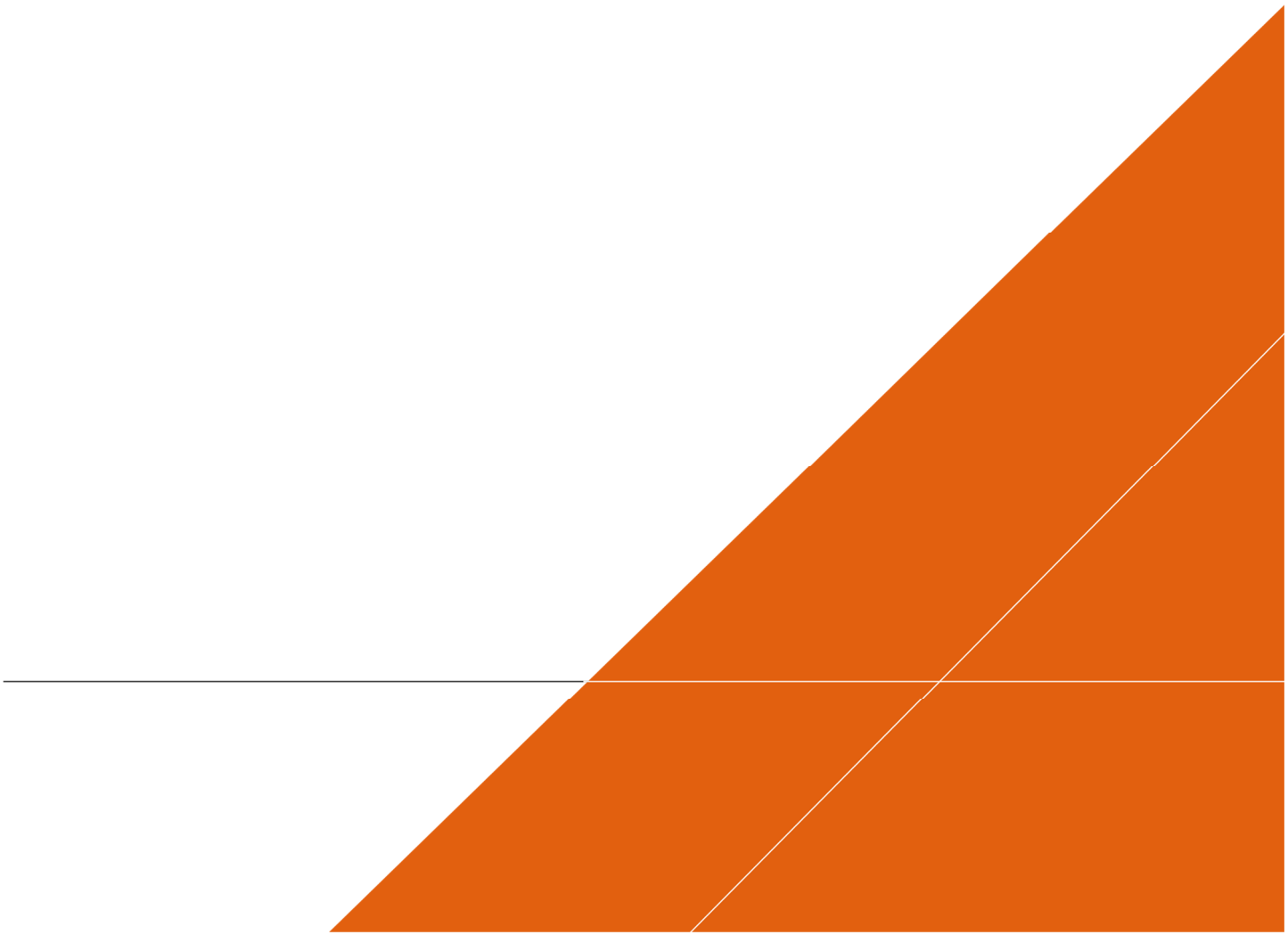
ARCADIS Design & Consultancy for natural and built assets

BURWOOD PLACE

Preliminary Civil Investigation

01 JUNE 2018



CONTACT

RHYS HARVEY
ENGINEER

T 8907 9128
M 0438 386 465
E Rhys.Harvey@arcadis.com

Arcadis
Level 16, 580 George Street,
Sydney NSW 2000, Australia

HOLDMARK PROPERTY GROUP PTY LTD
BURWOOD PLACE

Preliminary Civil Investigation

Utilities and Overland Flow

Author	Susumu Yamamoto	山本前
Checker	Rhys Harvey	
Approver	Cameron Hay	
Report No	AA8617-03	
Date	1/06/2018	
Revision Text	03	

REVISIONS

Revision	Date	Description	Prepared by	Approved by
01	21/08/2015	Draft issue for co-ordination and review	CM	-
02	31/08/2015	Final report	CM	CH
03	01/06/2018	Updated Report	SY	CH

CONTENTS

APPENDICES

1 INTRODUCTION

Arcadis have been engaged by Holdmark Property Group Pty Ltd (Holdmark) to complete civil engineering investigations to support and provide assistance for a planning proposal that is being prepared for their properties located at 42-50 and 52-60 Railway Parade, Burwood (site). As indicated in Figure 1, the site is bound by Railway Parade to the north, the Burwood Library and community hub to the west, Clarendon Place to the east and an existing Council car park to the south. Wynne Avenue is located between the two properties.

The existing site is currently occupied by commercial buildings and a carpark. The Local Government Authority is Burwood Council.

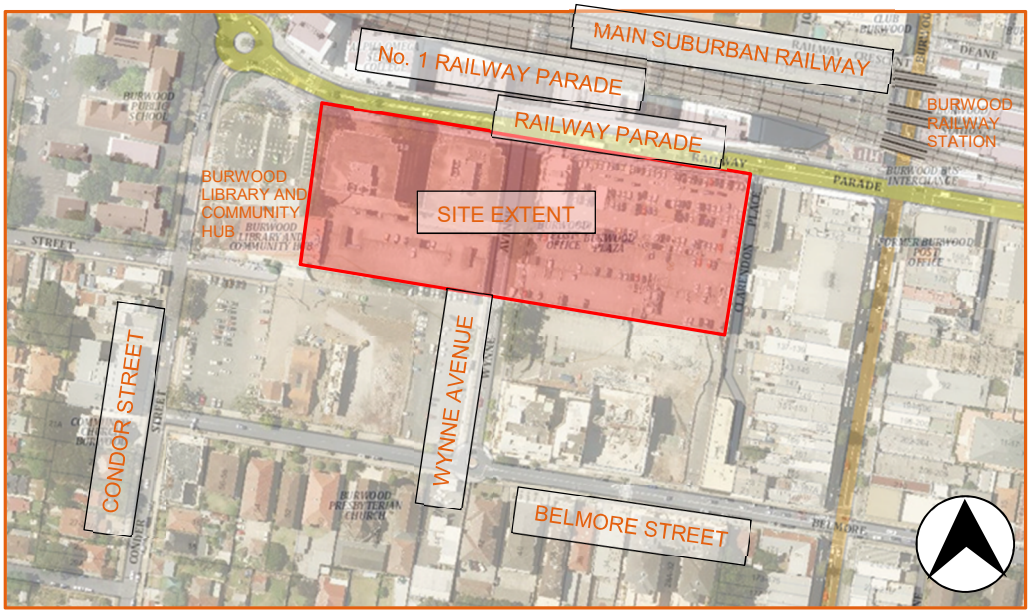


Figure 1 – Site location (Source: SixMaps)

1.1 Project Description

Cox Richardson, in a joint venture with Architectus, is preparing a planning proposal for a mixed-use development including an expansion of retail space and residential apartments. The concept design (included in Appendix A) includes seven basement levels spanning beneath Wynne Avenue (including the lower ground level).

