Architectural drawings by Turner
- Preliminary feedback received to date from authorities.

2. ELECTRICAL SERVICES

2.1 PROJECT MAXIMUM DEMAND

This new site is within Endeavour Energy Area for power. In consideration of the maximum demand, a new 1500kVA padmount substation is propose.

Please see below the maximum demand calculation. This includes a breakup for each new building, hydraulic equipment, common area and EV charger.

Name	kVA	Amps/phase
Carpark	107.34	154.93
EV Charger	226.14	326.40
Common Area	192.09	277.25
Building R1	219.04	316.16
Building R2	173.08	249.83
Building R3	264.99	382.49
Building R4	173.08	249.83
Other Equipment	173.79	250.84
Overall Total	1529.56	2207.72
Diversified Overall Total (0.8)	1223.64	1766.18

Figure 3.1 – Proposed Maximum Demand

The proposed new substation will be feeding all new buildings. The figure below indicates the proposed location of this new substation.



Figure 3.2 – Proposed Location of New Substation

JHA has already submitted the application to Endeavour Energy for the new substation. JHA has accredited Level 3 ASP designers that will be carrying out the design works in co-ordination with Endeavour Energy for this project.

2.2 NEW SUBSTATION

The proposed new Endeavour Energy padmount substation is proposed to be located in the southeast corner of the site along the property boundary adjacent the new driveway access.

This location has been considered as the most optimum for the Stage 1 works to be close to the proposed load centre/Main Switchboard, while still being along the boundary frontage to allow Endeavour Energy unobstructed access for future maintenance.

The below provides site requirements to be considered for the new substation to achieve a compliant Endeavour Energy substation arrangement:

- Minimum 2.75m x 5.5m easement
- Substation easement to be open to sky
- No utilities, other services or any foreign structures are allowed to encroach the substation easement (no water tank within 5m of substation)
- Substation site shall be flat and levelled over the entire easement area
- Be above the 1:100 flood levels for wherever the easement is located
- Substation is located at the front property boundary with unrestricted 24/7 vehicle access to the substation directly from a public street

The following are substation segregation requirements as per Endeavour Energy standards to be considered for the site:

- Easement must be located as such that the substation plinth is 3m from the neighbour boundary.
- Fire rating of any building structure within the first 1.5m from the substation cubicle needs to be 2 hour fire rated; and in the following 1.5m needs to be 1 hour fire rated. Any structure within 6m needs to be constructed of non-combustible material.
- No fixed glass/windows within 3m of substation cubicle.
- No fire egress paths are allowed within 3m of substation easement.
- Substation cubicle needs to be at least 10m away from any fire hydrant booster. If a fire pump room is within 10m of substation, fire authority approval may be required.
- Minimum separation from substation earthing system to communication assets and swimming pool to be as per site specific earthing design.

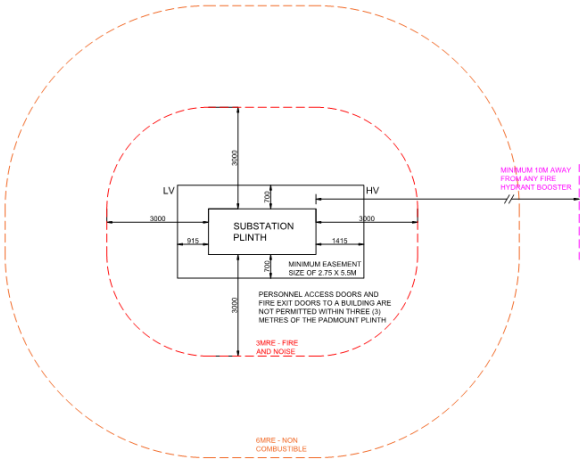


Figure 3.3 – Endeavour Energy Padmount Substation Spatial

2.3 NEW MAIN SWITCHBOARD

A new main switchboard proposed for this new development will be located on Level 02 carpark adjacent to Building R1. This new main switchboard will be fed from the new substation via underground conduit and feed the proposed to supply the stage 1 development with some surplus that can be used in the following stage. The figure below indicates the approximate location of the new main switchboard.

