University of Technology Sydney

Bon Marche and Science Precinct Master Plan

Preliminary Infrastructure Assessment

Final | 29 August

Job number 263809

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Executive Summary

The University of Technology Sydney are seeking modifications to the approved Campus Masterplan through a Section 75W application. The project relates to the Bon Marche and Science Precinct (Buildings 3, 4, 9 and 18) and includes changes to building GFA and height limits. This report summarises the preliminary infrastructure assessment for the proposed development in support of the Section 75W modification application.

A review of available information for the proposed redevelopment of the UTS Bon Marche and Sciences Precinct has been undertaken to determine utility servicing requirements at the site. As part of this review a Dial Before You Dig (DBYD) study was undertaken to understand the infrastructure surrounding the proposed development site.

Using the overall building GFA for the Bon Marche and Science Precinct, the demand for the proposed development was calculated for sewerage, potable water, electricity and natural gas. The proposed demand was assessed against the available infrastructure in the vicinity of the site to determine the servicing strategy for each utility.

Based on this preliminary assessment, the site will be able to be serviced via existing stormwater drainage, sewerage, potable water supply, electricity, telecommunications and natural gas infrastructure. Some on-campus infrastructure upgrades may be required, including the existing electrical substation, and a gas pressure reduction chamber. As the S75W modification application progresses and designs advance, it is recommended that utilities planning continues to be coordinated with the relevant utility authorities. In particular, where relocations and lead-in works are required to service the site, early planning is essential to accommodate lead times and prevent delays.

1 Introduction

This report supports a Section 75W (S75W) modification application submitted to the Minister for Planning pursuant to the *Environmental Planning and Assessment Act 1979* (EP&A Act) and more specifically, Schedule 2 of the *Environmental Planning and Assessment (Savings, Transitional and Other Provisions) Regulation 2017*.

The Application relates to the Concept Plan Approval for the University of Technology Sydney (UTS) City Campus Broadway Precinct, which was approved in December 2009 (MP08_0116).

More specifically the modification application relates to the Bon Marche and Science Precinct (Buildings, 3, 4, 9 and 18) and includes establishing new building envelopes with corresponding height and Gross Floor Area (GFA).

This Preliminary Infrastructure Assessment prepared by Arup summarises the proposed infrastructure servicing strategy to be implemented as part of the development. The following infrastructure requirements have been evaluated as part of this report:

- Potable water;
- Sewerage;
- Electricity;
- Telecommunications; and
- Natural gas.

1.1 Overview of Proposed Modifications

The S75W Application seeks the following key modifications to the approved Concept Plan:

- Conceptual demolition of existing Building 4, and rear section of Building 3;
- Conceptual modification to heritage items, Building 3, Building 9, and Building 18;
- Creation of a new building envelope for Building 4, Building 3 (part) and Building 9 (cantilevering over only), resulting in a maximum height of RL 86.55, an increase of approximately 45m above the existing Building 4 and approximately 50m above the existing Building 3;
- Corresponding increase in GFA for Building 4 and Building 3, comprising of an additional increase of up to 36,500m^2;
- Consequential amendments to the Urban Design Quality Controls/Principles to guide the future development of the Bon Marche and Science Precinct; and
- Indicative landscape and public domain concept for the precinct.

The proposed new envelope for the Bon Marche and Science Precinct will accommodate a future building that will have an effective maximum height of 16/17 storeys above Harris Street and six (6) storeys above Thomas Street (i.e. excluding basement levels and plant). The resulting total GFA for the Bon Marche and Science Precinct (new building envelope and existing buildings) is some 65,000m^2.

No physical works are proposed as part of this S75W modification application, with detailed application(s) to follow any approval granted.

1.2 Background

1.2.1 Evolution of UTS

UTS was formed in 1988 from the former NSW Institute of Technology, and was restructured in 1990 with the merger of the Kuring-gai College of Advanced Education, the School of Design, and the Institute of Technical and Adult Teacher Education to form the current UTS. This change in profile, combined with the University's predominantly CBD location in Sydney, created a new identity. During its early evolution, student numbers increased at UTS without any significant increase in student facilities.

UTS recognised the need to upgrade the City Campus back in 2000, and undertook a number of visioning and master planning projects culminating in the City Campus Masterplan 2020 (BVN, 2008) which provided a framework for refurbishments and new building works across the campus (comprising the Broadway Precinct and other sites in the Sydney CBD) in order to provide improved facilities and to accommodate future expected student and staff growth.

On 23 December 2009 a critical step in realising UTS's vision and identity for the Broadway Precinct was realised, with approval of the UTS City Campus Broadway Precinct Concept Plan (BPCP).

Since approval of the Concept Plan in 2009 UTS has secured the necessary detailed planning approvals and delivered a number of state of the art and iconic learning, research and social facilities across the Broadway Precinct, including (refer to Figure 1):

- Faculty of Engineering and IT Building, designed by Denton Corker Marshall Architects.
- Multi-Purpose Sports Hall, designed by PTW Architects.
- Alumni Green, designed by ASPECT Studios Landscape Architects.
- Faculty of Science and Graduate School of Health Building, designed by Durbach Block Jaggers in association with BVN Architecture.
- Library Retrieval System, designed by Hassell Architects.
- Great Hall and Balcony Room Upgrade, Designed by DRAW Architects in association with Kann Finch Architects.
- Student Housing Building, designed by nettletontribe architects.

The UTS Central Project (designed by fjmt in collaboration with Lacoste + Stevenson in association with Darryl Jackson Robin Dyke Architects) represents the latest project being delivered by UTS to meet the needs of staff and students. The first phase of the UTS Central Project, which required a modification to the Concept Plan (MOD 5), is expected to be completed in 2019. The second phase of this project will include an extension to the podium of Building 1 addressing Broadway.

UTS currently has less than 2% of space across campus unallocated which is insufficient to accommodate forecast continued growth in student and staff numbers in the future. The educational facilities within the existing Bon Marche Building 3 are outdated and inadequate to meet the needs of contemporary teaching and learning environments.

The existing Science buildings (Building 4) are nearing the end of their lifecycle, which together with the continued growing demands from students locally and abroad and growth in both Science and Design, Architecture and Building (DAB) faculties presents an opportunity for UTS to progress with plans to support additional and much needed teaching and research space.

UTS plays an important role in the success of Sydney and NSW, with the Greater Sydney Commission's recently released Sydney Regional and District plans acknowledging this importance and identifying the need to protect and support the growth of education activity within the Harbour CBD Innovation Corridor.

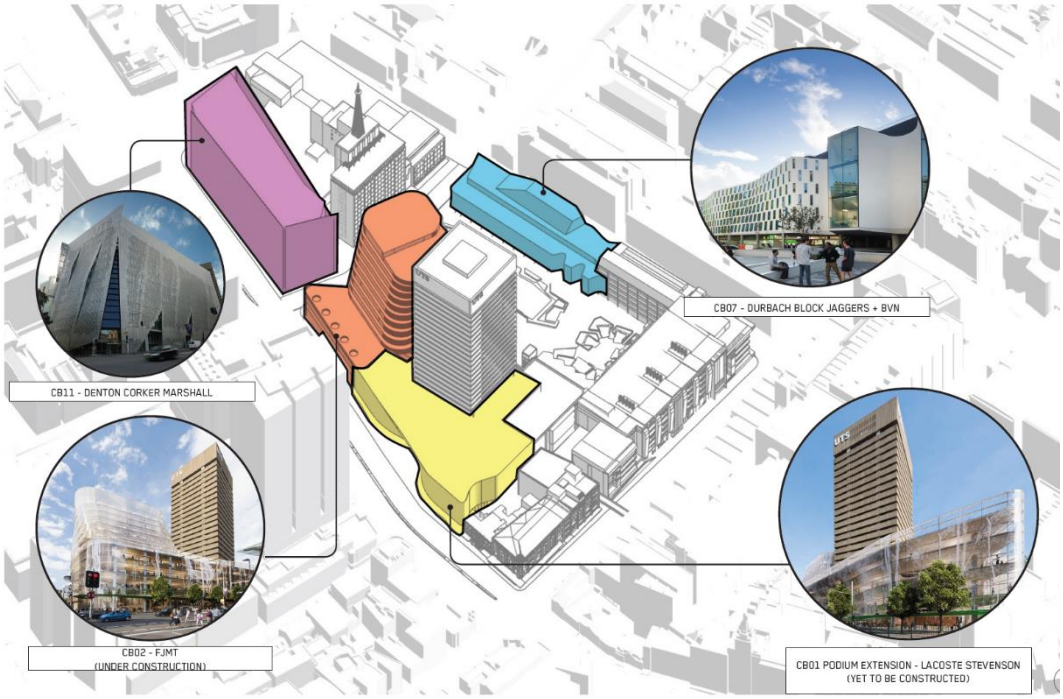


Figure 1 Key UTS projects approved/delivered under the Concept Plan (Source: BVN)

1.2.2 Evolution of Concept Plan

The UTS City Campus Broadway Precinct Concept Plan (BPCP, as illustrated in Figure 2) was approved by the then Minister for Planning on 23 December 2009 (MP08_0116). The Concept Plan initially included:

- New Broadway Building and Thomas Street Building with a combined gross floor area (GFA) of 44,650m^2;
- Expansion of Buildings 1 and 2 with a combined additional GFA of 10,800m^2;
- Expansion of Building 6 for the provisions of student housing with an additional 25,250m^2 GFA;
- Modifications to Buildings 3, 4 and 10;
- Modifications to Alumni Green with a new Multi Purpose Sports Hall and book vault beneath; and
- Public domain improvements to Broadway and Thomas, Harris, Wattle and Jones Streets.

