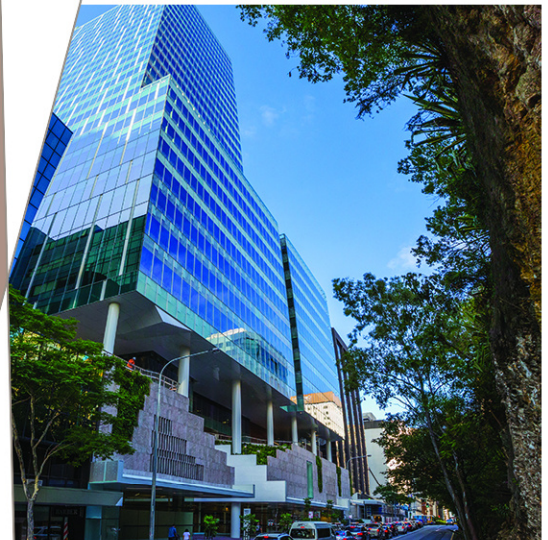


Services and Infrastructure Report

Barangaroo Stage 1B

NA50613044



Prepared for
LEND LEASE

11 November 2020

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Our report is based on information made available by the client. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Cardno is both complete and accurate. Whilst, to the best of our knowledge, the information contained in this report is accurate at the date of issue, changes may occur to the site conditions, the site context or the applicable planning framework. This report should not be used after any such changes without consulting the provider of the report or a suitably qualified person.

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1 Project Appreciation

1.1 Introduction

This report supports a State Significant Development (SSD) Development Application (DA) submitted to the Department of Planning, Infrastructure and Environment (DPIE) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The ‘amending’ SSD DA seeks approval for eight additional storeys and 5,650sqm of gross floor area (GFA), amongst other items, to Residential Building R4B approved under SSD 6965. This SSD DA proposes to amend the 60-storey Residential Building R4B development approved under SSD 6965, which in turn necessitates the inclusion of condition(s) of consent to this SSD DA that require the modification of SSD 6965.

1.2 Site Description

Barangaroo is located on the north western edge of the Sydney Central Business District (CBD), bounded by Sydney Harbour to the west and north, the historic precinct of Millers Point (for the northern half), The Rocks and the Sydney Harbour Bridge approach to the east; and bounded to the south by a range of new development containing large CBD commercial tenants.

The Barangaroo site has been divided into three distinct redevelopment areas (from north to south) – the Headland Park, Barangaroo Central and Barangaroo South. The Residential Building R4B site is located within Barangaroo South. The site of this proposed DA is located on land generally known and identified in the approved Concept Plan (as modified) as Block 4A, as shown in **Figure 1** below.