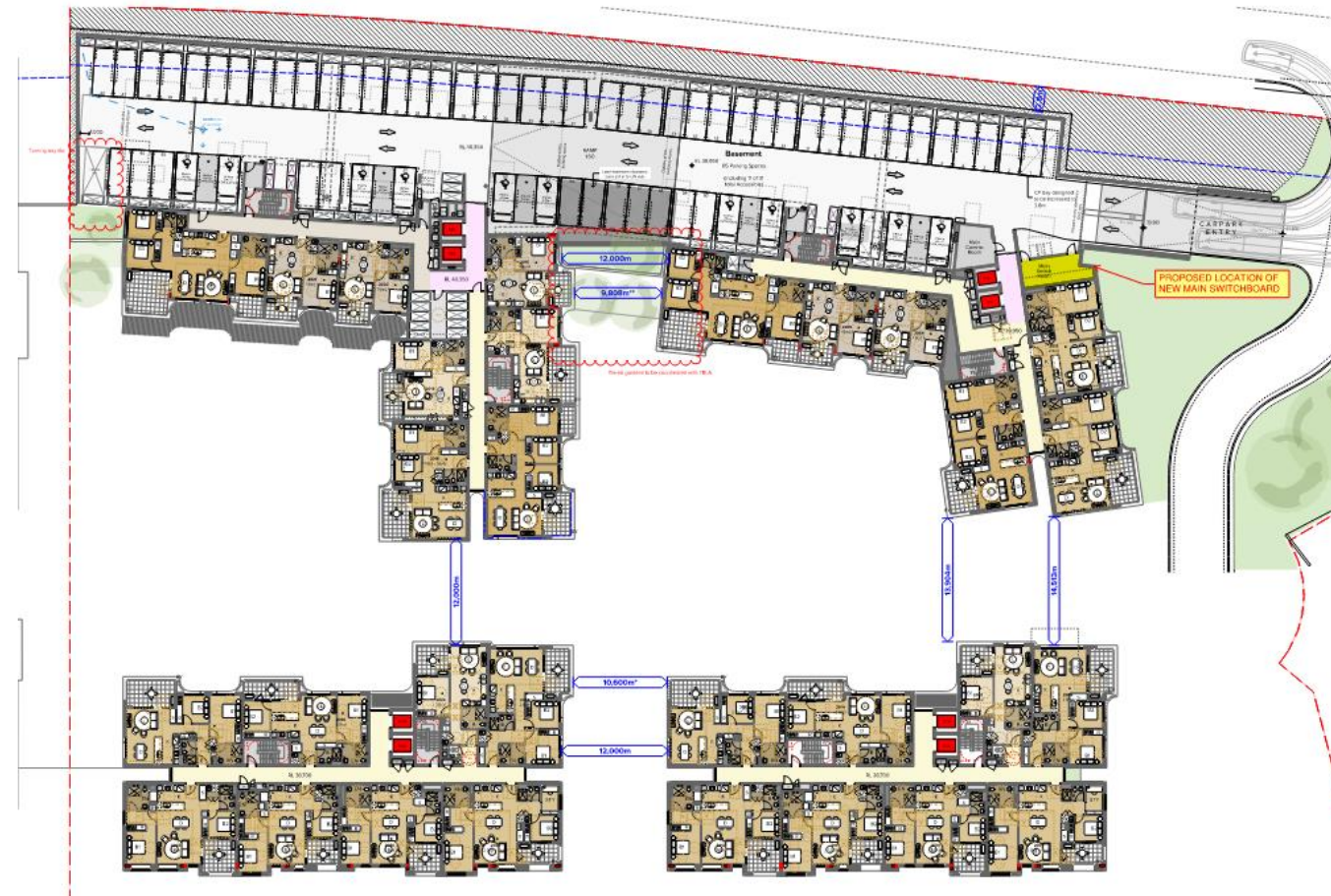


Figure 3.3 – Proposed Location of New Main Switchboard

All buildings will be fed from this main switchboard via underground conduits externally and most on cable trays internally.

A few new electrical distribution boards will be proposed to supply the common area. Each apartment will have its own electrical distribution board. These apartment distribution boards will be housed in each apartment.

2.4 NEW METERING

The new authority meter will be proposed for the proposed new work and located on the incoming supply. Uniting have confirmed that the site will be metered by an embedded energy provider. This authority meter will be known as the embedded gate meter for the site.

Separate NMI compliant meters will be including in the development for the following:

- Each apartment
- House services

The apartment NMI metres will be in meter enclosures/ cupboards on each floor or every other floor of each building. Please refer to the below figures for electrical cupboard locations.