The Minister also granted Project Approval for the following works:

- Construction of a new underground Multi Purpose Sports Hall; and
- Demolition of Buildings 11, 12 and 13.

The Concept Plan did not set new maximum heights and GFA for the Bon Marche and Science Precinct as demand for growth or redevelopment of these buildings was not identified at the time. The Concept Plan (2009) was informed by UTS's Growth Plan at the time to 2020, which had not foreseen that additional floor area

and significant modifications and upgrades to existing buildings was required in the Bon Marche and Science Precinct. The 2009 Concept Plan also did not take into account the lifecycle status of Building 4, which was recently investigated and reported to be nearing end of life in 2026.

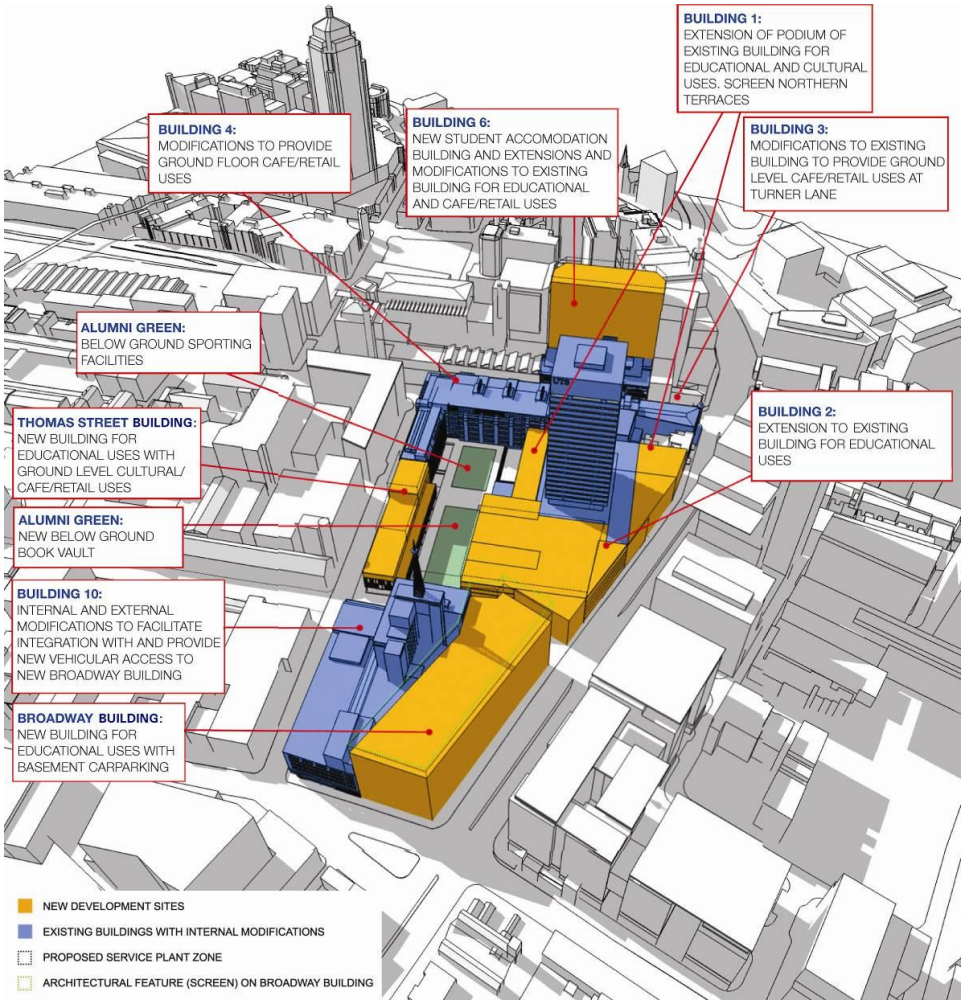


Figure 2 3D Model of approved concept plan (Source: BVN, DCM and JBA)

Since the Concept Plan was approved, five (5) subsequent modifications have been approved.

Modification No 1

Modification No 1 (MP 08_0116 Mod 1), approved in March 2011, sought to include bulk excavation works for the Broadway Building as part of the Project Approval works granted under the Concept Plan approval (enabling these works to be undertaken ahead of the Project Application for the building).

Modification No 2

Modification No 2 (MP 08_0116 Mod 2), approved in March 2011, related to an administration amendment to Concept Plan condition B2.

Modification No 3

Modification No 3 (MP 08_0116 Mod 3), approved in July 2011, sought to include the excavation, construction and operation of the Library Retrieval System (LRS) and Storage Building together with bulk excavation works for the Thomas Street Building as part of the Project Approval works granted under the Concept Plan approval (enabling these works to be undertaken without any further environmental assessment).

The modification also included a revised breakdown of GFA across the UTS Broadway site, with the Environmental Assessment submitted in support of the S75W identifying an increased GFA for the Thomas Street building of 12,150m^2 (corresponding with a decreased GFA for the Broadway Building of 34,650 m^2).

Modification No 4

Modification No 4 (MP 08_0116 Mod 4), approved in March 2012, related to an administration amendment to Concept Plan condition E3 (approved truck route plan for excavation of Thomas Street building and the library retrieval system).

Modification No 5

Modification No 5 (MP 08_0116 MOD 5) was approved by the then Minister for Planning in March 2016 and facilitated an expanded Building 2 envelope (maximum RL of 79.5) and corresponding increase in GFA for a new Building 2 and the Building 1 podium extension (resulting in a total maximum allowance of 64,407m^2). The modification provided the planning framework for the UTS Central project currently under construction.

Modification No 6

This report has been prepared in support of proposed Modification No 6 (MP 08_0116 Mod 6) to the Concept Plan.

1.3 SEARs

Secretary's Environmental Assessment Requirements (SEARs) were issued by the Department of Planning and Environment (DP&E) on 1 February 2018. There were no specific SEARs requirements relating to utilities and infrastructure. The purpose of this report is to demonstrate the that the proposed development can be feasibly serviced by surrounding infrastructure.

1.4 The Site

The Broadway Precinct of the UTS City Campus is located on the southern edge of the Sydney Central Business District (CBD). The UTS City Campus is located entirely within the City of Sydney (CoS) Local Government Area.

The Campus has frontages to Broadway, Thomas, Wattle and Harris Streets, and the Goods Line and is less than 700 metres from Central Railway Station. Jones Street runs through the Precinct. The area covered by the Concept Plan (MP 08_0116) is shown in Figure 3.

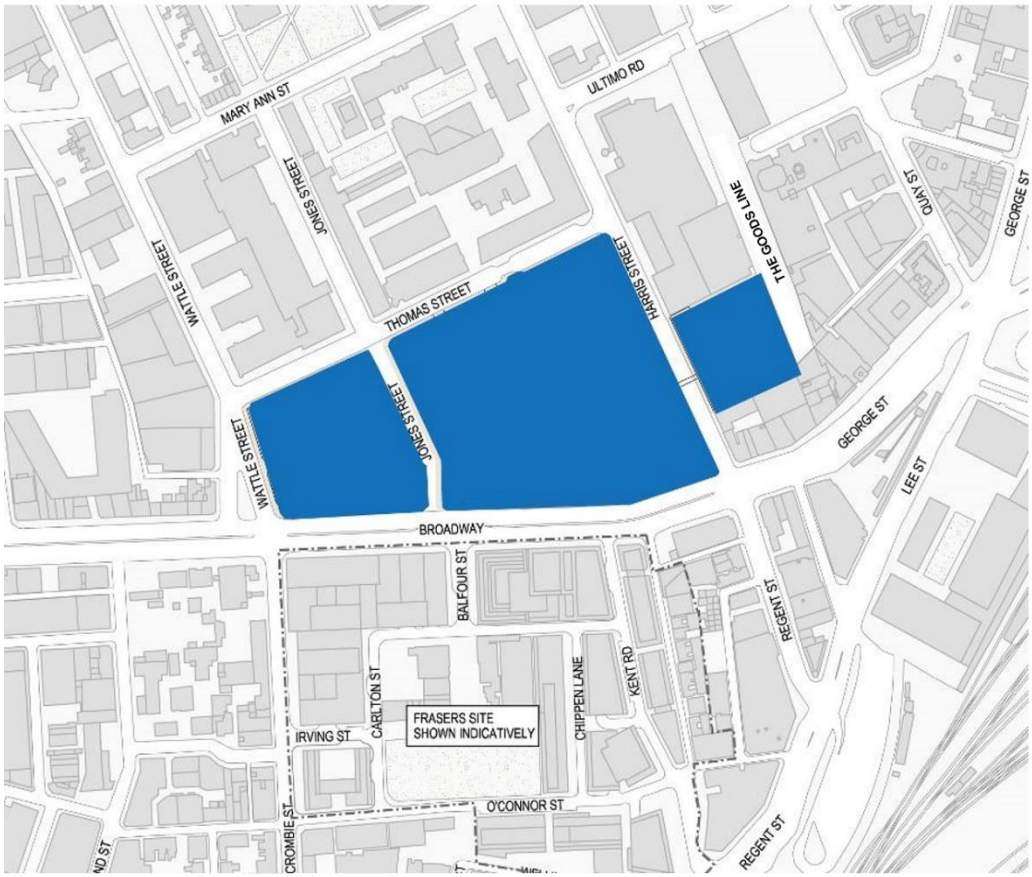


Figure 3 Site Context (Source: BVN)

More specifically, the Bon Marche and Science Precinct is located within the eastern part of the Broadway campus between Thomas Street and Broadway with frontage to Harris Street. It incorporates Buildings 3, 4, 9 and 18. Buildings 3, 9 and 18 are identified as heritage items under the *Sydney Local Environmental Plan 2012* (SLEP 2012). Refer to Figure 4 and Figure 5 for the location of the Bon Marche and Science Precinct.