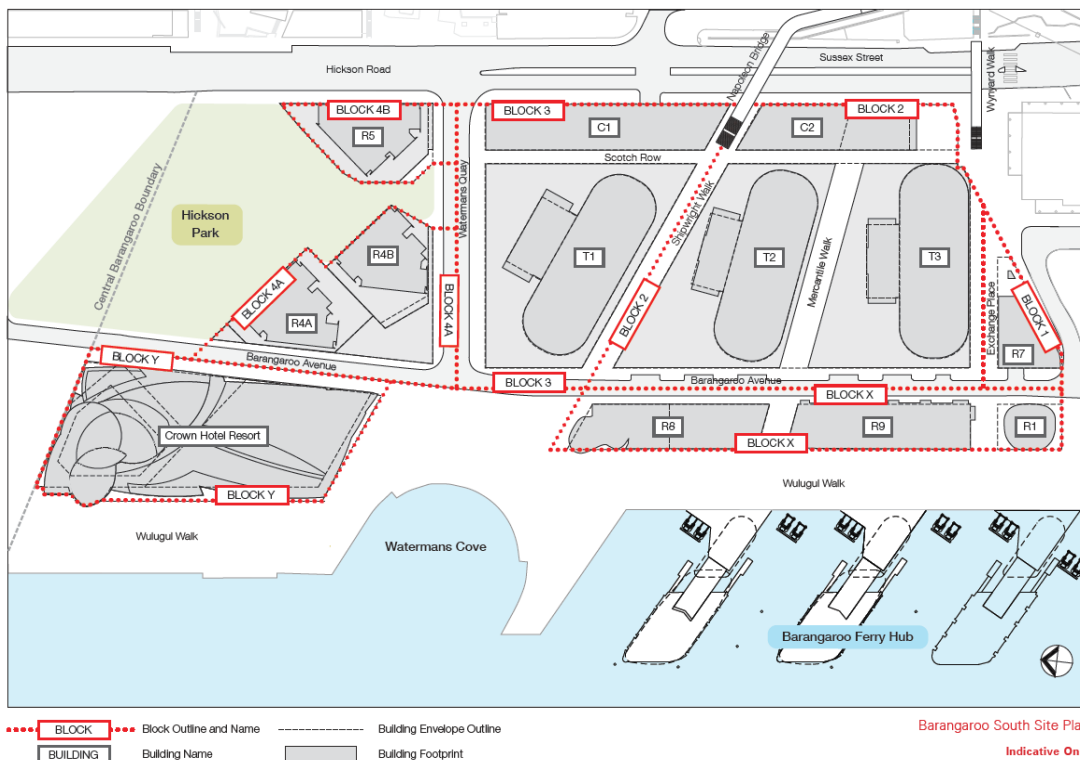


Figure 1-1 Block 4A in relation to Barangaroo South

Source: Lendlease

1.3 Concept Plan Modification

The approved Barangaroo South Concept Plan (MP06_0162) (as modified), includes approval for the following:

- A mixed use development involving a maximum of 602,354 sqm gross floor area (GFA), comprised of:

- a maximum of 191,031 sqm of residential GFA of which a maximum of 162,031 sqm will be in Barangaroo South;
 - a maximum of 76,000 sqm of GFA for tourist uses of which a maximum of 59,000 sqm will be in Barangaroo South;
 - a maximum of 34,000sqm of GFA for retail uses of which a maximum of 30,000 sqm will be in Barangaroo South;
 - a maximum of 5,000 sqm of GFA for active uses in the Public Recreation zone of which 3,500 will be in Barangaroo South; and
 - a minimum of 12,000sqm GFA for community uses.
- Approximately 11 hectares of new public open space/public domain, with a range of formal and informal open spaces serving separate recreational functions and including an approximate 2.2km public foreshore promenade.
 - Built form design principles, maximum building heights and GFA for each development block within the mixed use zone.
 - Public domain landscape concept, including parks, streets and pedestrian connections.
 - Alteration of the existing seawalls and creation of a partial new shoreline to the harbour.
 - Construction, operation and maintenance of a concrete batching plant to supply concrete for construction of future development under this Concept Plan at Barangaroo South.
 - No approval is granted or implied for the future use of a heliport and/or a helipad.

This 'amending' SSD DA seeks to achieve the maximum permissible GFA and height for Residential Building R4B that was approved as part of the latest modification to the Concept Plan (modification 10). Any consent that is granted to this SSD DA will be generally consistent with the terms of approval of the Concept Plan (as modified).

Residential Building R4B - Development consent SSD 6965

Development consent SSD 6965 was granted by the NSW Minister for Planning on 7 September 2017 for Residential Building R4B, comprising of a 60-storey mixed use building, with 297 residential units and retail floor space at ground level. This included a total gross floor area (GFA) of 38,896sqm, 38,602sqm of which was approved for residential floor space, and the remaining 294sqm was approved for retail floorspace.

Consent was also provided for associated building public domain works, fit-out and use of the basement, a link bridge connecting to Building R4A and associated building identification signage.

On 7 February, 2020, development consent SSD 6965 was amended to account for a range of design changes, including an increase in total GFA from 38,896sqm to 38,911sqm, comprised of an increase in retail GFA from 294sqm to 309sqm, and a reduction in the number of apartments to 283.

A second application to modify development consent SSD 6965 has been submitted to the DPIE. The amendments contained within the modification application broadly relate to the following changes:

- increase the number of apartments from 283 to 290;
- revised dwelling mix and internal layout changes;
- changes to the landscaped podium layout; and
- changes to the number of car spaces from 320 to 324.

It is anticipated that this modification application to development consent SSD 6965 will be determined prior to the determination of this SSD DA. As such, this SSD DA is made with the above changes in mind.

1.4 Overview of Proposed Development

This 'amending' SSD DA seeks consent for eight additional storeys with 5,650sqm of GFA and containing 32 additional apartments, and an allocation of 7 additional car parking spaces to Residential Building R4B. More specifically, this SSD DA proposes to amend Residential Building R4B, through:

- an increase to the overall building height from RL208.23 up to RL235 (an additional 8 levels)

- increase the overall number of apartments from to 290 to 322
- revise the dwelling mix and apartment relocations within the building envelope; and
- change to the number of car spaces from 324 to 331.

1.5 Purpose of the Report

This report addresses the provision of trunk utility infrastructure required to service the proposed Building R4B and the Secretary's Environmental Assessment Requirements (SEARs) for SSD 8892218. The infrastructure servicing strategy to service the proposed Building R4B including the additional 8 levels was investigated during the modification of the concept plan (Mod 10). This report has been prepared to outline the proposed infrastructure to support the additional 8 levels at R4B.