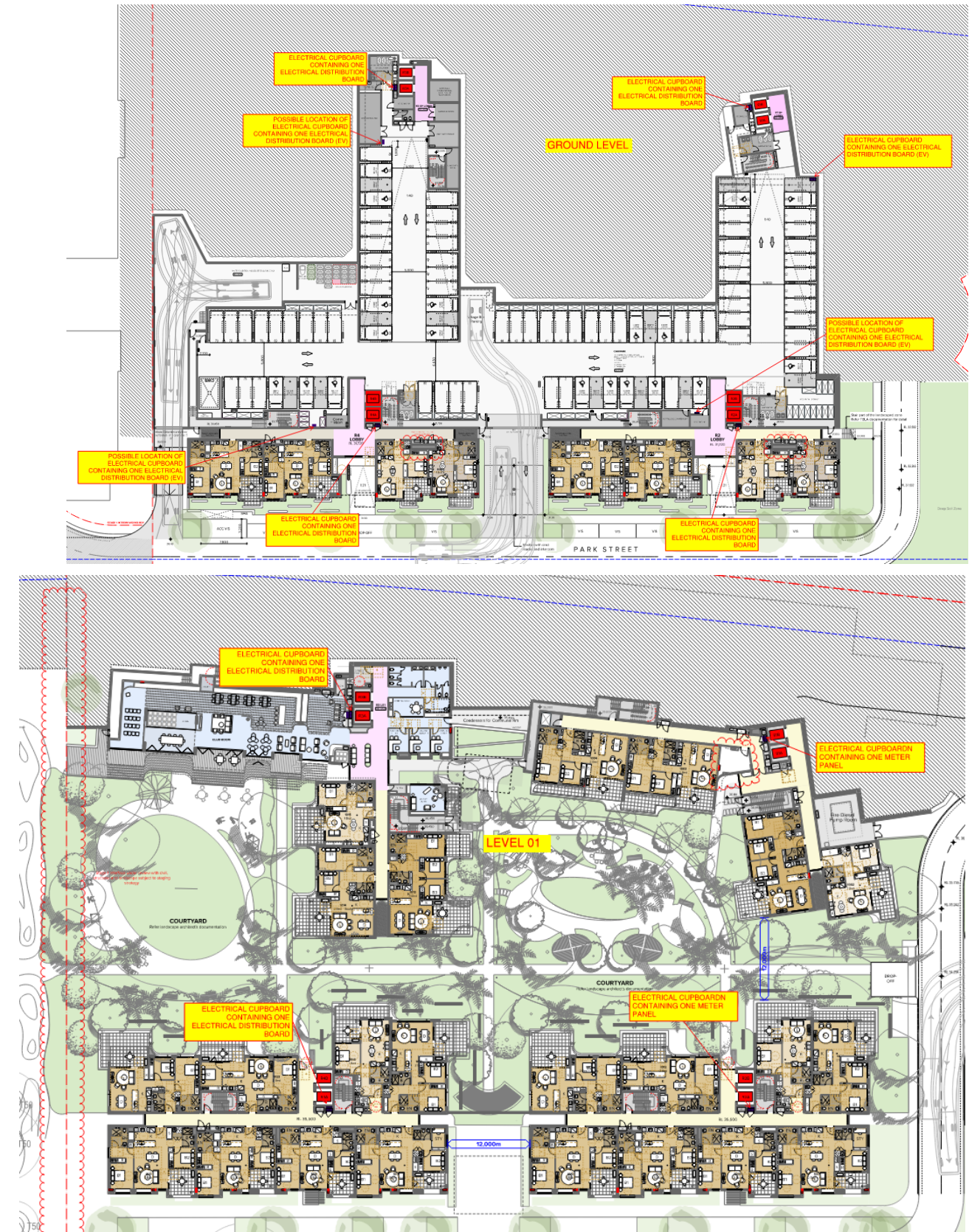




Figure 3.4 – Indicative Locations of Electrical Distribution Boards and Meter Panels

2.5 EXISTING NBN FIBRE ACCESS NODE (FAN)

There is an existing NBN Fibre Access Node (FAN) located in the path of proposed internal road intersection with Wattle Rd. Please see below the indicative location of this NBN facility.



Figure 3.5 – Existing NBN Fibre Access Node



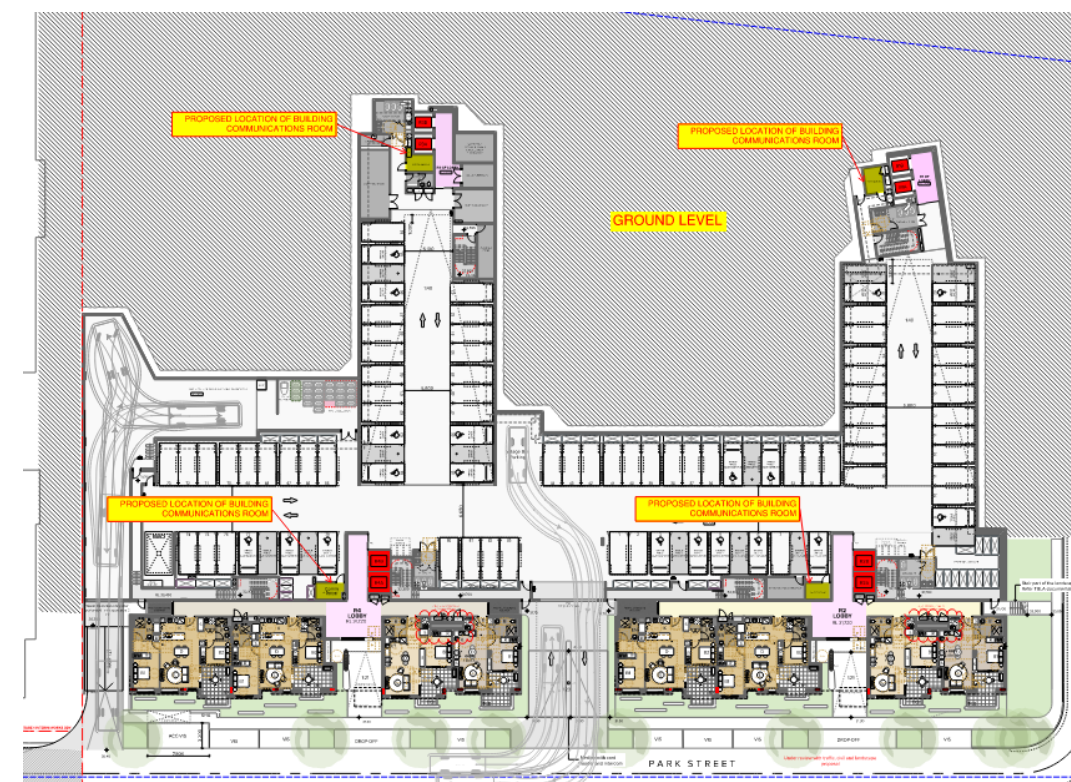
Figure 3.6 – Indicative Location of Existing NBN Fibre Access Node

As mentioned above, the existing NBN FAN is currently obstructing the proposed vehicle crossing (the planned road entry).