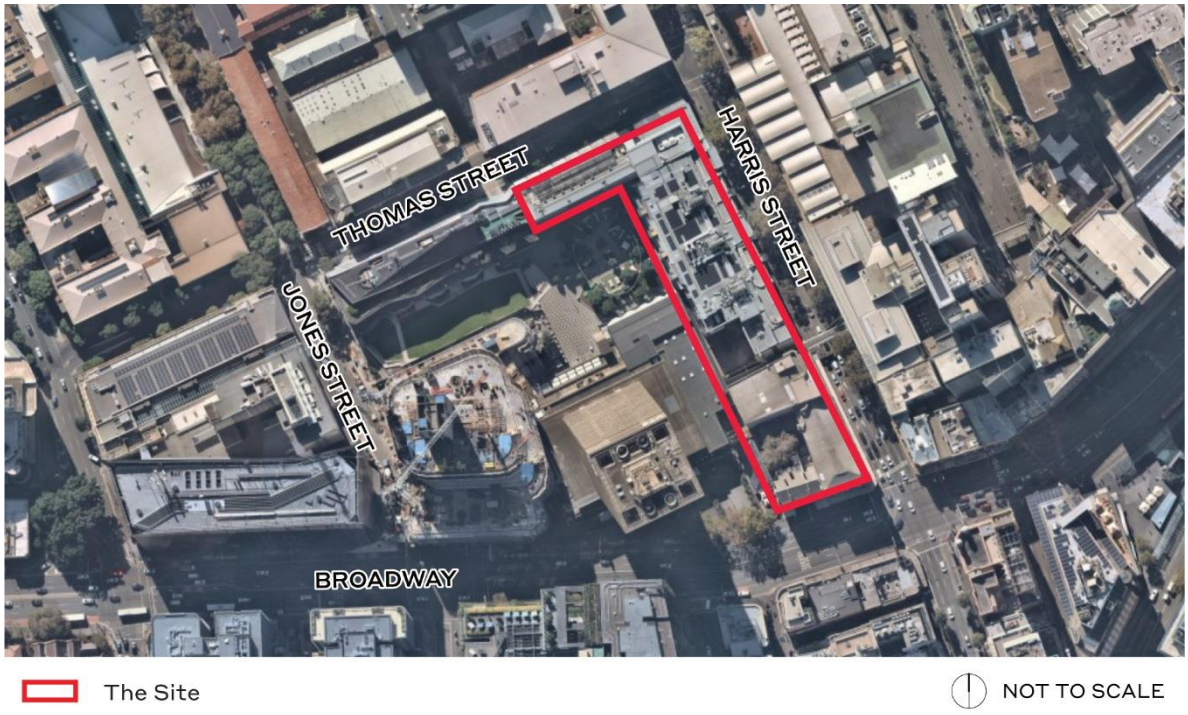


Figure 4 Aerial image of Bon Marche and Science Precinct (outlined in red) – May 2018 (Source: NearMap)

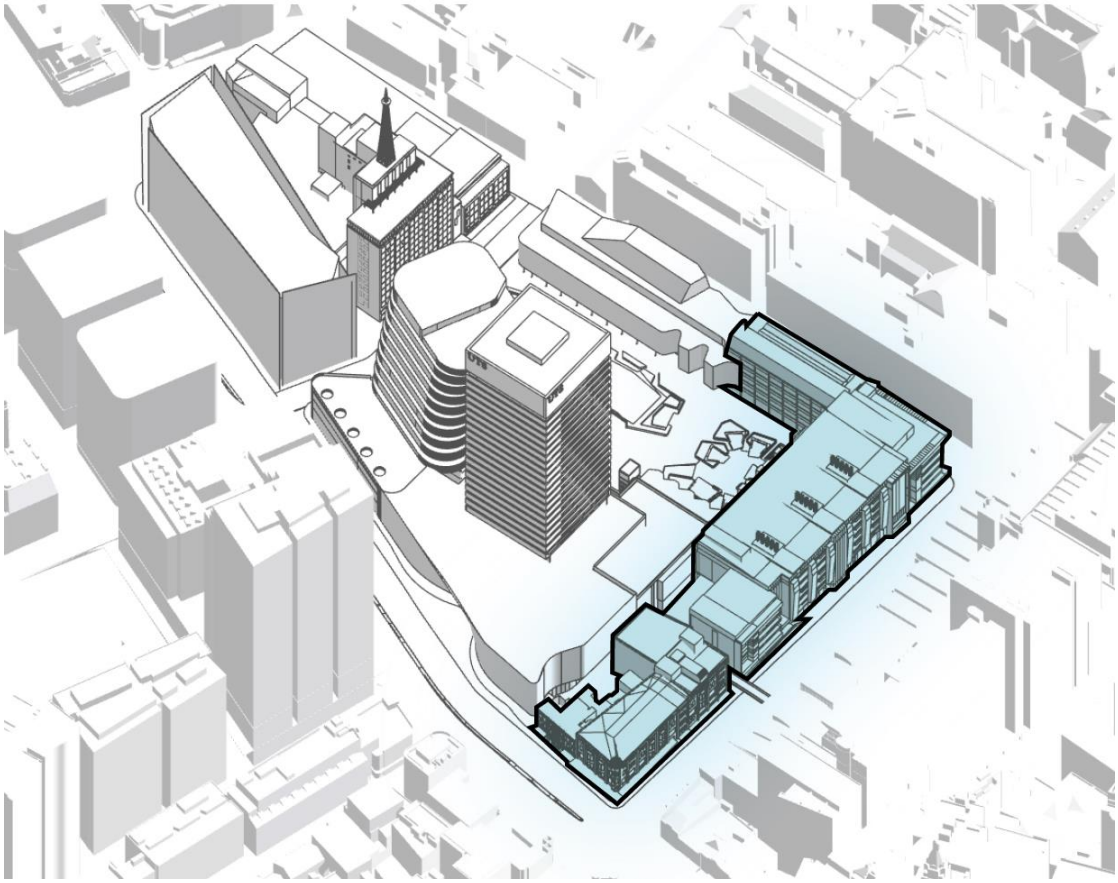


Figure 5 3D perspective of the existing Bon Marche and Science Precinct (Source: BVN)

2 Utilities Servicing Strategy

2.1 Stormwater Drainage Infrastructure

2.1.1 Existing Stormwater Drainage

The existing stormwater drainage infrastructure surrounding the site includes local drainage collecting stormwater from the UTS campus site and Sydney Water/City of Sydney road drainage in the adjacent streets. The existing site topography falls from south to north along Harris Street. The high point at the corner of Harris Street and Broadway is approximately RL16.5m AHD, while the high point along Thomas Street is approximately RL13m AHD. The low point of the site is located at the corner of Harris Street and Thomas Street and is approximately RL8.9m AHD.

Stormwater runoff from the existing buildings discharge to the street stormwater network via numerous connection points and kerb outlets along Harris Street and Thomas Street. From the corner of Thomas Street and Harris Street the Sydney Water/City of Sydney stormwater network drains to the north.

2.1.2 Proposed Stormwater Drainage

The proposed development would not alter the overall building footprint of the site, therefore, the existing connection points along Harris Street and Thomas Street from the existing buildings will be retained and re-used to discharge the proposed stormwater network. The proposed stormwater network will meet Council requirements for Water Sensitive Urban Design (WSUD) and on-site detention (OSD).

A more detailed summary of the proposed stormwater collection network is included in the Preliminary Stormwater Management Concept Plan(Arup, 2018).

2.2 Sewerage Infrastructure

2.2.1 Existing Sewerage

Existing sewerage infrastructure in the vicinity of the development site are the assets of Sydney Water Corporation (SWC). There are two (2) sewer mains located on Harris Street; an existing 225mm diameter sewer main located under the western footpath and an existing 300mm diameter sewer main located under the western lane of the carriageway. Additionally, there is an existing 225mm diameter sewer main located on Thomas Street. The existing and indicative proposed sewerage infrastructure is shown below in Figure 6 with additional information provided in Appendix A.