13. Infrastructure Provision

- Detail any infrastructure proposed to service the development and demonstrate that the site can be suitably serviced.
- Detail the existing infrastructure on-site, and identify any possible impacts on infrastructure arising from construction of the proposed works.
- Where the proposed works affect existing infrastructure, the application should detail any mitigation works proposed, including service relocations.

16. Water, Drainage, Stormwater and Groundwater

- Prepare a Stormwater and Drainage Assessment to assess the impacts of the proposal on surface and groundwater hydrology and quality.
- Identify appropriate water quality management measures focussing on the management of the impacts from the proposed works on Sydney Harbour.
- Prepare an Integrated Water Management Plan. This should include stormwater and wastewater management, including any re-use and disposal requirements, demonstration of water sensitive urban design and any water conservation measures.
- The applicant shall provide information on the required water and wastewater services and any augmentation of Sydney Water infrastructure that may be required for the proposed development.

All utility infrastructure connections and infrastructure to service Building R4B including potable and non-potable water, sewerage, gas, electricity and telecommunications will be provided as part of the Stage 1B Basement Car Parking SSDA Development Application (SSD 6960). In-building service reticulation is addressed in a separate report (Lend Lease, 2015).

1.6 Related Documents

The following reports shall be read in conjunction with this document:

- > Stage 1B Basement Stormwater Management and Infrastructure Servicing Strategy CS7000, Revision 06, dated 17 April 2015, prepared by Cardno;
- > Barangaroo South Flood Study CS7300 (15-0132), Revision 1, dated February 2015, prepared by Cardno;
- > Barangaroo South Stage 1A and Stage 1B Stormwater Management Strategy Report for Green Star EMI-5 Stormwater Credit, dated 14 July 2015, prepared by Cardno;
- > Residential Building R4B State Significant Development Application (SSD 6965) Stormwater Management and Infrastructure Servicing Report, dated 2 August 2016, prepared by Cardno;
- > Stormwater Management and Civil Infrastructure Report, Barangaroo South Stage 1B Public Domain, Revision 6, Dated May 2019, prepared by Cardno; and
- > Infrastructure Concept Plan, Barangaroo South – MOD10 Planning Submission, dated January 2020, prepared by Cardno.

2 Infrastructure Provision

The infrastructure servicing strategy to service the amended building height for R4B was investigated as part of Mod 10. No changes to the servicing strategy have been identified, A summary of the proposed trunk infrastructure provision to the amended Building R4B is presented below:

- **Potable Water:** A new 250mm diameter ring main will be constructed in Watermans Quay and Barangaroo Ave within Stage 1B. The ring main will be connected to an existing 300mm diameter main in Hickson Road.
- **Recycled Water:** The existing Barangaroo South Recycled Water Treatment Plant (RWTP) will supply recycled water to Stage 1B via the mains that have been constructed in Barangaroo South Basements. All recycled water infrastructure servicing R4B will be contained within the Stage 1B Basement.
- **Wastewater:** Connection to the Barangaroo South RWTP will be made via a network of sewerage mains within the Stage 1B. No additional or new connection to Sydney Water's sewerage system will be required to service R4B.
- **Gas:** A new low pressure gas main will be constructed above the Stage 1B Basement and will connect to an existing 110mm low pressure gas main in Hickson Road.
- **Chilled Water:** The HHR and DCP in Barangaroo Stage 1A site have also been designed to service the proposed Stage 1B Barangaroo Development, Chilled water reticulation pipes will be constructed to service R4B.
- **Electricity:** A private network of cabling and substations will be established within Stage 1B to service R4B. These will be serviced from Ausgrid's City North zone substation.
- **Telecommunications:** New communication cables will be installed and connected to the reticulation network within the Barangaroo development site. Reticulation within the site has generally be in dedicated carrier cable trays at a high level in the basements and provides diverse paths from site entry points to the proposed R4B building node rooms to allow for a high level of network resilience.

3 Water, Wastewater and Groundwater

3.1 Integrated Water Management

Barangaroo South will include an integrated water management system that will consider all facets of the water cycle to provide services that maximise social, economic and environmental benefits associated with water management within the development.

A schematic showing the proposed integrated water cycle within Barangaroo South is presented in Figure 3-1.