This NBN infrastructure item has been identified and the propose road has been designed to avoid it and protect it.

NEW COMMUNICATION ROOM

A new main communication room is proposed on Level 2 carpark next to Building R1. This new main communication room will contain NBN equipment, security equipment and one communications rack. Each building also requires dedicated communications rooms. These four building communications rooms are located on ground level. Please see below locations of these communications rooms.



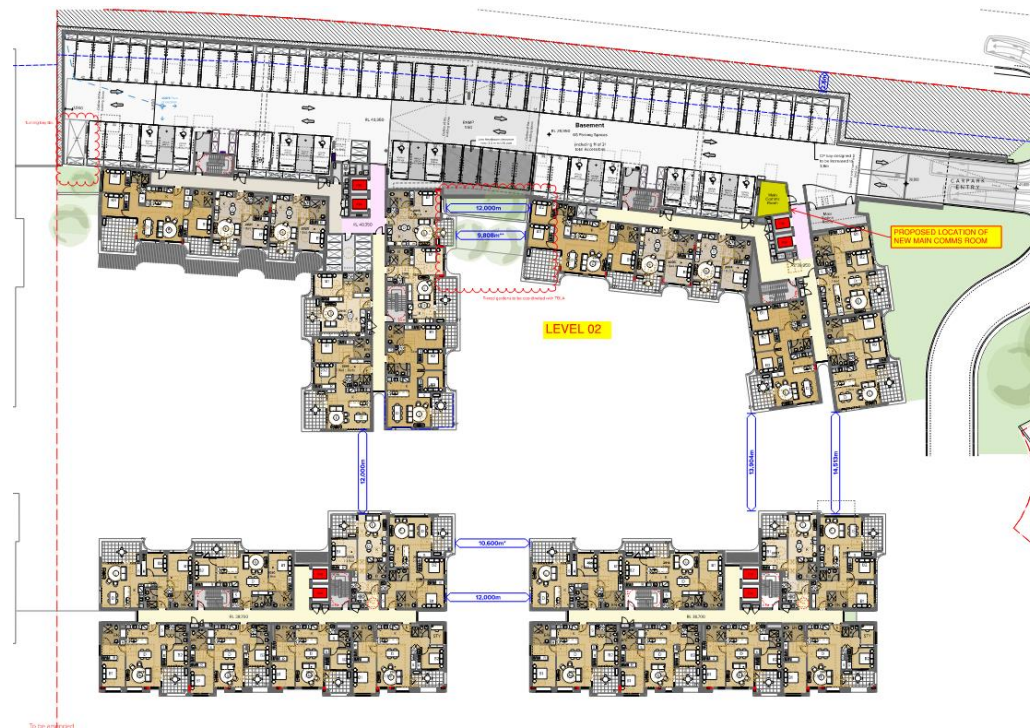


Figure 3.7 – Proposed locations of Communication Rooms

Communication cables will be reticulated via cable trays internally. Underground conduits are to be used externally for NBN lead-in service.

Each apartment will contain its own NBN modem. The tenant distribution board will be housed together with NBN equipment in the same enclosure in each apartment.

3. HYDRAULIC SERVICES

The current DBYD information indicates there are in-ground water and in-ground sewer services that run through the property. The following sewer and water services are available to the development site. Natural Gas owned by Jemena is also available along Wattle Road however Uniting have decided to not supply natural gas to the site in the interest of sustainability.

3.1 SEWER

The DBYD information provided by Sydney Water Corporation (SWC) indicates:

- An existing 150 VC (Vitrified Clay) sewer main located within the property.
- The development is expected to generate a sewer waste flow rate of 1,672 Loading units allowing for bathrooms, kitchens and Laundries of residence. AS3500.2 Sanitary Plumbing and Drainage indicates that a DN150 can handle this flow rate at a grade of 2.5%. JHA confirm that this is suitable for our works within the property and to the Sydney water utility main.

There is an existing connection to the 150 VC sewer falling from the north to south into a pit and then across Davey CI to the west. Part of the existing 150 VC is below the proposed building footprint it is proposed that the sewer service would be cut back to the edge of Davey Close outside the construction zone prior to construction commencing.