1.2 Purpose

The purpose of this investigation is to;

1 identify existing utilities (based on a Dial Before You Dig search) in the vicinity of the site and in particular the existing services located within Wynne Avenue.
2 complete a preliminary assessment of the existing overland flow path along Wynne Avenue.
3 identify key constraints and design opportunities for works within Wynne Avenue with respect to the existing utilities and overland flow path.
4 assist the architects to develop the planning proposal.

Following the planning proposal stage, consultation with utility authorities (including Council) will be required.

2 EXISTING UTILITIES

Arcadis have investigated the utilities and services located in the vicinity of the site. As part of these investigations Arcadis have completed a Dial Before You Dig (DBYD) investigation (dated18th May 2018) and have reviewed stormwater layout information provided by Council. The following sections summarise the findings of these investigations. The complete findings of the DBYD search have been included in Appendix B.

2.1 Stormwater

Based on information provided by Council, there is an Ø600mm stormwater pipe located on the western side of Wynne Avenue. This continues along the southern side of Railway Parade to a low point approximately 30m to the west of the intersection of Railway Parade and Wynne Avenue, crossing Railway Parade in twin Ø600m pipes. The stormwater system continues beneath the Main Suburban Railway line to the north and ultimately discharges into Canada Bay approximately 1.5km downstream of the site.

2.2 Potable Water

Based on the results of the DBYD there are a number of Sydney Water assets in the vicinity of the site. These include;

- Ø200mm water main on the southern side of Railway Parade.
- Ø200mm water main on the eastern side of Wynne Avenue.
- Ø100mm water main on the western side of Wynne Avenue.

While some upgrades to the existing Sydney Water network may be necessary to service the proposed development, it is likely that the existing water network would have sufficient capacity to service the proposed development. However, we recommend that a Feasibility Application be lodged with Sydney Water as soon as possible to confirm suitable connection points for the development and any upgrades to the existing network that may be required.

2.3 Sewer

Based on the results of the DBYD there are a number of Sydney Water assets in the vicinity of the site. These include;

- Ø1200mm sewer main to the south of the site that runs from west to east.
- Ø225mm sewer main that runs approximately through the centre of Wynne Avenue, that drains to Railway Parade to an Ø300mm sewer main beneath the railway line to the north.
- Ø225mm sewer main on the southern side of Railway Parade.
- Ø225mm sewer main to the west of 52-60 Railway Parade.
- Ø225mm sewer main to the east of 42-50 Railway Parade.

While some upgrades to the existing Sydney Water network may be necessary to service the proposed development, it is likely that the existing sewer network would have sufficient capacity to service the proposed development. However, we recommend that a Feasibility Application be lodged with Sydney Water as soon as

possible to confirm suitable connection points for the development and any upgrades to the existing network that may be required.

2.4 Electrical

Based on the results of the DBYD there are a number of Ausgrid assets in the vicinity of the site. These include a;

- number of electrical conduits along the southern side of Railway Parade.
- number of electrical conduits along the western side of Wynne Avenue.
- Substation located approximately halfway along the eastern boundary of property 52-60 Railway Parade (this may be a private substation).
- Substation located in the south-western corner of property 42-50 Railway Parade (this may be a private substation).
- A proposed number of electrical conduits along the south west side of the site boundary.

There is also an overhead power line and street lighting located on the western side of Wynne Avenue.

2.5 Gas

Based on the results of the DBYD, Jemena have a 75mm nylon line along the western side of Wynne Avenue and southern side of Railway Parade.

It is likely that the network will have sufficient capacity to service the proposed development, subject to a commercial agreement with Jemena.

2.6 Telecommunications

Based on the results of the DBYD there are a number of telecommunications assets in the vicinity of the site. These include an;

- Optus optic fibre line to the south of Railway Parade.
- Telstra conduit on the southern side of Railway Parade and the western side of Wynne Avenue.
- Roads and Maritime Services (RMS) have a number of conduits and vehicle loop detectors as part of the signalised intersection of Railway Parade and Wynne Avenue.
- NBN optic fibre lines on the southern side of Railway Parade and the western side of Wynne Avenue.

3 FLOODING AND STORMWATER

The site is located within the St Lukes sub-catchment (as identified by Councils online mapping system). Generally, stormwater drains from south to north across the catchment. There is a pit and pipe stormwater system in the streets adjacent the site. Councils SMC noted residential pipe systems are to be designed to cater for the 20yr ARI, with greater flows travelling overland in the street. There is a trapped sag located at the intersection of Wynne Avenue and Railway Parade, restricted by the capacity of the stormwater system beneath the Main Suburban Railway.

Council have prepared a stormwater assessment of their entire catchment and the findings were summarised in the report Hydraulic study and on-site detention modelling for Burwood Council catchments (April 2002). Further, Arcadis have previously completed a stormwater investigation as part of the development of No. 1 Railway Parade (located on the northern side of Railway Parade adjacent the site), which looks at the local catchment in more detail.

3.1 Existing Conditions

Based on the previous investigations for No.1 Railway Parade, the sag point in Wynne Avenue is expected to have ponding up to 300mm depth to an RL of approximately 19.5m AHD during a 100yr ARI event, as shown in Figure 2.

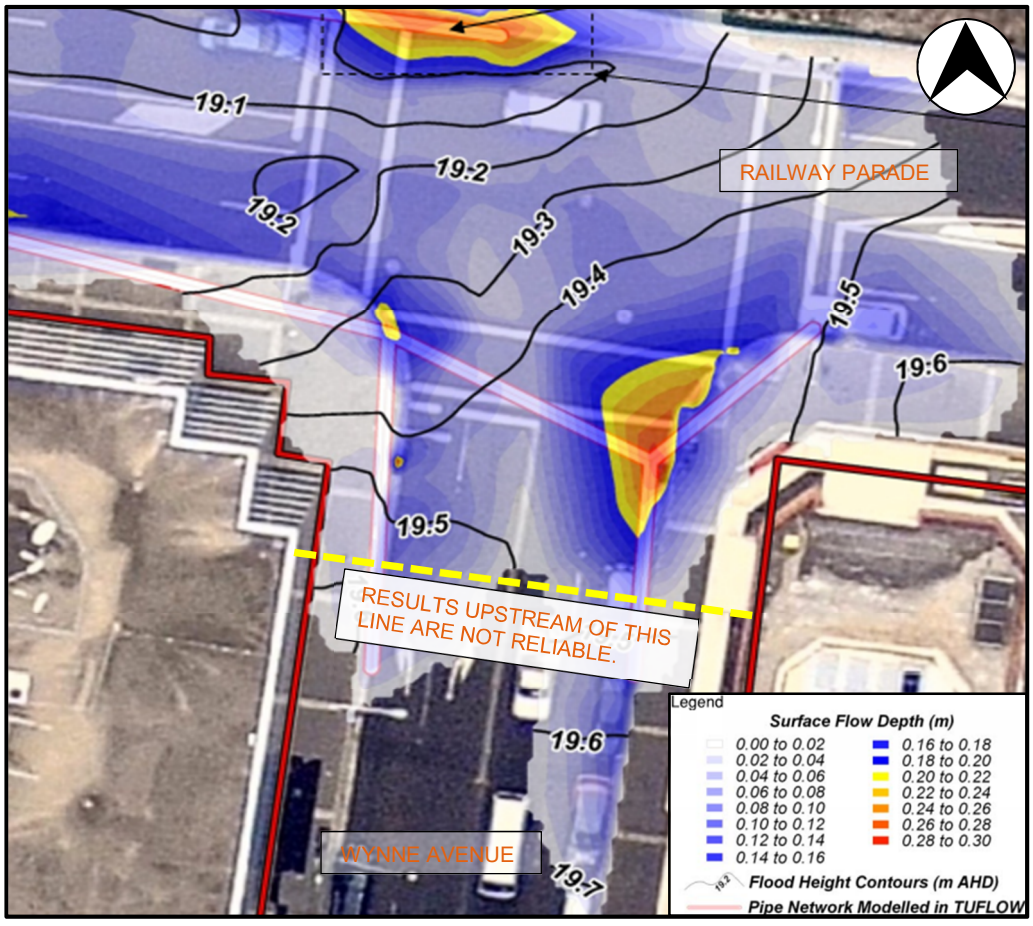


Figure 2 – Sag point in Wynne Avenue (Extract of Fig. 01C from letter dated 28th Feb, 2012)

Based on the previous investigations for No.1 Railway Parade, the sag point in Railway Parade is expected to have ponding up to 300mm depth to an RL of approximately 19.2m AHD during a 100yr ARI event, as shown in Figure 3.