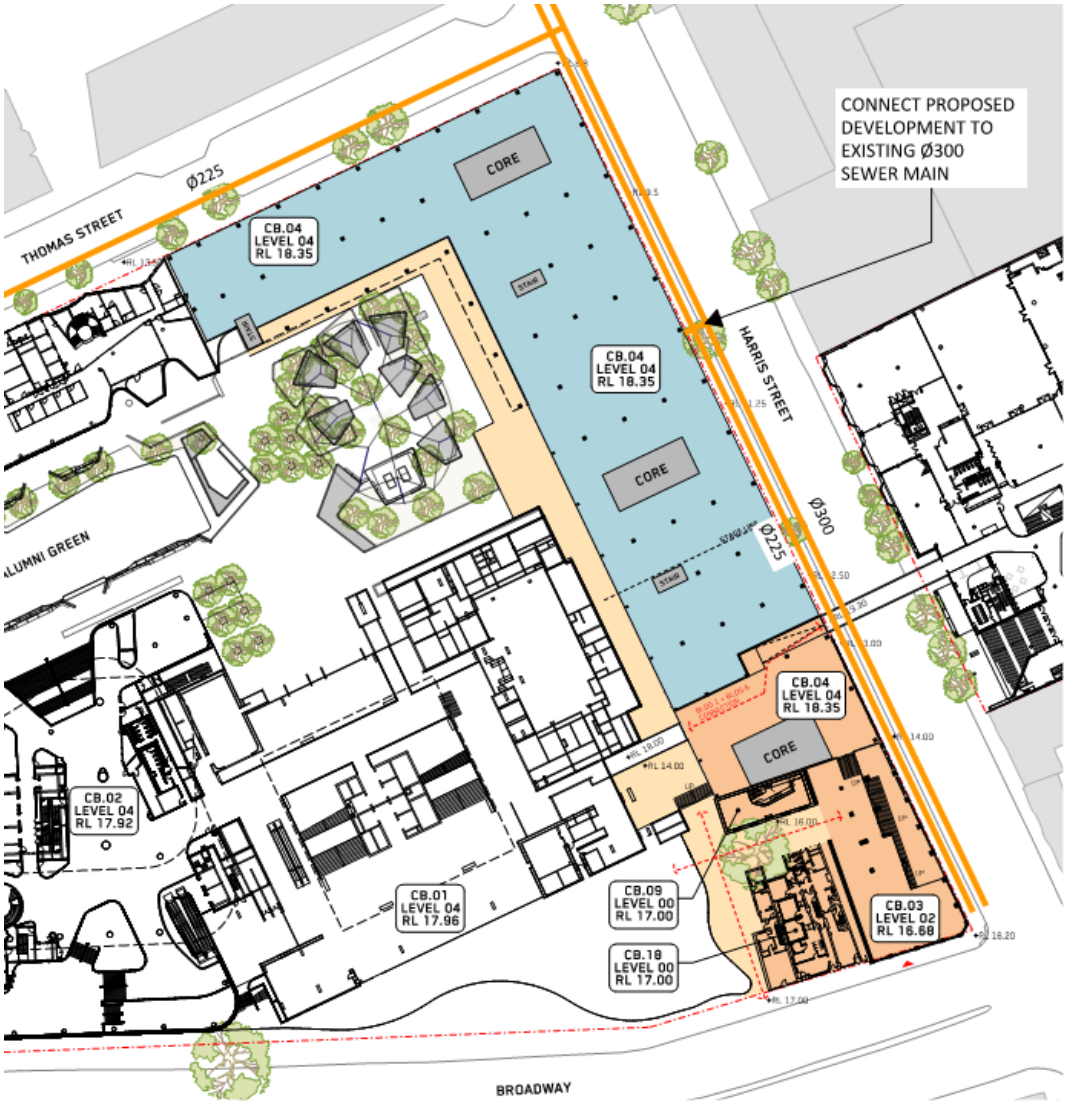


Figure 6 Existing Sewerage Infrastructure and Proposed Sewerage Servicing Strategy

Through consultation with UTS operations staff, it was determined the existing sewer discharge for the Bon Marche and Science Precinct buildings is 10,804kL/annum.

2.2.2 Proposed Sewerage

In order to assess the requirements for sewerage at the site, a preliminary sewer loading calculation has been undertaken using the SWC spreadsheet (Sewerage Flow Schedule – Sydney Water, 2016).

SWC uses Equivalent Population (EP) ratios to estimate expected sewerage flow by land use. A summary of the EP's based on the preliminary development yields for the architectural plan received in August 2018 are provided in Table 1.

Table 1 Equivalent Population (EP) Ratios

Land Use	Calculation	Equivalent Population (EP)
Educational Institutions	0.2 EP / Student	1,301
TOTAL		**1,301**

We have used assumed 10m^2 GFA per student in the above calculation of EPs for the site. This includes the academic staff of the university in the calculation.

Based upon the expected EPs for the site, the estimated Average Dry Weather Flows and Peak Dry Weather Flows into the SWC sewerage system are summarised in Table 2.

Table 2 Estimated Average and Peak Dry Weather Sewer Flows

Average *(L/s)*	Peak *(L/s)*
2.26	6.91

SWC acknowledges that peak flows occur at different times along the length of the pipe and therefore, Peak Dry Weather Flows are not summed linearly.

The flow from the proposed development equating to 1,301 EP should be directed towards the existing 300mm diameter main on Harris Street. A 300mm diameter main corresponds to a maximum allowable EP of 3,200 depending on the pipe grades along the length of the main in comparison to a maximum allowable EP of 1,600 for a 225mm diameter main (dependent on pipe grade). It is recommended that the existing 300mm diameter main is used to service the proposed development rather than the existing 225mm diameter main, as it should have greater capacity to cater for the additional flow from the proposed development. This will need to be confirmed with SWC to assess any potential upstream and downstream impacts associated with this additional flow.

It should be noted that the sizing of mains above 300mm diameter requires verification using a hydraulic model incorporating a Dynamic Wave Routing option to perform capacity assessment, surcharge and overflow analysis (Sydney Water, Sewerage Flow Schedule, 2016).

Based on our initial review of the anticipated sewer load and nearby infrastructure we do not anticipate that new sewerage infrastructure will be required to service the proposed development. The existing sewerage infrastructure located on Harris Street (and Thomas Street if required) is anticipated to have sufficient capacity to service the proposed development. This will need to be confirmed through consultation with SWC during future design stages.

Given the scale of the proposed development it is anticipated that modelling of the existing and proposed sewerage system will be required during the design phase to confirm capacities of existing receiving sewers. This modelling is to be undertaken by the developer at their cost.

2.3 Potable Water Supply Infrastructure

2.3.1 Existing Potable Water Supply

Existing potable water supply infrastructure in the area are the assets of SWC. According to SWC records these assets include a 150mm diameter main on Thomas Street and a 200mm diameter main under the northern side of Broadway. On Harris Street, a 150mm diameter main and a 300mm diameter main are located under the western footpath while a 300mm diameter main is located under the eastern footpath. Existing potable water mains in the area and the indicative proposed connection point are shown in Figure 7 with additional information provided in Appendix B.