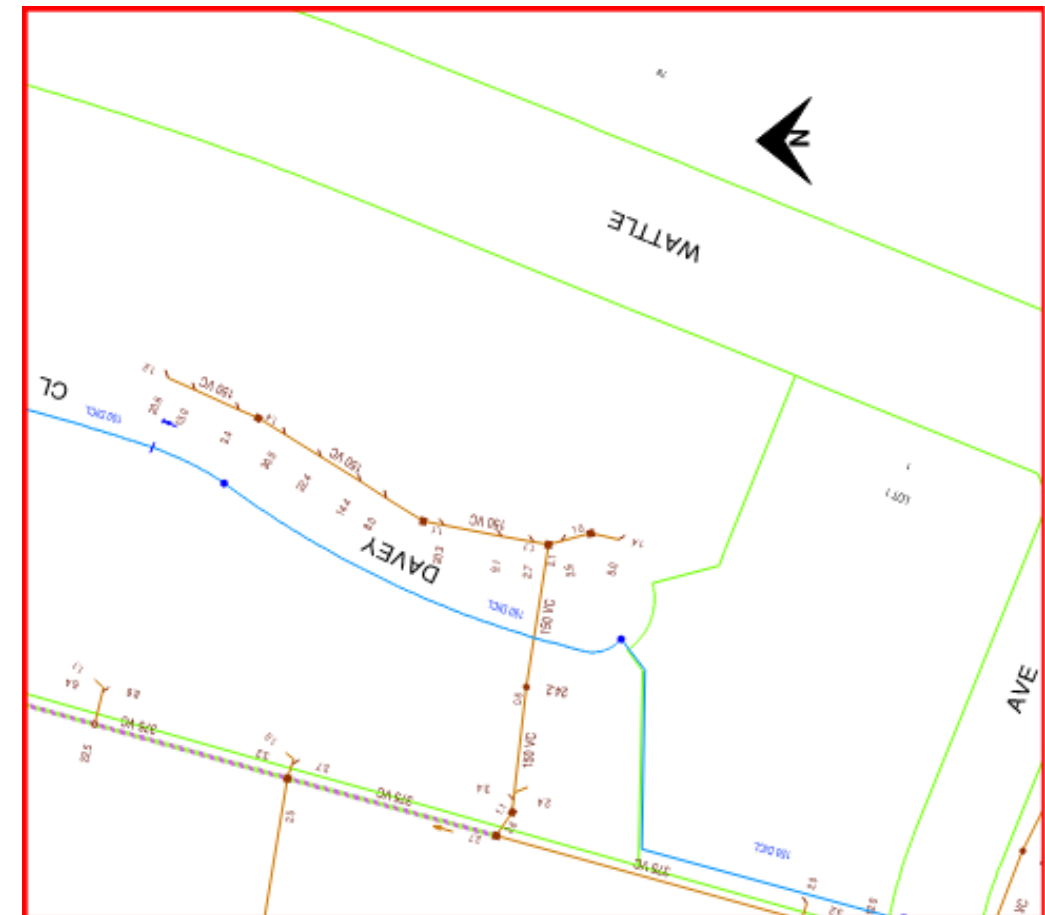


Figure 4.1 – Sydney Water Mains Map

Table 3,3,1 — Maximum fixture unit loading for vented drains

Grade %	Nominal size of drain, DN						
	65 ^a	80	100	125	150	225	300
5.00	60	215	515	1 450	2 920	11 900	26 900
3.35	36	140	345	1 040	2 200	9 490	21 800
2.50	25	100	255	815	1 790	8 060	18 700
2.00	×	76	205	665	1 510	7 090	16 600
1.65	×	61	165	560	1 310	6 370	15 000
1.45	×	(50)	(140)	485	1 160	5 810	13 900
1.25	×	(42)	(120)	425	1 040	5 360	12 900
1.10	×	×	×	(380)	935	4 970	12 100
1.00	×	×	×	(340)	855	4 500	11 400
0.85	×	×	×	×	(725)	3 850	10 300
0.65	×	×	×	×	(595)	3 250	9 090
0.50	×	×	×	×	×	×	7 720
0.40	×	×	×	×	×	×	6 780

^a DN 65 drains may be used as branch drains only, provided no soil fixtures (except urinals) are connected thereto.

NOTE 1 “×” indicates that the combination of nominal size and grade is not acceptable.

NOTE 2 Values in parentheses are the maximum fixture unit loadings for drains laid at reduced grades in accordance with [Clause 3.4.2](#).

NOTE 3 The regulatory authority may prescribe or approve the sizing and grading of any drain on the basis of observed peak flows for buildings of similar occupancy in lieu of the size determined as prescribed in this document.

NOTE 4 See [Table C.1](#) for conversion of percentage to ratio.

Figure 4.2 – AS3500.2 pipe size table

3.2 WATER

The DBYD information provided by SWC indicates:

- An existing 150mm DICL (Ductile Iron Cement Lined) water main located within the site fed from Benson Ave