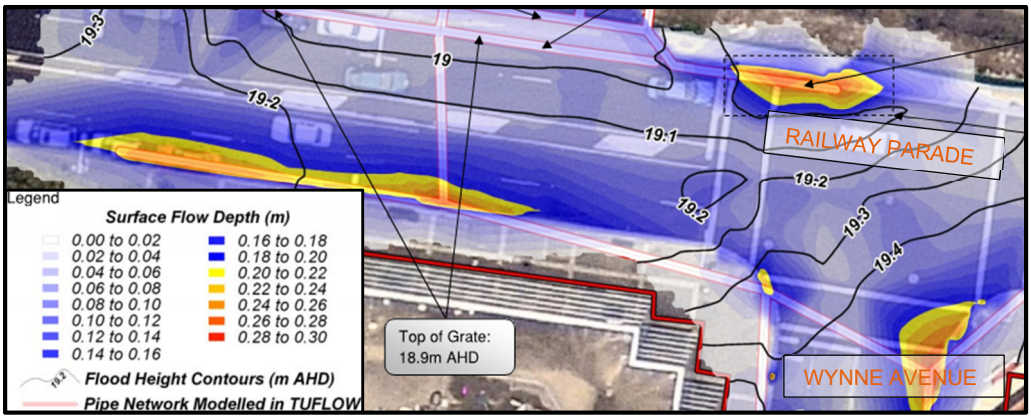


Figure 3 - Sag point in Railway Parade (Extract of Fig. 01C from letter dated 28th Feb, 2012)

From the Burwood Council Hydraulic Study (April 2002) report, Table 11.1 identifies a ponded water depth at Railway Parade near Wynne avenue in the Probable Maximum Flood event (PMF) of 2.05m (approximately RL 21m).

3.2 Planning Requirements

The proposed development will be assessed against the Burwood Council Development Control Plan (DCP, 2016). Stormwater management (Section 6.5) requires that all developments within the Burwood Local Government Authority (LGA) to be in accordance with the Stormwater Management Code (SMC). A summary of key requirements from the SMC in relation to overland flows include;

- Development activities must not cause an adverse impact on adjoining or any other properties. This includes preserving surface flow paths and not increasing water levels. (extract of SMC, Section 8.1). Any existing flood storage on site is to be maintained or appropriately mitigated to prevent impacts to neighbouring developments.
- Surface flow paths are to be preserved, or alternatives provided, wherever they pass through or affect the development site. (extract of SMC, Section 8.3)
- A building floor level freeboard from 0.3m to 0.5m will be required against channel or mainstream flows, or in areas where significant overland flow occurs. (extract of SMC, Section 9.3)

A number of other stormwater requirements will need to be considered in future design stages. These include, but are not limited to, the following;

- Stormwater system is to be designed to convey a minimum of 20yr ARI runoff (for commercial sites).
    - On-site detention to restrict flows to pre-development levels (up to 100yr ARI).
    - Design and construction certification will be required from a suitable practitioner.

- Determining appropriate building floor levels based on adjacent overland flow (or flooding) levels.
- Potential for Water Sensitive Urban Design (WSUD) measures to be incorporated into the development for the treatment of stormwater runoff from the site.

4 DESIGN CONSIDERATIONS

Arcadis have completed a high-level review of the concept architectural drawings and have identified a range of engineering items that may impact on the building design. Specifically, we have investigated options for utility relocations along Wynne Avenue to suit the proposed basement design, the stormwater overland flow path along Wynne Avenue and some more general building design items that are likely to require further assessment in future stages.

Based on this review, and subject to implementing standard engineering requirements, the concept design appears feasible from an engineering perspective.

4.1 Basement Beneath Wynne Avenue

There are several services located along Wynne Avenue that are possibly impacted by the proposed basement car park;

- Ø600mm stormwater pipe.
- Ø200mm water main on the western and Ø100mm water main on the eastern side of Wynne Avenue.
- Ø225mm sewer main through the centre of Wynne Avenue.
- Electrical, NBN / communications conduits and street lighting are generally located on the western side of Wynne Avenue.
- Ø75mm gas.

Arcadis have prepared a cross-section through Wynne Avenue (provided in Appendix B), and estimated the location and depths to each service based on survey, works-as-executed drawings or generally accepted minimum cover requirements (where no other information is available).

The proposed basement beneath Wynne Avenue is likely to require diversion, or amendments to, the existing utilities. Whilst all utilities will require alteration, both the stormwater and sewer lines have less design flexibility as they are a gravity service restricted to connecting into existing systems. We have reviewed a few design options with respect to the proposed basement design for both sewer and stormwater.

Sewer

The existing Ø225mm sewer main appears to service lots upstream of Wynne Avenue and service to these properties must be maintained. The proposed basement could be reconfigured or the existing sewer main could potentially be diverted or removed. We have considered the following options for the design;

- Noting that this would have a significant impact on the proposed basement design, the sewer could be left at existing levels. This would require the top level of the basement to be significantly lower than the current design.
- It may be possible to divert the sewer around the basement and connect into the existing sewer to the west of the site, or a new line to the sewer located in Railway Parade. This option would require Sydney Water approval as well as an assessment of existing levels and capacity.
- In order to make the existing Ø225mm sewer redundant, it may be possible to construct a new sewer manhole to connect the Ø225mm sewer to the

Ø1200mm main within Wynne Avenue. This option would require Sydney Water approval and is likely to be reasonably expensive to construct.

Stormwater

The existing Ø600mm stormwater services an upstream catchment. We have considered the following options for the design;

- The basement level could be set beneath the existing stormwater line. To reduce the impact on the basement design, this could be a local lowering of the basement in a north-south direction (and also accommodate additional services and potentially street trees above).
- It may be possible to run the stormwater through the basement. This would require Council approval and would also require further consideration of maintenance issues as well as potential tenancy requirements due to increased risk of leaking, flooding, etc.

Other utilities

The other existing utilities in Wynne Avenue (water, gas, electrical and communications) have more flexibility in terms of relocation. We have considered the following options for the remaining services;

- Allocate a services zone along the western side of Wynne Avenue, generally in-line with existing utilities. The intent is to provide a corridor for services (and potentially street trees) that allows access from the surface level (which is likely to be each authority's preference).
- Set basement surface levels so the structure can be fully beneath existing services (excluding sewer) and a service zone above the basement is allowed.
- Under sling services to soffit of basement slab in cable trays or similar.
- Divert services around the building (e.g. within the western extent of the site).

4.2 Wynne Avenue Open Space

The design of the open space through Wynne Avenue will require consideration of the overland flow to ensure no adverse impacts on flooding upstream or downstream of the development;

- The surface profile (cross-section extent and levels) of Wynne Avenue are to remain as close as practical to existing. Any proposed changes are to be reviewed by an appropriately qualified engineer.
- Any changes to the surface levels at the intersection of Wynne Avenue and Railway Parade will have an impact on the local stormwater system. In particular, the existing sag on the east side of Wynne Avenue provides significant inlet capacity which would be impacted by a change in surface levels.
- The overall width of road reserve is recommended to be maintained (or increased) to provide a similar flow regime to existing conditions.
- The void to the basement level (and vehicular entry point from Railway Parade) should be reviewed by an engineer to ensure suitable flooding protection is provided to basement levels. This may require consideration of storm events greater than the 100yr ARI.