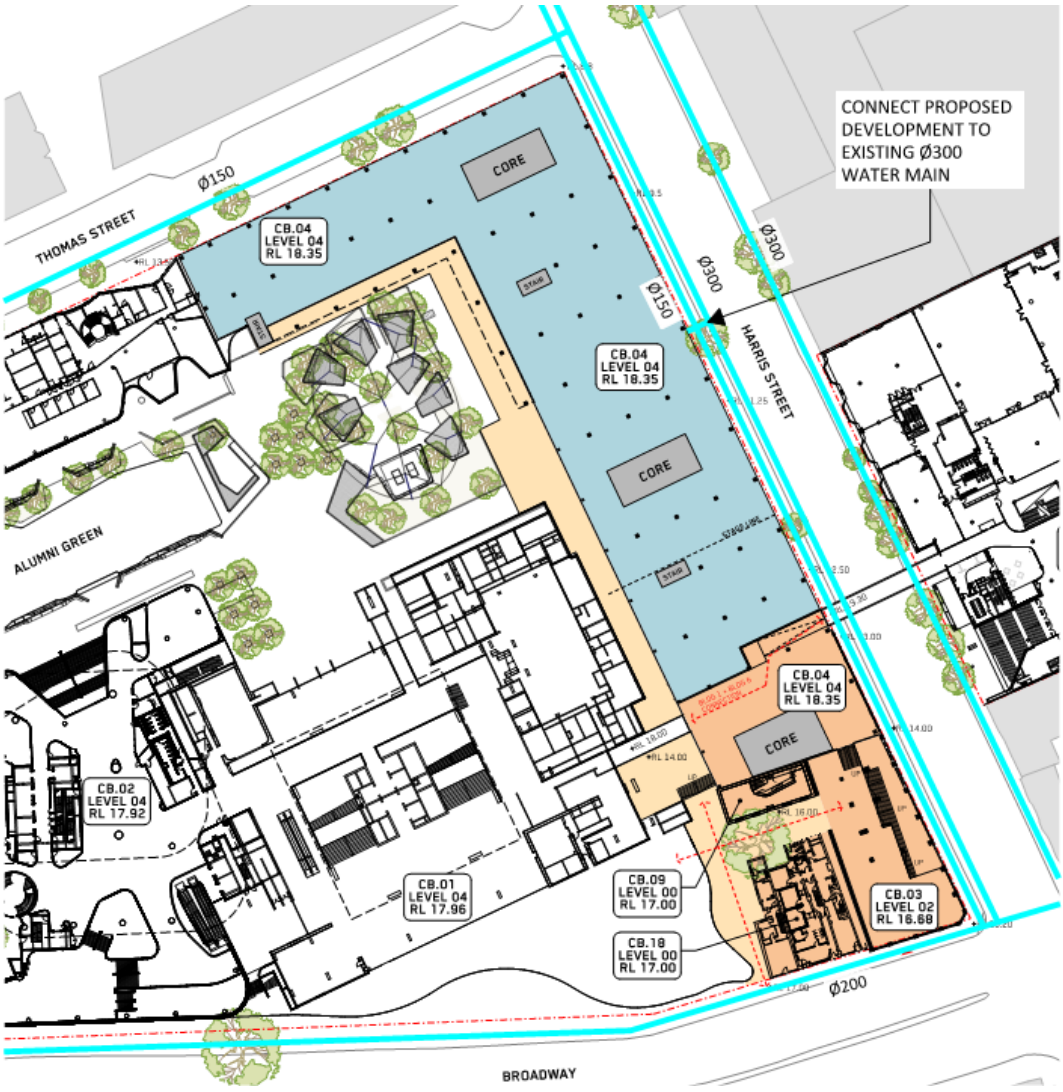


Figure 7 Existing Potable Water Infrastructure and Proposed Potable Water Servicing Strategy

Through consultation with UTS, it was determined the existing potable water use for the Bon Marche and Science Precinct buildings is 17,425kL/annum.

2.3.2 Proposed Potable Water Supply

Potable water demands have been estimated utilising SWC planning metrics (September, 2014). The applicable metrics are presented in Table 3. In calculating the maximum daily demand and peak flows for general university space, in the absence of more detailed information such as the number of fixtures, general university space was assumed to be equivalent to high rise commercial usage. These metrics were used to estimate the potable water demand of the proposed development based upon the preliminary development yields for the architectural plan received in August 2018. These estimates, expressed as the Maximum Daily Water Demand, are summarised in Table 4.

Table 3 Water Demand Rates (SWC, 2014)

Land Use	Projected Max Daily Demand	Projected Peak Flow
Commercial	6.3 L/m^2/day	1.46 L/ha/s

Table 4 Projected Maximum Daily Water Demand and Peak Flow

Land Use	Max Daily Demand *(L/day)*	Max Peak Flow *(L/s)*
Commercial	409,695	9.48
TOTAL	**409,695**	**9.48**

Based on our preliminary assessment, it is anticipated that the existing potable water supply infrastructure adjoining the site has sufficient capacity to service the proposed development, although some upgrades to the existing network may be required to enable supply for the entire development. This includes connection to either the 150mm or 300mm diameter main along Harris Street, depending on available capacity. Lead in works would be required for this connection in addition to any further connections if required. It is expected that the existing mains on Harris Street will continue to have sufficient capacity to service the increased demand. However, this should be verified through consultation with SWC. It is noted that SWC will not provide formal advice until the lodgement of a Section 73 application. These projected demand values are preliminary and subject to refinement as design and consultation with SWC progresses.

To service the proposed development site internally, the following potable water supply infrastructure is seen as being required:

- Connections to the existing potable water infrastructure located on Harris Street; and
- All pipework to be PVC-O material unless advised otherwise.

Modelling of the existing and proposed water supply network will be required during the design phase to confirm that existing water mains have sufficient capacity. This is to be undertaken by the developer at the developer's cost.

In order to demonstrate the serviceability of the proposed development a schematic design of an indicative potable water reticulation network has been prepared. The schematic concept plan for the final stage of this network is included in Figure 7 while the various stages are shown in Appendix B.

2.4 Electrical Infrastructure

2.4.1 Existing Electrical Infrastructure

Existing electrical infrastructure in the area are the assets of Ausgrid. Based on information received from the Dial Before You Dig (DBYD) enquiry, it is understood that there are existing underground high-voltage routes running in roads in the vicinity of the site, as shown in Figure 8 with additional information provided in Appendix C. Within the site there is an existing substation containing two (2) x 1000 kVA transformers, accessible from Harris Street. Additionally, UTS Building 1 contains four (4) substations; two (2) located on Level 1 with additional substations located on Level 7 and Level 29.

Figure 8 Existing Electricity Infrastructure and Proposed Electricity Servicing Strategy

Consultation with UTS has indicated the maximum demand loading on the existing substation in the site is 1000kVA while the other substations located in Building 1 are at maximum capacity. It is understood that the campus Central Energy Plant is currently operating at capacity.

Through consultation with UTS, it was determined the existing electricity use for the Bon Marche and Science Precinct buildings is 6,563kWh/annum.

2.4.2 Proposed Electrical Infrastructure

The estimated electricity demand and total peak power demand for the proposed development is summarised in Table 5. The demand rate used assumes that the proposed development is fully air conditioned. These estimated peak demands have been summed linearly and therefore do not account for probability of peak demands occurring concurrently, and therefore are considered a conservative estimate of the ultimate peak demand of the whole development site.

Table 5 Projected Peak Electric Demand Rates

Usage	Projected Peak Demand	Peak Power (kVA)
University - General	100 VA/m^2	6,503
TOTAL		**6,503**

In the absence of projected peak electric demand rates for university areas, the projected peak demand value for theatres and halls has been used to calculate the peak power demand for the proposed development (Annexure B Ausgrid Network Standard).These projected demand values are preliminary and subject to refinement as design progresses.

To satisfy the electricity demands of the proposed development the existing substation located on Harris Street will need to be replaced with a substation with much greater capacity. It is expected 5 x 1500 kVA transformers or equivalent will be required to upgrade the existing substation. A concept plan for the proposed electrical layout for the development is included in Appendix C.

Within the campus, as the Central Energy Plant is at capacity there is currently no reserve capacity to cater for the chilled water and heating water requirements of the new Bon Marche and Science Precinct development. Therefore, air conditioning for the new development will need to be provided by either standalone plant or district energy initiatives such as providing an additional chilled water connection with the Central Park development. These options will be considered in more detail during later design stages.

Ausgrid, upon receipt of a formal application will model the network to examine the effect of the additional load and determine the point of connection. It is recommended that Ausgrid are consulted in future design stages to determine capacity within the existing system to cater for the proposed development.

2.5 Telecommunications Infrastructure

2.5.1 Existing Telecommunications

Existing telecommunications infrastructure in the area are the assets of Telstra, Optus, NBN Co, AAPT, Nextgen, Verizon, Vocus, Uecomm and Australia's Academic and Research Network (AARNet). DBYD data shows the following connections to the site:

- AARNet; including a communications line running through the site from a connection point from Harris Street;
- NBN Co; significant infrastructure in ducts across site;
- Nextgen; including a communications line running through the university from a connection point from Thomas Street;
- Optus; including a communications line running through the site from a connection point from Harris Street; and
- Telstra; connections to the site from Harris Street and Thomas Street.

The existing telecommunications infrastructure in the area is shown in Figure 9 with additional information provided in Appendix D.