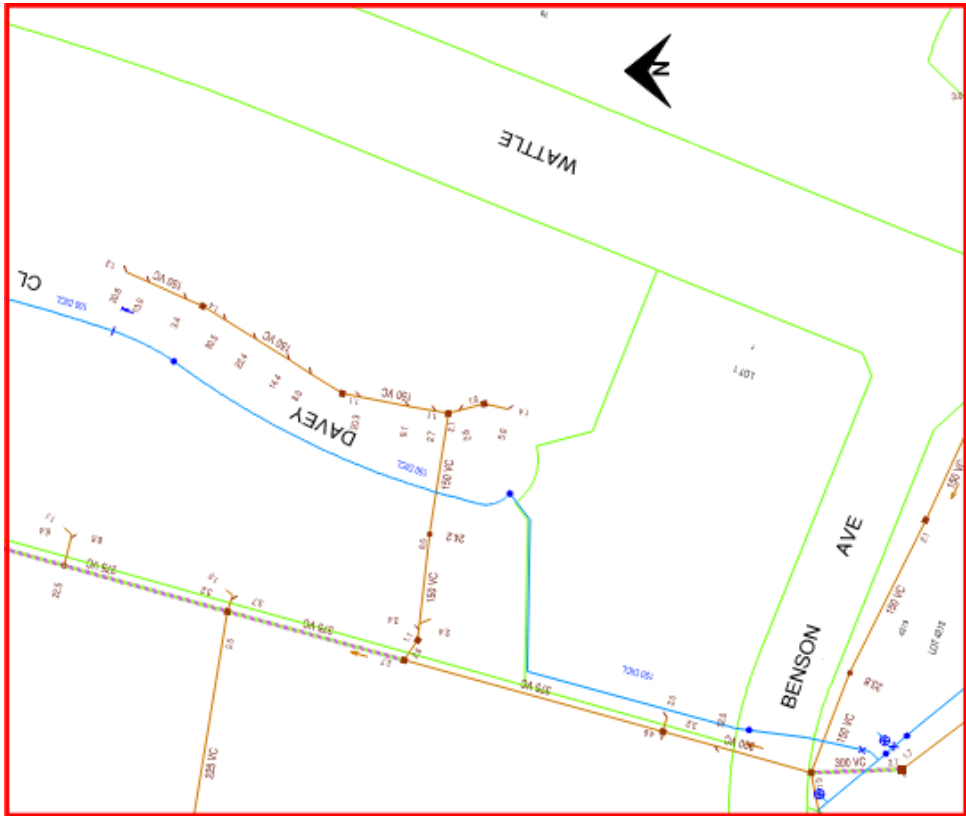


Figure 5.1 – Sydney Water Mains Map

- A Pressure and Flow application has been received from Sydney Water with a proposed connection from the 150mm water main within Davey Close. At the water main there is a maximum pressure of 64m head and a maximum permissible flow of 60L/s. The preliminary calculations show that the site will require a flow rate of approximately 6.5L/s for domestic water services. Therefore, there is sufficient flow to maintain the domestic water services for 95% of the time.
- The preliminary water design criteria for the combined hydrant sprinkler system is 38L/s (18L/s for the sprinkler system and 20L/s for the hydrant system). The existing water main connections to the site will be adequate to serve the demand, however the pressure will not be great enough for the height of the building; therefore a fire pump set will be required (refer to Fire Services Section below).

ASSUMED CONNECTION DETAILS

Street Name: Davey Close	Side of Street: West
Distance & Direction from Nearest Cross Street	52 metres North from Benson Avenue
Approximate Ground Level (AHD):	32 metres
Nominal Size of Water Main (DN):	150 mm – As per Diagram Provided

EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure	64 metre head
Minimum Pressure	58 metre head

WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	58
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	10	58
	15	57
	20	57
	25	56
	30	55
	40	54
	50	51
	60	48

Figure 5.2 –Water Main Pressure and Flow

3.3 NEXT STEPS

Once development consent is granted and prior to Construction a Water Services Coordinator (WSC) will need to be engaged to lodge a section 73 application to gauge if Sydney Water require any upgrades of the mains due to this development.

4. FIRE SERVICES

4.1 COMBINED FIRE SPRINKLER AND FIRE HYDRANT SYSTEM

4.1.1 BOOSTER ASSEMBLY

A new Combined Hydrant-Sprinkler Booster Assembly is proposed to be installed at the site boundary, adjacent to the vehicular entryway at Wattle Road; parallel to the street. The booster shall be concealed or screened where possible to minimise visual impact to residents.

The booster will be positioned such that it is readily accessible to the fire brigade to meet their operational requirements; and will be located no further than 10m from a truck hardstand. The booster assembly shall also be a minimum of 10m away from any High Voltage infrastructure (i.e. substation).

The primary source of water is intended to be from the site's Sydney Water Town's Main connection located towards Benson Ave. No fire water tank is required/proposed.