- It is recommended that building floor levels and adjacent surface levels are set in order to achieve falls away from buildings.
- Construction methodology to acknowledge and cater for overland flows occurring during construction.

4.3 Building Design

We have reviewed the concept architectural plans for the site and recommend the following items are considered in more detail in future design stages;

- Basement excavation may be beneath the water table which would require geotechnical and structural review.
- The proximity of building to the railway line may require liaison with Railcorp, for the following;
    - Assessment of vibration isolation for human comfort.
    - Assessment of stray currents.
    - Acoustic separation for low rise levels
    - Monitoring of lateral movement and vertical settlement during construction.
- The Council SMC requires OSD is to be incorporated into the proposed development. As a 'rule of thumb', the approximate volume of storage required can be calculated as 455m³/ha (based on Upper Parramatta River Catchment Trust)
- All building floor levels and entry points to the building (doorways, carparking, etc) will require assessment against overland flow depths and ponding of water in Railway Parade and Wynne Avenue. As a guide, majority of Councils require assessment of building levels against 100yr ARI flood levels with consideration for larger storm events such as the PMF, which rises up to an RL 21.0m.
- The capacity of the existing utilities to service the proposed development will require confirmation from each authority.
- Sediment and erosion control measures will be required during construction.

4.3.1 Structural Design

- Based on the conceptual architectural plans, the tower lift cores are located centrally to the tower floorplans and carried down to foundation level. This is desirable feature for the structural design.
- Additional lift capacity may be required to service the number of apartments. Increasing the number of lifts also provides opportunity to increase the size of the structural core (for the taller towers), which would benefit the tower structure.
- Following the design of the lift cores, the next most significant vertical and lateral load-carrying elements are typically around the perimeter of a tower. Providing clear column paths down to foundations would be beneficial. This may be difficult to achieve where basement floor uses vary between levels.
- As the basement levels will require unique layouts (to suit commercial and retail areas) the column layout will likely require column transfers between floors. This will increase the structural depth and may impact on headroom clearance.

- The loading dock design will require consideration of headroom and swept path clearance to ensure appropriate access for delivery trucks. Vehicular circulation generally require clear spans, columns above would require large transfer structure. There may be opportunity to locate turning circles away from tower footprints to minimise or avoid the number of transfers required.