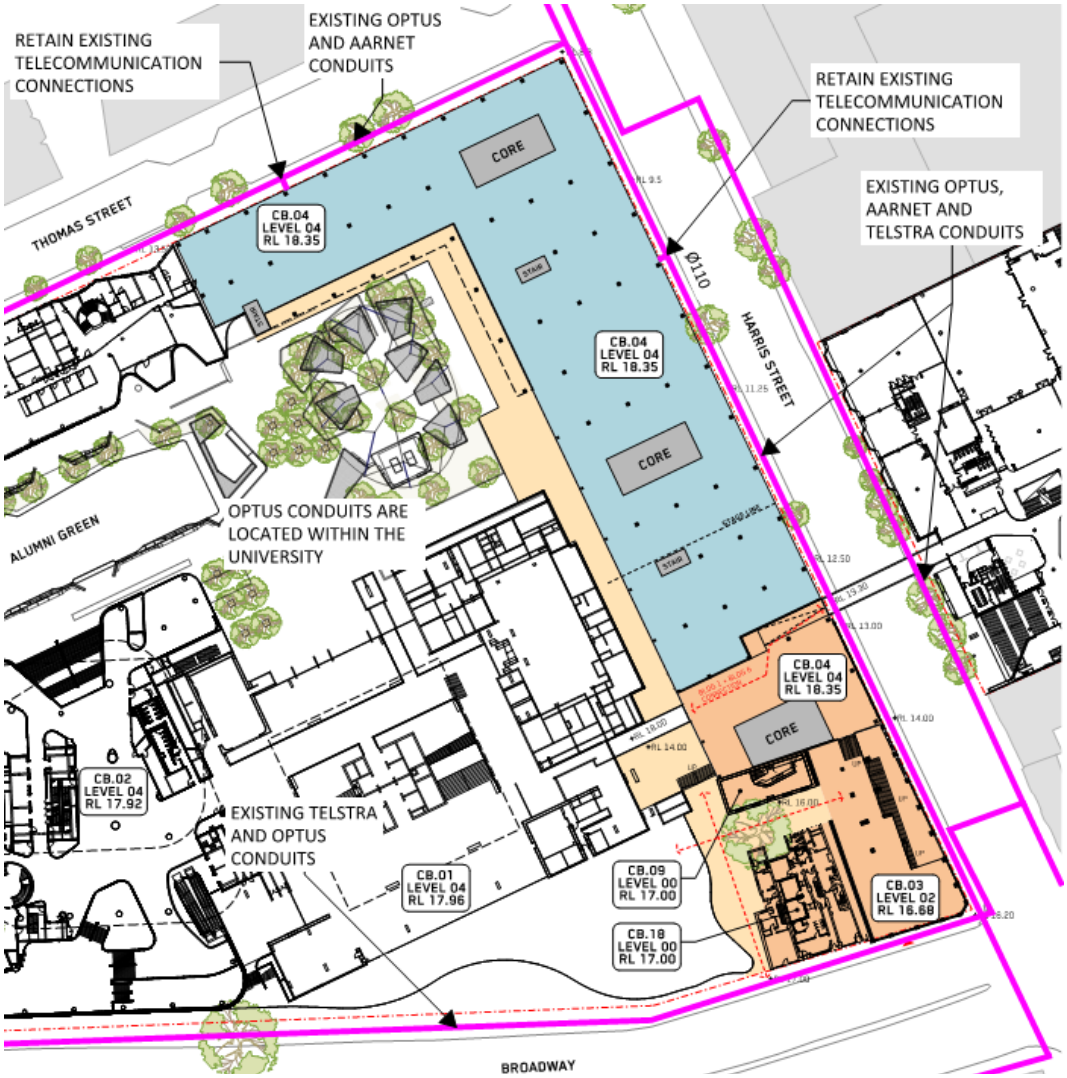


Figure 9 Existing Telecommunications Infrastructure and Proposed Telecommunications Servicing Strategy

2.5.2 Proposed Telecommunications

No discussions have been held with any of the existing communications providers to date. However, as the proposed development forms part of UTS, it is proposed the site is serviced by NBN Co and AARNet at a minimum.

Consultation with telecommunication providers will be required in future stages of design to confirm capacity to service the proposed development.

2.6 Natural Gas Infrastructure

2.6.1 Existing Natural Gas

Existing Natural Gas infrastructure in the area are the assets of Jemena Limited. These assets include 210kPa gas mains along Harris Street. Secondary, 1,050kPa, high pressure gas mains are located to the north of the site along Thomas Street. This high pressure gas main also runs along Jones Street through the UTS campus. The existing natural gas infrastructure is shown in Figure 10 with additional information provided in Appendix E.

From available DBYD information and consultation with UTS, it is understood the 1,050kPa high pressure gas main on Jones Street services the existing Bon Marche and Science Precinct buildings. The 1,050kPa high pressure gas main in Jones Street connects to the gas meter room located within Building 2. Gas is

subsequently reticulated at a lower pressure to service the existing development.

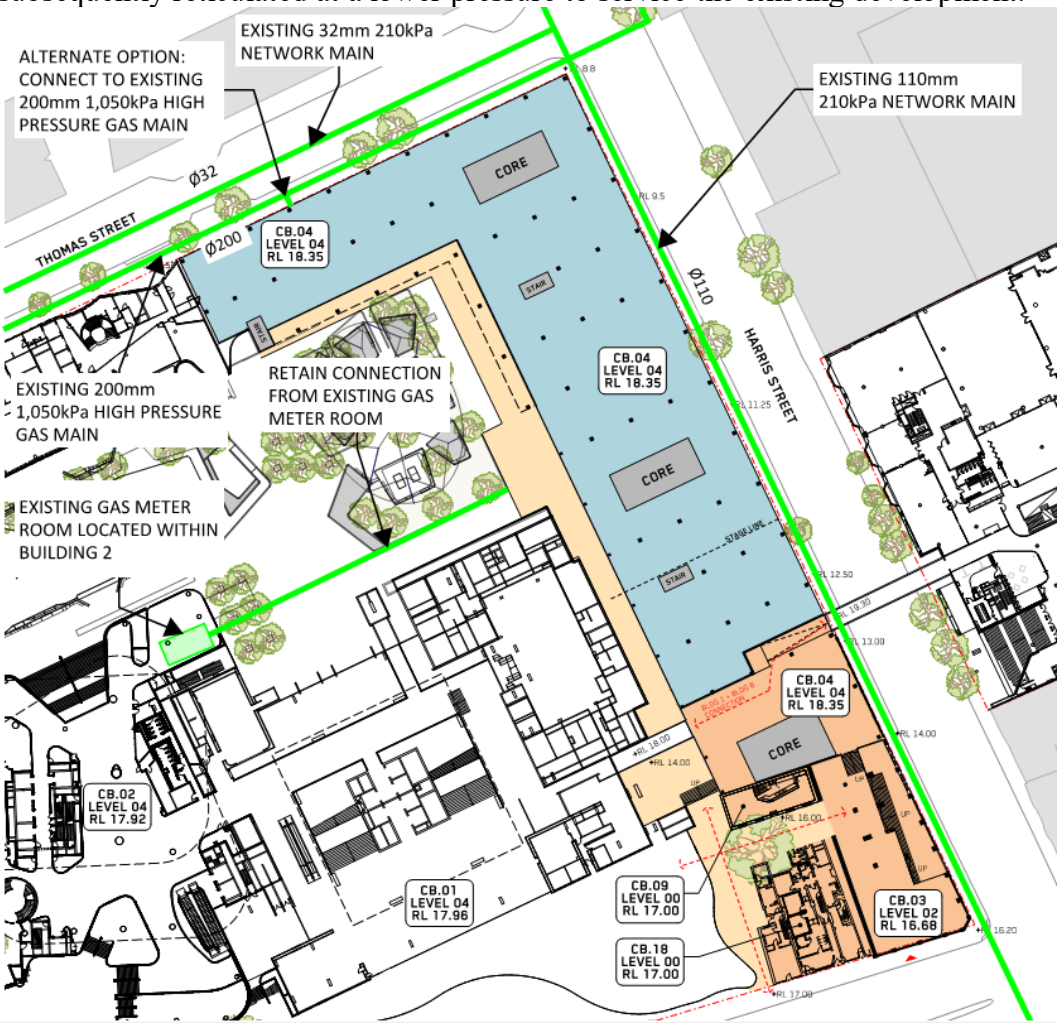


Figure 10 Existing Natural Gas Infrastructure and Proposed Natural Gas Servicing Strategy

2.6.2 Proposed Natural Gas

In order to assess the requirements for Natural Gas at the site, a preliminary Natural Gas loading calculation has been undertaken using the metrics provided in Table 6 which are based on industry standards and our experience on similar projects. These metrics were used to estimate the peak gas demands summarised in Table 7. These estimated peak demands have been summed linearly and therefore do not account for probability of peak demands occurring concurrently, and therefore are considered an overestimate of the ultimate peak demand of the whole development site.

Table 6 Projected Peak Gas Demand Rates

Land Use	Projected Peak Demand
University	0.125 kW/m^2

The projected peak gas demand for universities is highly dependent on the intended usage and could vary significantly. The projected peak gas demand for the site are summarised in Table 7.

Table 7 Projected Peak Gas Flow Rates

Land Use	Peak Demand *(kW)*	Peak Demand *(m^3/s)*
University	8,129	0.205
TOTAL	**8,129**	**0.205**

Through consultation with UTS, it is understood the preferred natural gas servicing strategy is to service the proposed development from the existing 1,050kPa high pressure gas main connection at Jones Street. As outlined previously, the gas meter room located within Building 2 (shown in Figure 10) currently services the existing Bon Marche and Science Precinct. Arup has been advised that the gas meter room has capacity to service the future demands of the proposed Bon Marche and Science Precinct.

As part of the current Building 2 development, a 150mm gas main will be connected from the high pressure gas main in Jones Street to a gas room with a pressure reduction chamber located in Building 2. This gas would then be reticulated at a lower pressure to service the campus. This main has been designed with sufficient capacity to the proposed Bon Marche and Science Precinct development and so is recommended to be used to supply the proposed development.

An alternative option to supply the proposed developed would be to connect to the high pressure gas main located on Thomas Street. In order to supply the site from this 1,050kPa gas main, a pressure reduction pit would need to be installed at the connection point at Thomas Street. This would have approximate dimensions of 3m by 5m and would be located within the site or road reserve if space is available.

A concept plan for the site domestic gas network for the final stage is shown in Figure 10. A preliminary concept plan for the domestic gas network for the remaining stages is included in Appendix E.

3 Conclusion

A review of available information for the proposed redevelopment of the UTS Bon Marche and Sciences Precinct has been undertaken in order to determine infrastructure requirements at the site. This report addresses infrastructure and utilities requirements associated with the proposed development, and has summarised the proposed servicing strategy for major utility infrastructure and provisional projected utility demands.