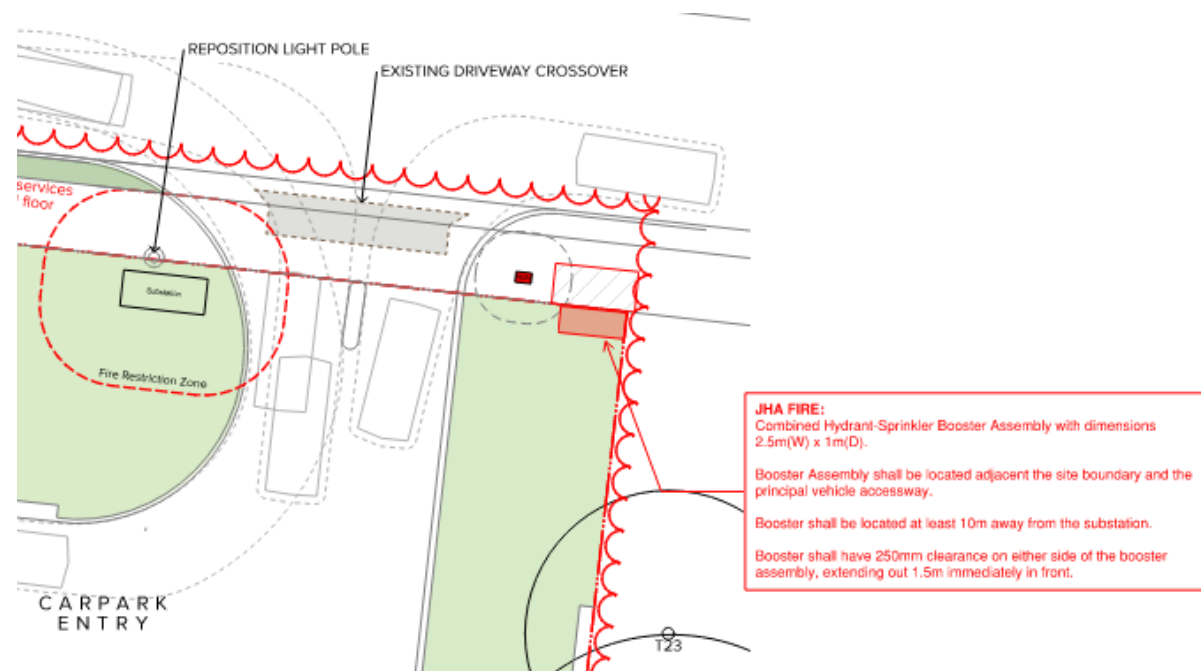


Figure 6.1 – Proposed Fire Booster location

4.1.2 FIRE PUMPSETS

The Fire Services Pumproom is proposed to be on Level 01 in a standalone room that is directly accessible from an open space. This room shall be provided with double door access to allow for installation and maintenance/replacement of the pumps.

This pumproom shall house the Combined Hydrant-Sprinkler diesel pumps (minimum 2-off required) as well as the electric jockey pump and the pump test pit. The following pump constraints and requirements are to be implemented:

- A clearance of not less than 1.0m shall be provided around the pump assembly, and a clearance of not less than 600mm between two pumps shall be provided.
- The clearance around the Fire Pump Control Panel shall be 1.0m at the front and 0.6m on both sides of the controller.

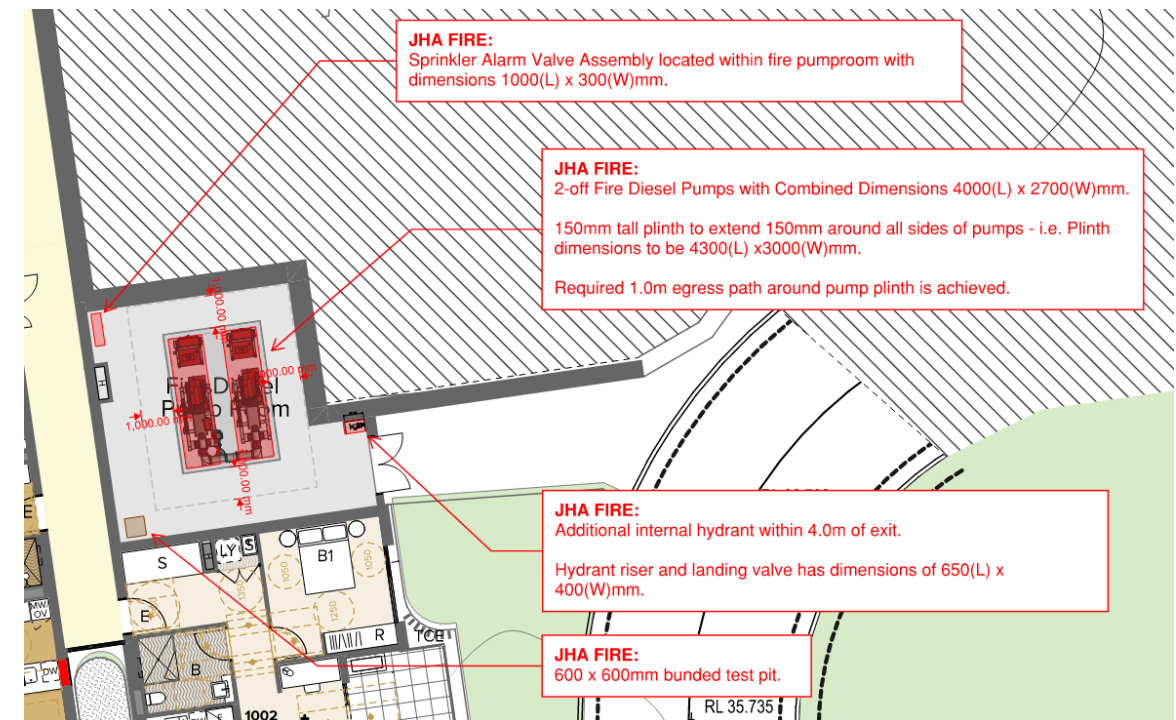


Figure 6.2 – Proposed Fire Pumproom

4.1.3 SPRINKLER CONTROL VALVE ASSEMBLIES

The Combined Hydrant-Sprinkler System is intended to have 150mm fire mains reticulate throughout site via a combined fire services ring main; with risers located in each fire stair throughout the development. Sprinkler Control Valve Assemblies shall be provided at each storey (supplied by the 150mm riser) and are typically located within the fire-isolated stairway.