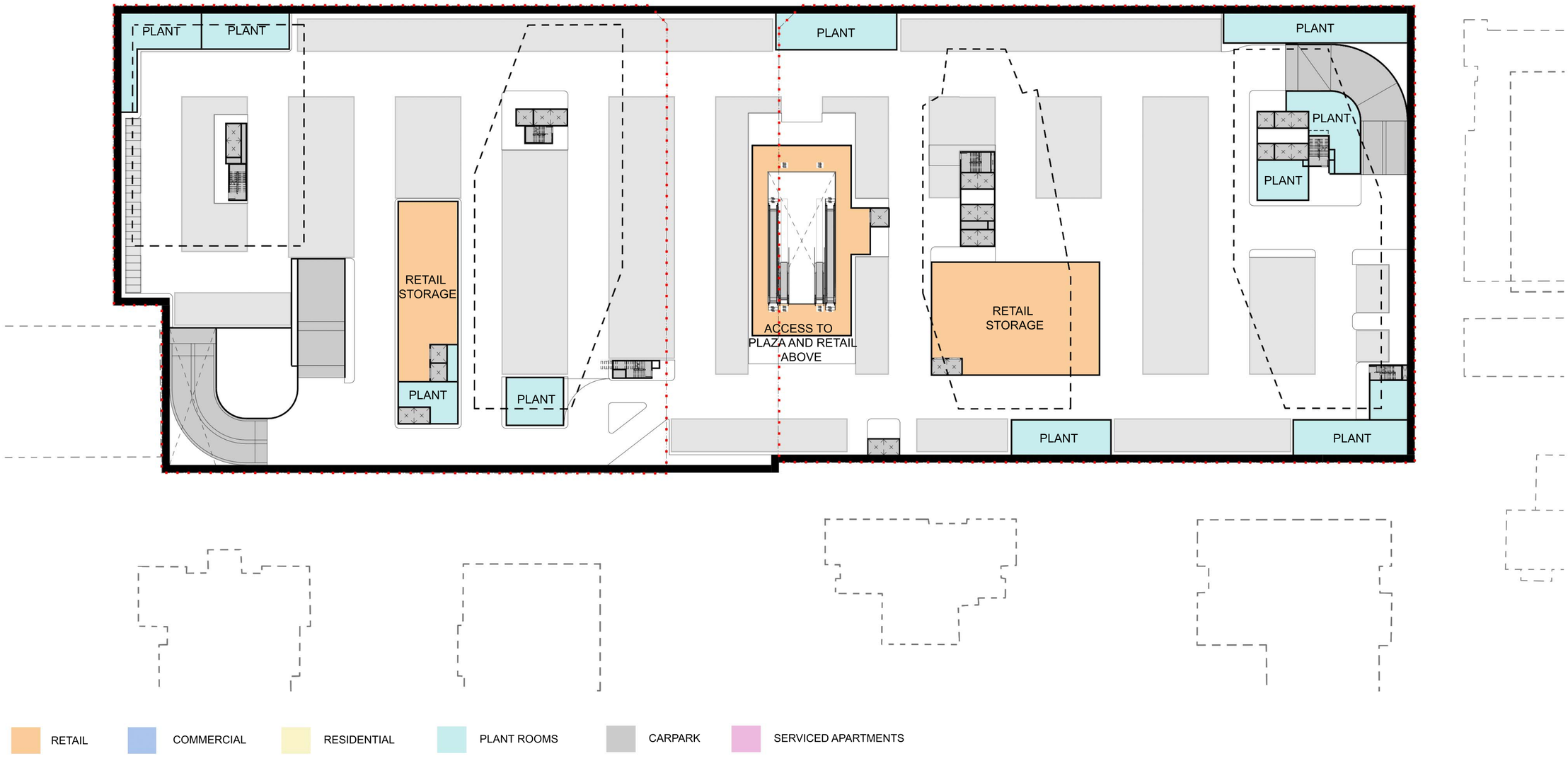
4.4 Other Considerations

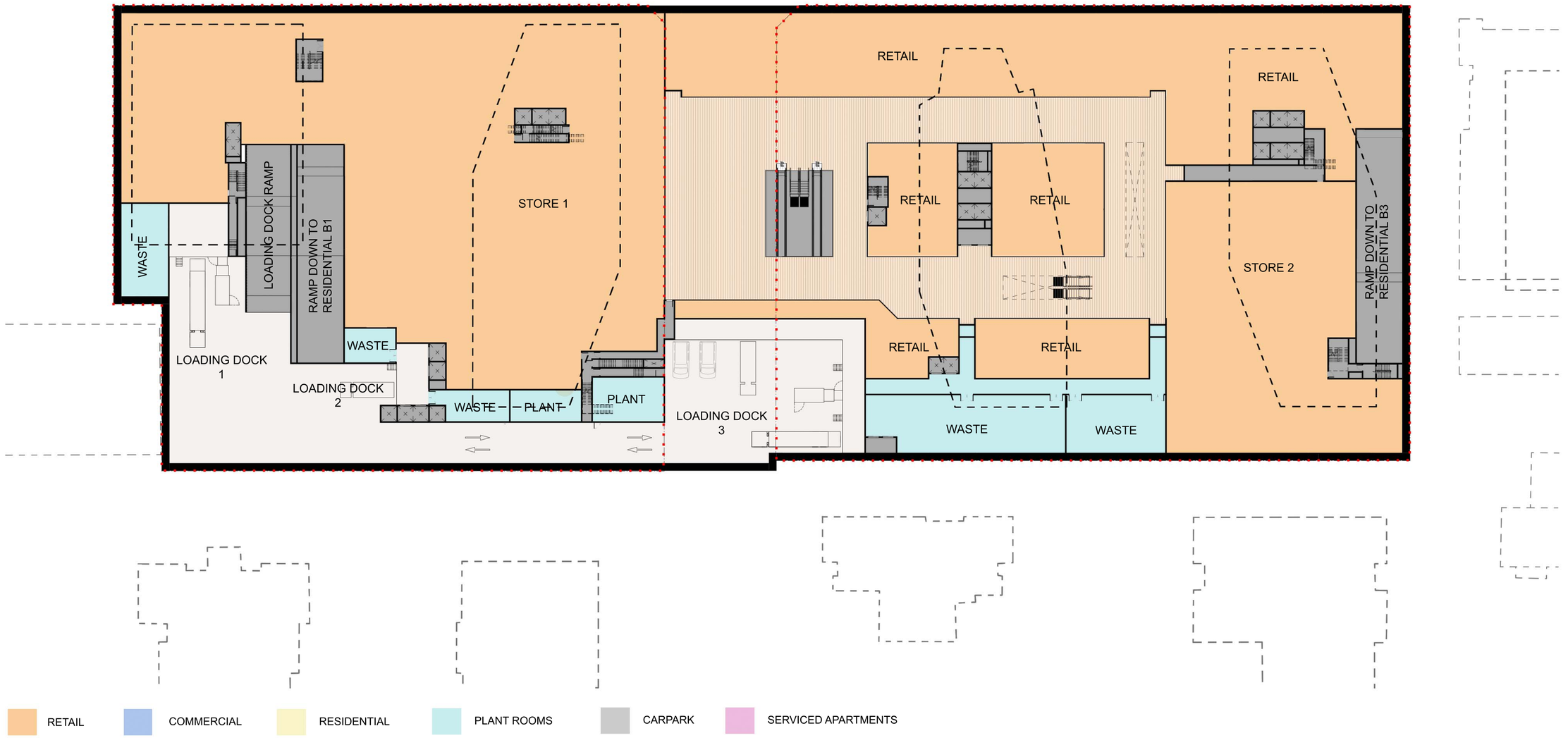
From a brief review of the concept architectural plans we also note the following;

- Construction staging is likely to be a key factor in the determining the best solution for the provision of utilities.
- Modifications to the bus bay on the corner of Wynne Avenue and Railway Parade may require a number of adjustments to existing utilities.
- The existing signalised intersection at Wynne Avenue and Railway Parade may require adjustment to suit the development (e.g. re-phasing for pedestrian crossing) which would require RMS approval.
- Tower cranes slewing over rail lines are generally not permitted.
- Temporary closure of Wynne Avenue will be required during construction.
- The legal ownership of Wynne Avenue at completion of works should be considered;
    - A stratum restriction may be required (e.g. from top of basement slab and above).
    - The void at ground level encroaches onto Wynne Avenue, and may require alteration of existing property boundaries.
    - If Wynne Avenue is to become privately owned and act as a roadway, agreements (e.g. for parking) with road authorities may be required (e.g. deed of agreement with Council).

APPENDIX A

Concept Architectural Plans


PLANT
PLANT
PLANT
PLANT
RETAIL STORAGE
PLANT
PLANT
ACCESS TO PLAZA AND RETAIL ABOVE
RETAIL STORAGE
PLANT
PLANT
PLANT
PLANT
PLANT
RETAIL
COMMERCIAL
RESIDENTIAL
PLANT ROOMS
CARPARK
SERVICED APARTMENTS


WASTE
LOADING DOCK RAMP
RAMP DOWN TO RESIDENTIAL B1
STORE 1
RETAIL
RETAIL
RETAIL
RETAIL
RETAIL
STORE 2
RAMP DOWN TO RESIDENTIAL B3
LOADING DOCK 1
WASTE
LOADING DOCK 2
WASTE
PLANT
PLANT
LOADING DOCK 3
WASTE
WASTE
RETAIL
COMMERCIAL
RESIDENTIAL
PLANT ROOMS
CARPARK
SERVICED APARTMENTS

RAILWAY PARADE

RAILWAY PARADE

RETAIL

WYNNE AVENUE

RETAIL

CINEMA ROOM 07

CINEMA ROOM 06

CINEMA ROOM 05

RETAIL

CINEMA ROOM 04

BURWOOD CENTRAL

CLARENDON PLACE

BURWOOD LIBRARY

RETAIL

RETAIL

RETAIL

CINEMA ROOM 01

CINEMA ROOM 02

CINEMA ROOM 03

PLANT

RETAIL

BURWOOD GRAND

WYNNE AVENUE

B1 SQUARE

RETAIL

COMMERCIAL

RESIDENTIAL

PLANT ROOMS

CARPARK

SERVICED APARTMENTS

RAILWAY PARADE

RAILWAY PARADE

COMMERCIAL

COMMERCIAL

WYNNE AVENUE

RETAIL

RETAIL

RETAIL

PLANT

CLARENDON PLACE

BURWOOD CENTRAL

BURWOOD LIBRARY

BURWOOD GRAND

WYNNE AVENUE

B1 SQUARE

RETAIL

COMMERCIAL

RESIDENTIAL

PLANT ROOMS

CARPARK

SERVICED APARTMENTS

RAILWAY PARADE

RAILWAY PARADE

RETAIL

LOBBY

RETAIL

RETAIL

RETAIL

LOBBY

WYNNE AVENUE

WYNNE AVENUE PLAZA

LOBBY

RETAIL

RETAIL

LOBBY

LOBBY

RETAIL

CLARENDON PLACE

BURWOOD CENTRAL

BURWOOD LIBRARY

RETAIL

COMMERCIAL LOBBY

RETAIL

PLANT ROOMS

RETAIL

PLANT

WYNNE AVENUE

RETAIL

COMMERCIAL

RESIDENTIAL

PLANT ROOMS

CARPARK

SERVICED APARTMENTS

RAILWAY PARADE (AVENUE OF NATIONS)

RAILWAY PARADE (AVENUE OF NATIONS)

CONDER STREET

ACCESS TO UNDERGROUND CARPARK

WYNNE AVENUE

CLARENDON PLACE

BURWOOD ROAD

CONDER STREET

WYNNE AVENUE

BURWOOD ROAD

BELMORE STREET

BELMORE STREET

RAILWAY PARADE (AVENUE OF NATIONS)

RAILWAY PARADE (AVENUE OF NATIONS)