Existing utility services are available in the existing road network surrounding the site. Based on our preliminary assessment, the site will be able to be serviced with stormwater drainage, sewerage, potable water supply, electricity, telecommunications and natural gas infrastructure. As the S75W modification application progresses and designs advance, it is recommended that utilities planning continues to be coordinated with the relevant utility authorities. In particular, where relocations and lead-in works are required to service the site, early planning is essential to accommodate lead times and prevent delays.

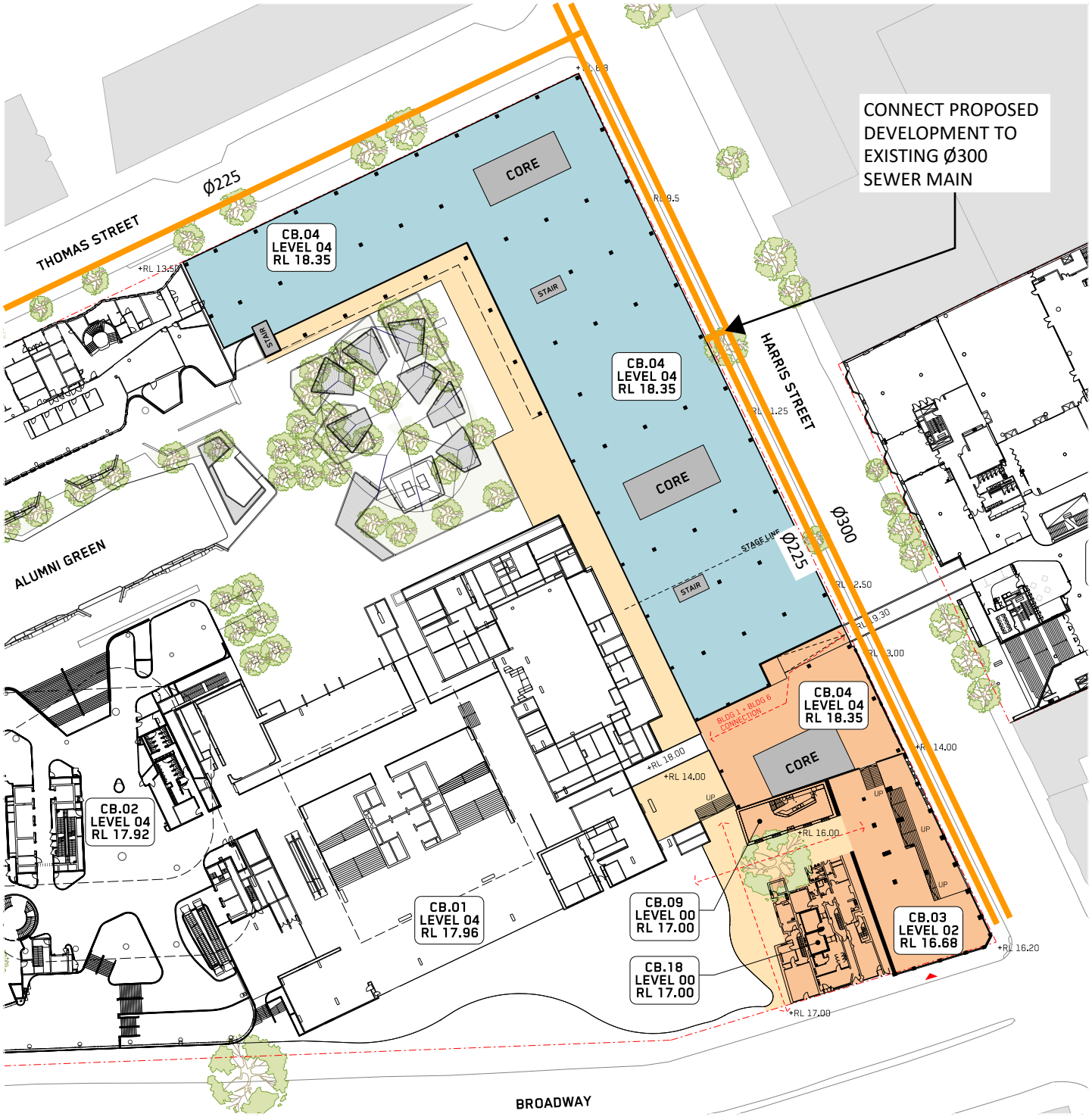
Appendix A

Preliminary Sewerage Concept Plan

Notes:

1. Existing sewer network information is approximate only and is based on the following sources:
a. Sydney Water Dial Before You Dig information
b. Site inspection on 9/8/2018

2. It has been assumed that the proposed development will require a single connection, which is shown indicatively



UTS Bon Marche and Sciences Precinct Masterplan

SK02
EXISTING AND PROPOSED SEWER

14/08/2018

ARUP

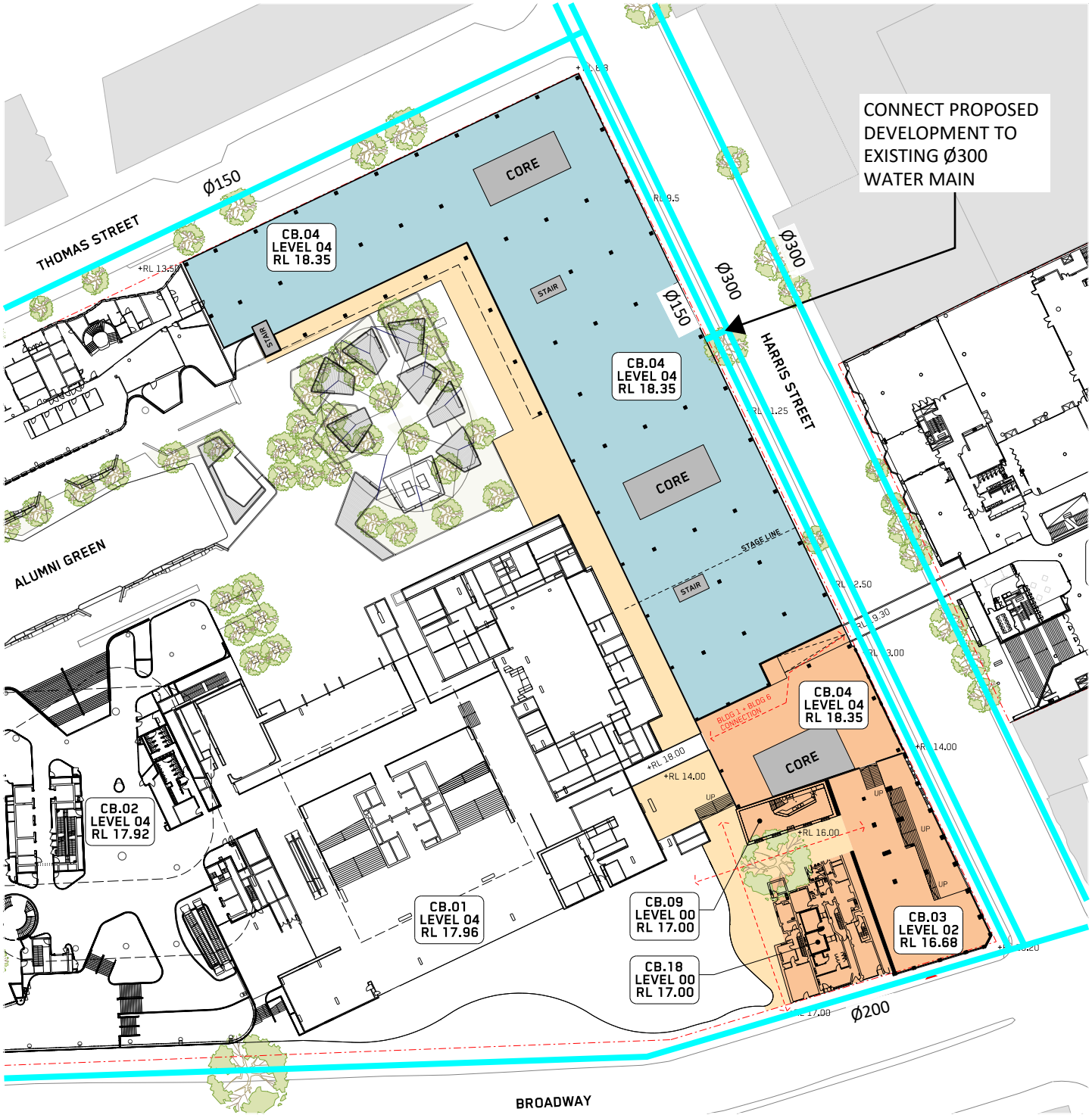
Appendix B

Preliminary Potable Water Concept Plan

Notes:

1. Existing water network information is approximate only and is based on the following sources:
   a. Sydney Water Dial Before You Dig information
   b. Site inspection on 9/8/2018

2. It has been assumed that the proposed development will require a single connection, which is shown indicatively



UTS Bon Marche and Sciences Precinct Masterplan

SK03
EXISTING AND PROPOSED WATER

14/08/2018

ARUP

Appendix C

Preliminary Electrical Concept Plan

Notes:

1. Existing electrical network information is approximate only and is based on the following sources:
   a. Ausgrid Dial Before You Dig information
   b. Arup's 2009 Utilities and Infrastructure Report
   c. Site meeting with UTS on 9/8/2018
   d. Site inspection on 9/8/2018