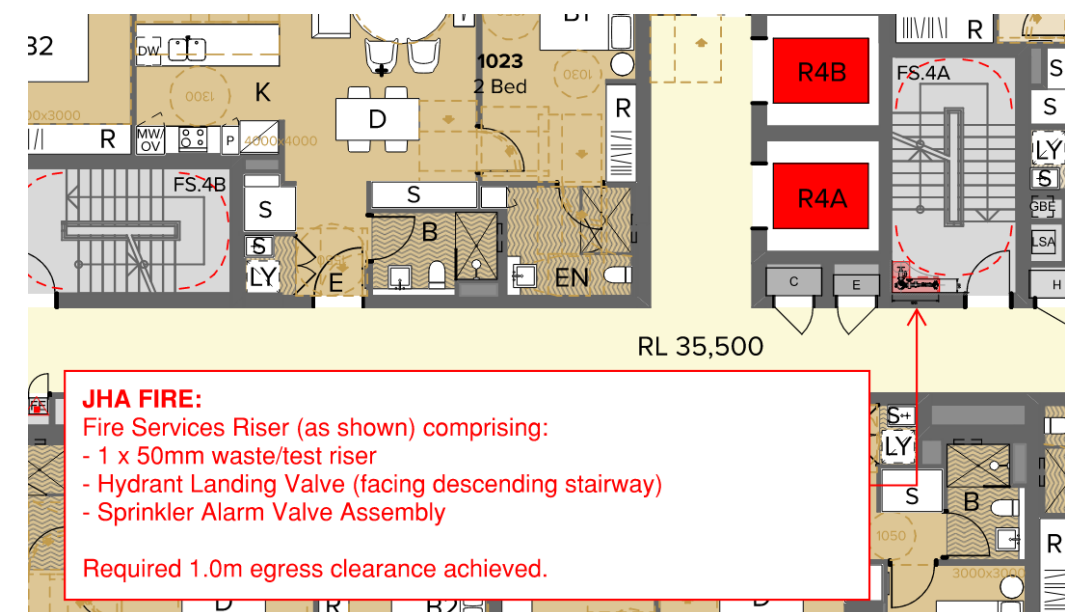


Figure 6.3 – Typical Sprinkler Control Valve Assembly

The Sprinkler Control Valve Assembly and associated components shall include everything necessary for the function of the system, and as a minimum, include a:

- Main Stop Valve: Butterfly valve, with flange or roll grooved connection, hand wheel, right-handed
- Connection to a Fire Indicator Panel
- Flow switch and solenoid valve arrangement with system test drain
- Installation pressure gauges
- Block plan
- Emergency instructions
- A location plate
- A notice above the mains top valve identifying the installation and the area served by the installation

Each flow switch shall be wired back to the Fire Indicator Panel on separate alarm zone facilities in accordance with AS 1670.1.

4.1.4 WET FIRE DESIGN CRITERIA & WATER SUPPLY

The following fire sprinkler and hydrant demands and design criteria apply to the development - these components are required to operate simultaneously.

The site’s Sydney Water Town’s Main conditions have been indicated in the Hydraulic Services Section.

FIRE SPRINKLER DESIGN CRITERIA

Building Occupancy	Hazard Class	Maximum Number of Sprinkler Heads in the Most Unfavourable Array (1L/s per head)
Residential	Light Hazard	6 heads
Plant Spaces	Ordinary Hazard 1	6 heads
Car park	Ordinary Hazard 2	12 heads

FIRE HYDRANT DESIGN CRITERIA

Application	Criteria
Operating pressures at fixture outlets.	Minimum - 700kpa Maximum – 1200kpa
Operating Velocities through pipework.	Maximum – 4m/sec
Minimum number of Hydrants to operate simultaneously	2
Minimum operating flow rate	20L/s

4.2 DRY FIRE SERVICES

4.2.1 SMOKE DETECTION & ALARM SYSTEM

A Smoke Detection & Alarm System will be provided in accordance with NCC, AS 1670.1-2018 and AS/NZS 1668.1-2015. The system shall be an automatic fully addressable fire detection and alarm system that is controlled and monitored by a Fire Indicator Panel (FIP), located at each Building Lobby. The Building R1 lobby shall contain the Main-FIP while Buildings R2, R3 and R4 shall contain sub-FIPs at the lobby.

The FIP is intended to house the Alarm Signalling Equipment (for FRNSW callout) and the Fire Fan Controls.

A fully addressable fire detection system, designed and installed in compliance with AS1670.1-2018 (incorporating Amendment 1), is proposed to be installed throughout. It is proposed that smoke alarms serve the interior of SOUs, whilst smoke detection serve the remainder of the site.

It is noted that the Honeywell Notifier-series of FIP and products are preferred by Uniting (as outlined in the Uniting Design Guidelines). The Fire Indicator Panels shall be provided with a minimum of 20% spare capacity.



Figure 6.4 – Typical Fire Indicator Panel

4.2.2 BUILDING OCCUPANT WARNING SYSTEM (BOWS)

A Building Occupant Warning System (BOWS) shall be provided throughout all areas of the development and shall be designed and installed in accordance with AS1670.1-2018. This system shall instigate an audible warning throughout the site in the event of activation of fire mode.

The BOWS Panel shall be located adjacent to the Main-FIP, within the Building R1 lobby. BOWS modules are proposed to be installed within the sub-FIPs located in Buildings R2, R3 and R4.

Standard ceiling-mounted BOWS speakers are proposed to be installed throughout development, where horn speakers will be provided only within the carpark areas and plant/services rooms.

The BOWS panel and modules shall be provided with a minimum of 20% spare capacity.