CONDER STREET

ACCESS TO UNDERGROUND CARPARK

WYNNE AVENUE

CLARENDON PLACE

BURWOOD ROAD

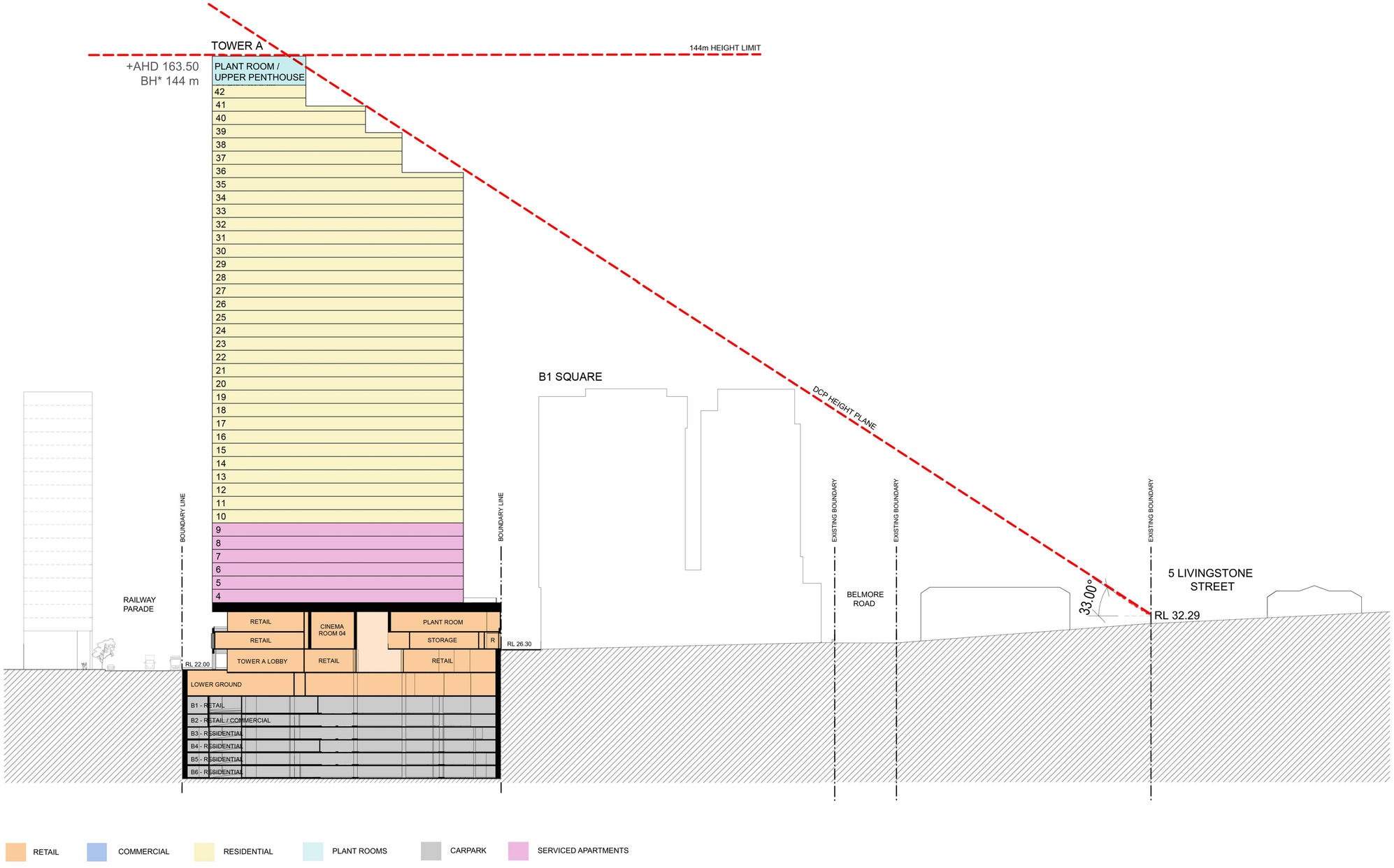
CONDER STREET

WYNNE AVENUE

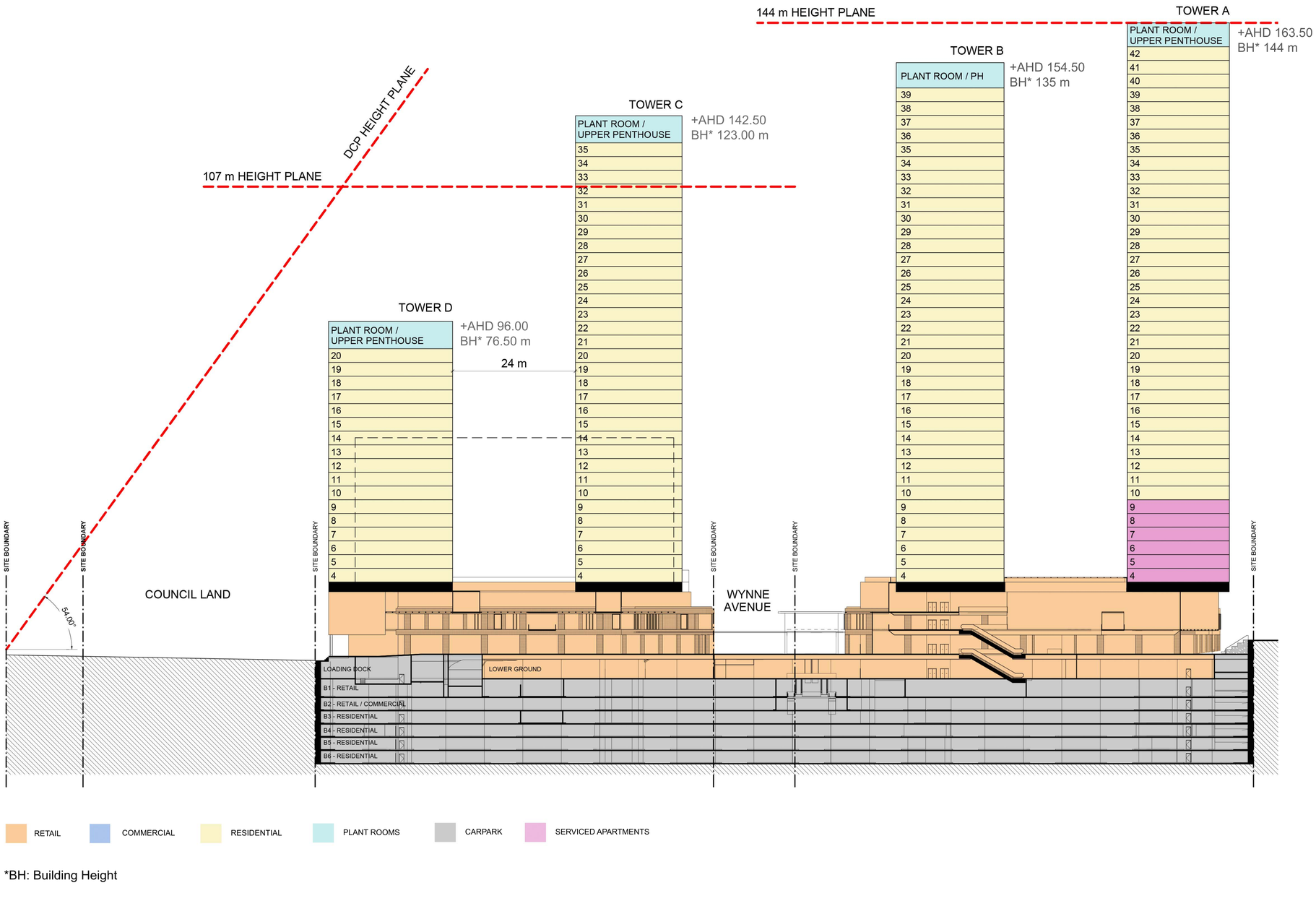
BURWOOD ROAD

BELMORE STREET

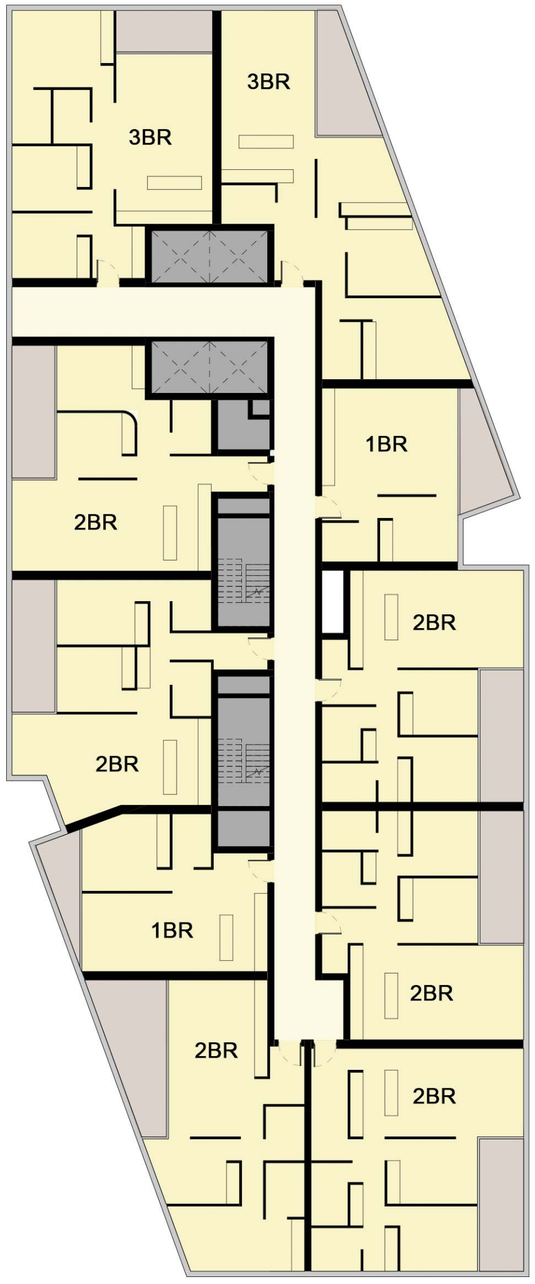
BELMORE STREET

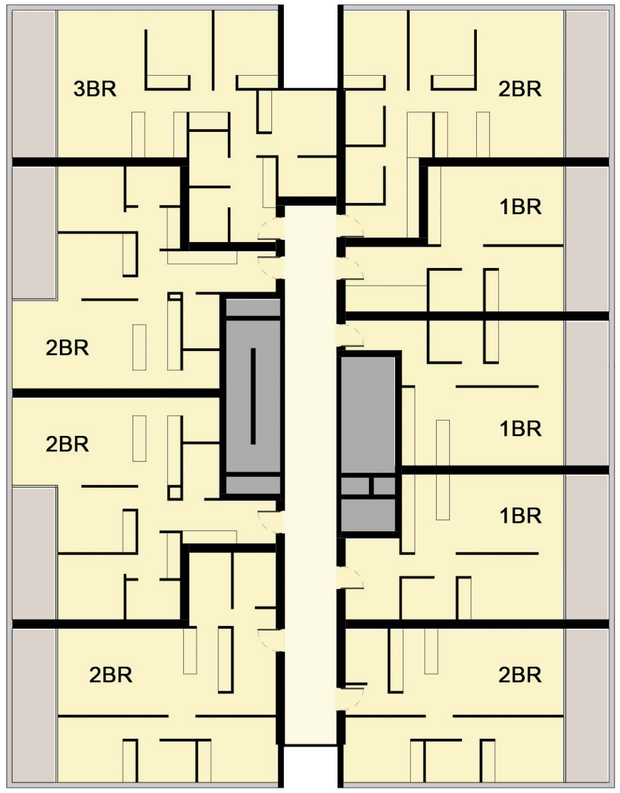


*BH: Building Height



*BH: Building Height


3BR
3BR
1BR
2BR
2BR
2BR
1BR
2BR
2BR
2BR


3BR
2BR
1BR
2BR
1BR
2BR
1BR
2BR
2BR

RAILWAY PARADE