2. It has been assumed that the proposed development will reuse existing connections, which are not shown

UTS Bon Marche and Sciences Precinct Masterplan

SK04
EXISTING AND PROPOSED ELECTRICITY

14/08/2018

ARUP

Appendix D

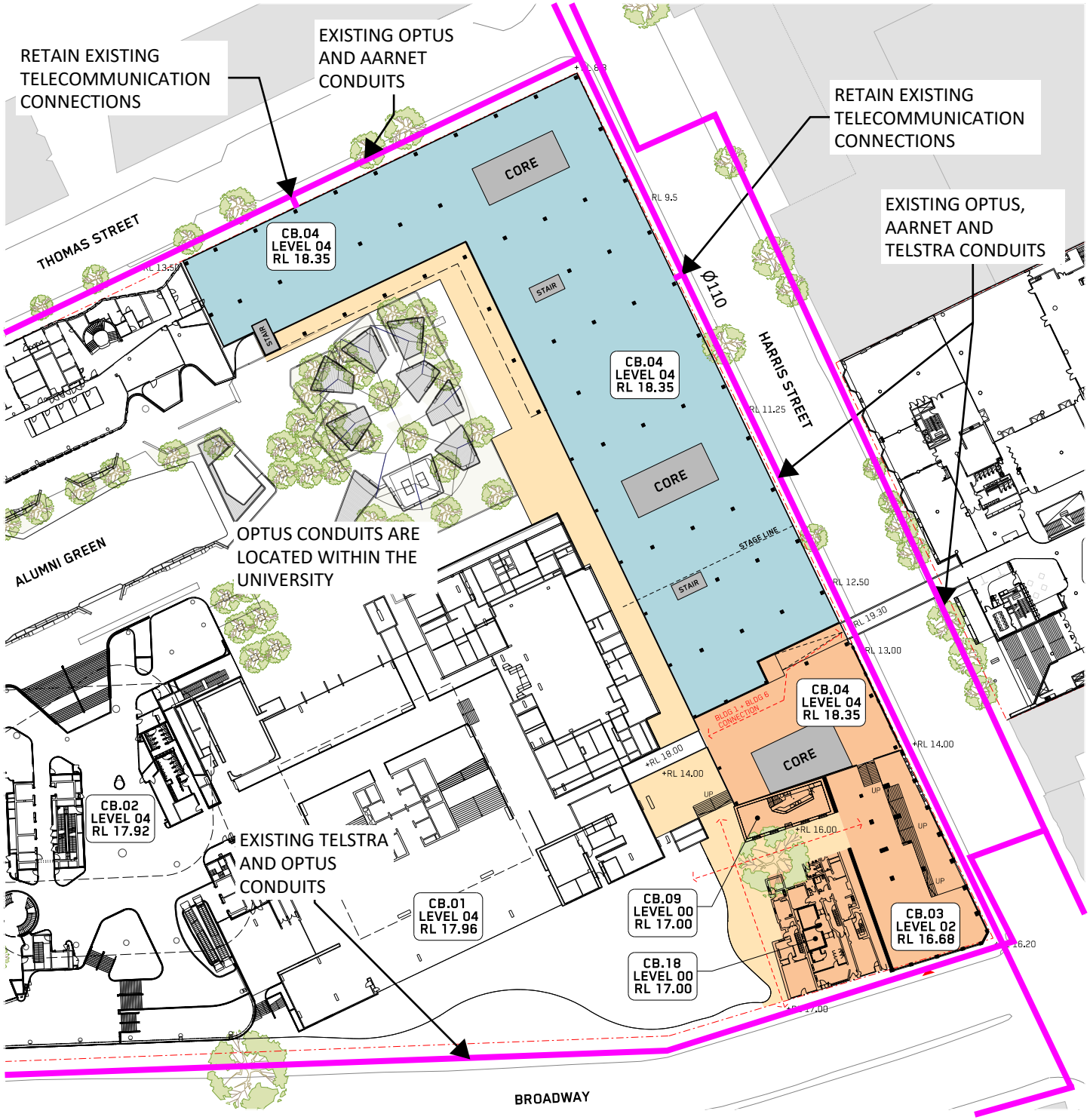
Preliminary
Telecommunications Concept
Plan

Notes:

1. Existing telecommunication network information is approximate only and is based on the following sources:
   a. AARNet Dial Before You Dig information
   b. NBN Co Dial Before You Dig information
   c. Optus Dial Before You Dig information
   d. Telstra Dial Before You Dig information
   e. Site inspection on 9/8/2018

2. It has been assumed that the proposed development will reuse the existing telecommuncation connections. All existing may not be shown

3. Only major telecommunication providers are shown. Other carriers are available in the area



UTS Bon Marche and Sciences Precinct Masterplan

SK05
EXISTING AND PROPOSED TELECOMMUNICATIONS
14/08/2018

ARUP

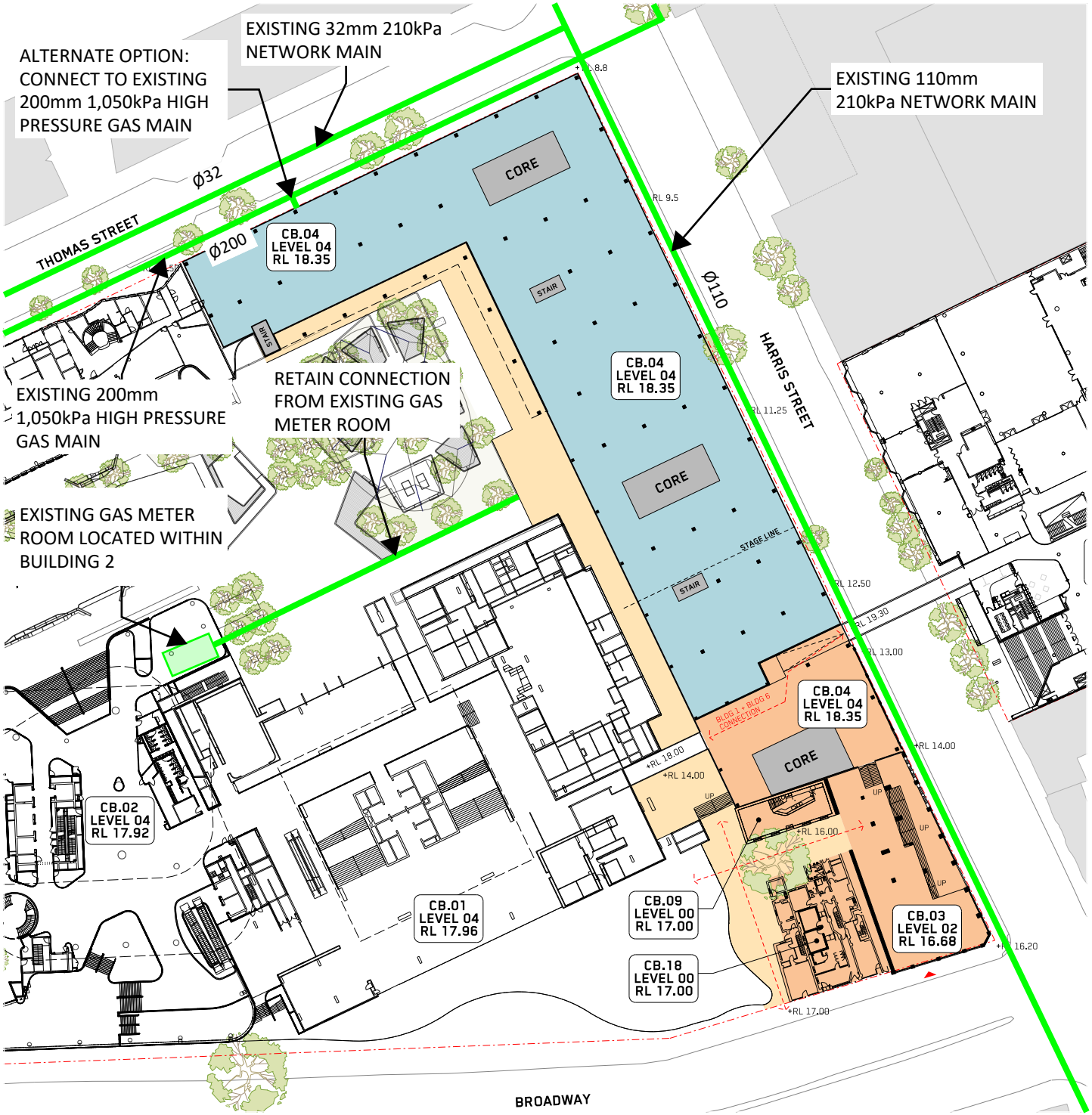
Appendix E

Preliminary Natural Gas Concept Plan

Notes:

1. Existing gas network information is approximate only and is based on the following sources:
   a. Jemena Dial Before You Dig information
   b. Site inspection and consultation with UTS on 9/8/2018

2. It has been assumed that the proposed development will be serviced from the gas meter room located in Building 2, which currently services the existing development. An alternate option is shown



UTS Bon Marche and Sciences Precinct Masterplan

SK06
EXISTING AND PROPOSED GAS
29/08/2018

ARUP