RAILWAY PARADE

RESIDENTIAL TOWER D

RESIDENTIAL TOWER C

WYNNE AVENUE

COMMERCIAL TOWER E

BURWOOD LIBRARY

BURWOOD GRAND

WYNNE AVENUE

RESIDENTIAL TOWER B

RESIDENTIAL TOWER A

CLARENDON PLACE

BURWOOD CENTRAL

B1 SQUARE

RETAIL

COMMERCIAL

RESIDENTIAL

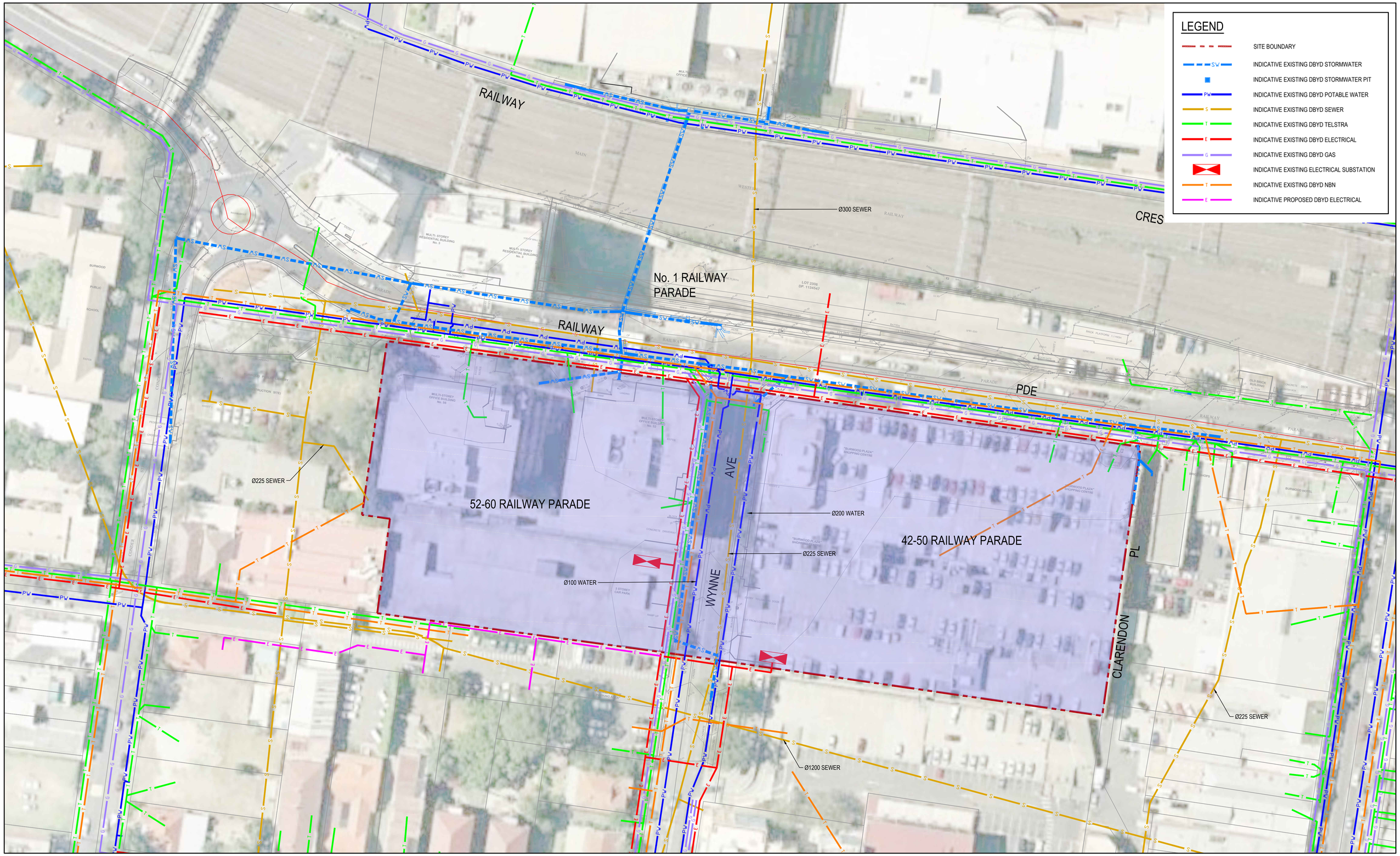
PLANT ROOMS

CARPARK

SERVICED APARTMENTS

APPENDIX B

Existing Utilities Plan



Issue	Description	Date
P2	ISSUE FOR INFORMATION	21.08.2015
P1	ISSUE FOR INFORMATION	21.08.2015

100mm on Original

0 10 20 30 40 50m

1 : 500

Client: HOLDMARK

Status: CONCEPT
NOT TO BE USED FOR CONSTRUCTION

		Current Issue Signatures	
Scales	1:500	Drawn A.ZHAO	
Original Size	A1	Designed C.McCLELLAND	
Height Datum	mAHD	Checked	
Grid		Approved	

Filename:

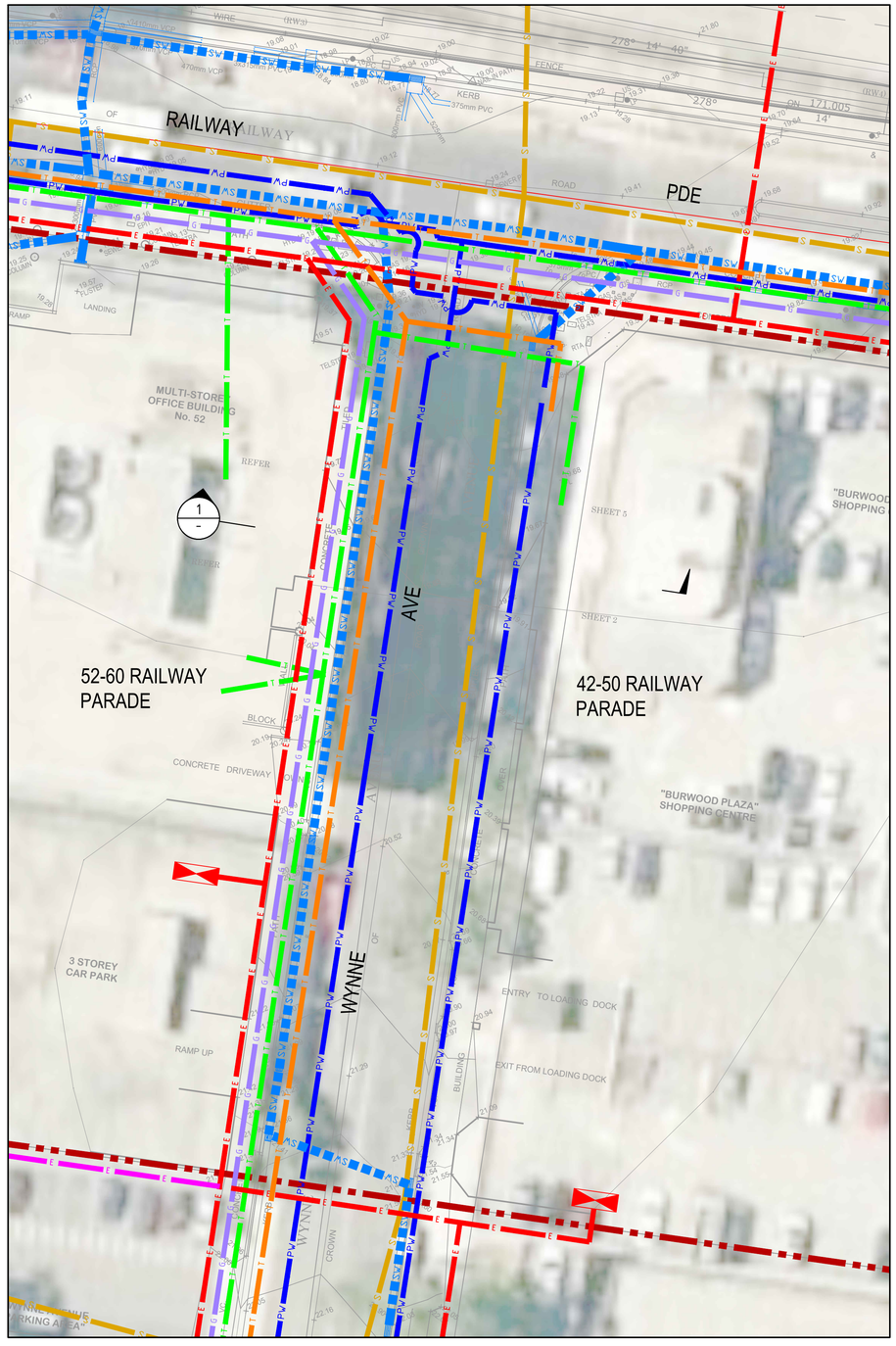
Project: 42-50 & 52-60 RAILWAY PARADE, BURWOOD

Title: EXISTING UTILITIES PLAN

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Drawing No.	Project No.	Issue
SKC001	AA008617	P2

Date Plotted: 1 Jun 2018 - 03:23PM File Name: F:\AA008617\E-CAD\C-Civil\B-Sketches\SKC001-ExistingUtilitiesPlan.dwg V1

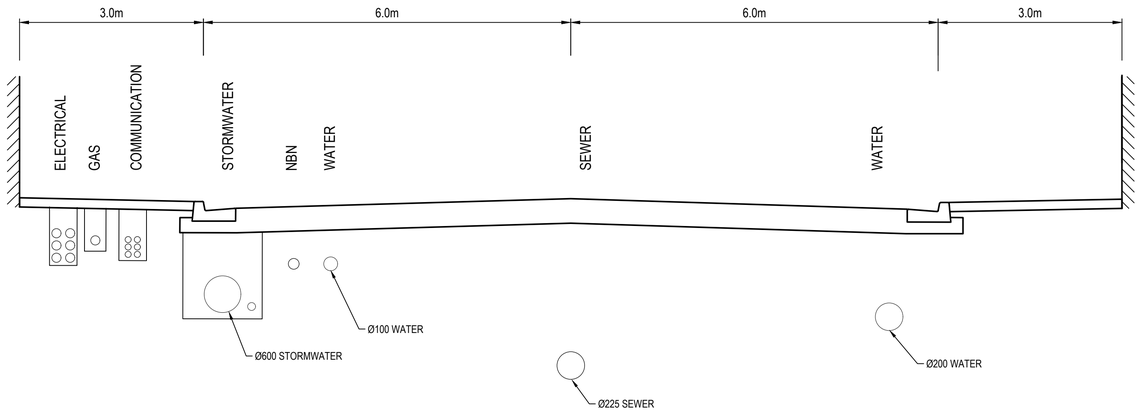


PLAN
1:250

LEGEND

- SITE BOUNDARY
- INDICATIVE EXISTING DBYD STORMWATER
- INDICATIVE EXISTING DBYD STORMWATER PIT
- INDICATIVE EXISTING DBYD POTABLE WATER
- INDICATIVE EXISTING DBYD SEWER
- INDICATIVE EXISTING DBYD TELSTRA
- INDICATIVE EXISTING DBYD ELECTRICAL
- INDICATIVE EXISTING DBYD GAS
- INDICATIVE EXISTING ELECTRICAL SUBSTATION
- INDICATIVE EXISTING DBYD NBN
- INDICATIVE PROPOSED DBYD ELECTRICAL

NOTE
LOCATION OF SERVICES SHOWN INDICATIVELY. ACTUAL LOCATION TO BE CONFIRMED ON-SITE



SECTION 1 - 1
1 : 50

WYNNE AVENUE SECTION

Issue	Description	Date
P2	ISSUE FOR INFORMATION	30.05.2018
P1	ISSUE FOR INFORMATION	21.08.2015

100mm on Original

Client: HOLDMARK

Status: CONCEPT
NOT TO BE USED FOR CONSTRUCTION

		Current Issue Signatures	
Scales	1:250	Drawn A.ZHAO	
Original Size	A1	Designed C.McCLELLAND	
Height Datum	mAHD	Checked	
Grid		Approved	

Filename:

Project: 42-50 & 52-60 RAILWAY PARADE, BURWOOD

Title: WYNNE AVE
PLAN AND SECTIONS

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Drawing No.	Project No.	Issue
SKC002	AA008617	P2