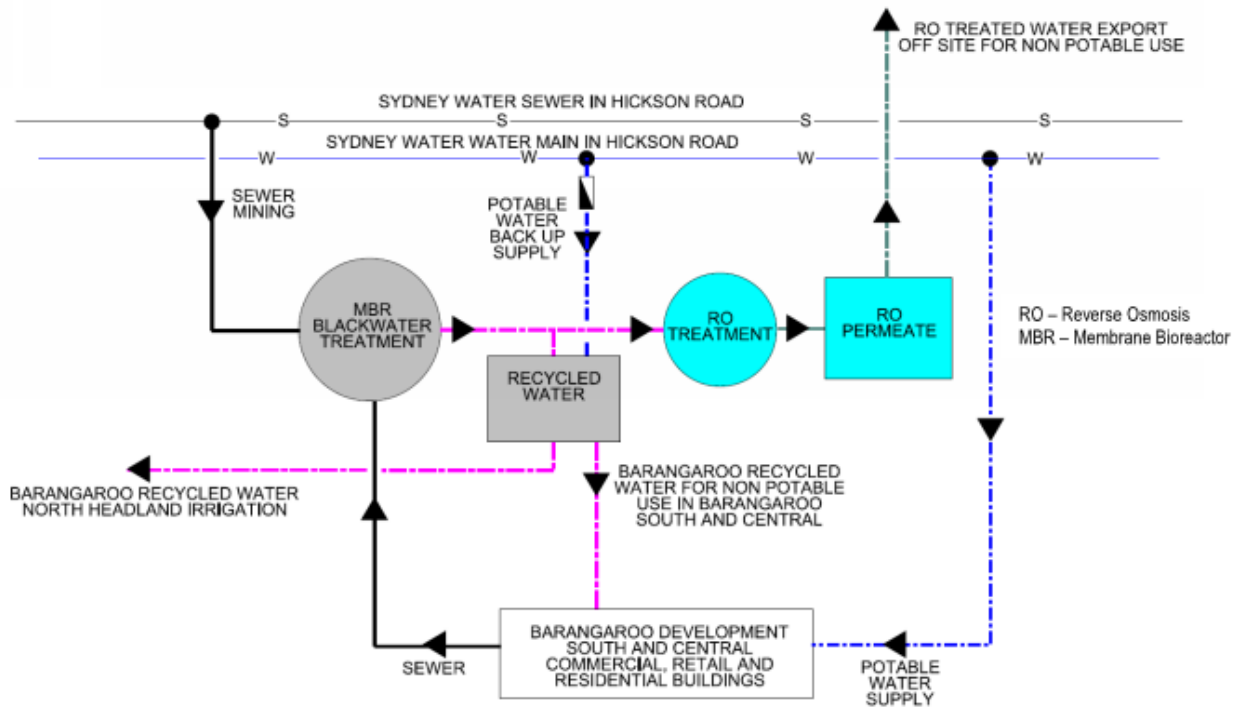


Figure 3-1 Barangaroo South Integrated Water Management Flow Diagram

Stormwater runoff from the residential tower R4B and the associated podiums will connect to the stormwater drainage network within the public domain area and treated by the stormwater treatment system prior discharging to Darling Harbour.

3.2 Potable Water

Sydney Water is the primary potable water supplier for the Barangaroo South development through an existing DN300 pipe running along Hickson Road. The potable water reticulation network to which Building R4B will connect to is being provided as part of the Basement Infrastructure works and will be located above the structural slab. The reticulation network will consist of a 250 mm diameter ring main along Watermans Quay, Barangaroo Avenue and Barton Street.

The water network will be provided in accordance with Sydney Water requirements.

3.3 Wastewater

Wastewater from the residential tower R4B will connect to the privately own wastewater pipes which drain to the RWTP located in Barangaroo, the plant is privately owned and is operating under Water Industry Competition Act. Therefore, no additional connections to Sydney Water assets will be required.

3.4 Groundwater

The proposed development of the residential tower R4B will be built on Stage 1B basement, which is currently being constructed as part of SSD 7944. The proposed development of R4B should have no impact on the groundwater condition.

4 Stormwater Drainage

4.1.1 R4B Building Drainage

It is proposed to capture and convey rainwater from roof and podium areas through conventional gutters, roof top drainage outlets and associated downpipes. Detailed design has been undertaken by the building hydraulic consultant and coordinated to allow connection to the trunk stormwater drainage within Barangaroo Avenue and Watermans Quay that is incorporated in the scope of work under the Stage 1B Basement DA (SSD 6960).

The location of downpipe connections and stormwater drainage to service R4B is subject to detailed design. An indicative schematic showing potential downpipe locations and connection points to the proposed Stage 1B local drainage system is presented in Figure 4.1.

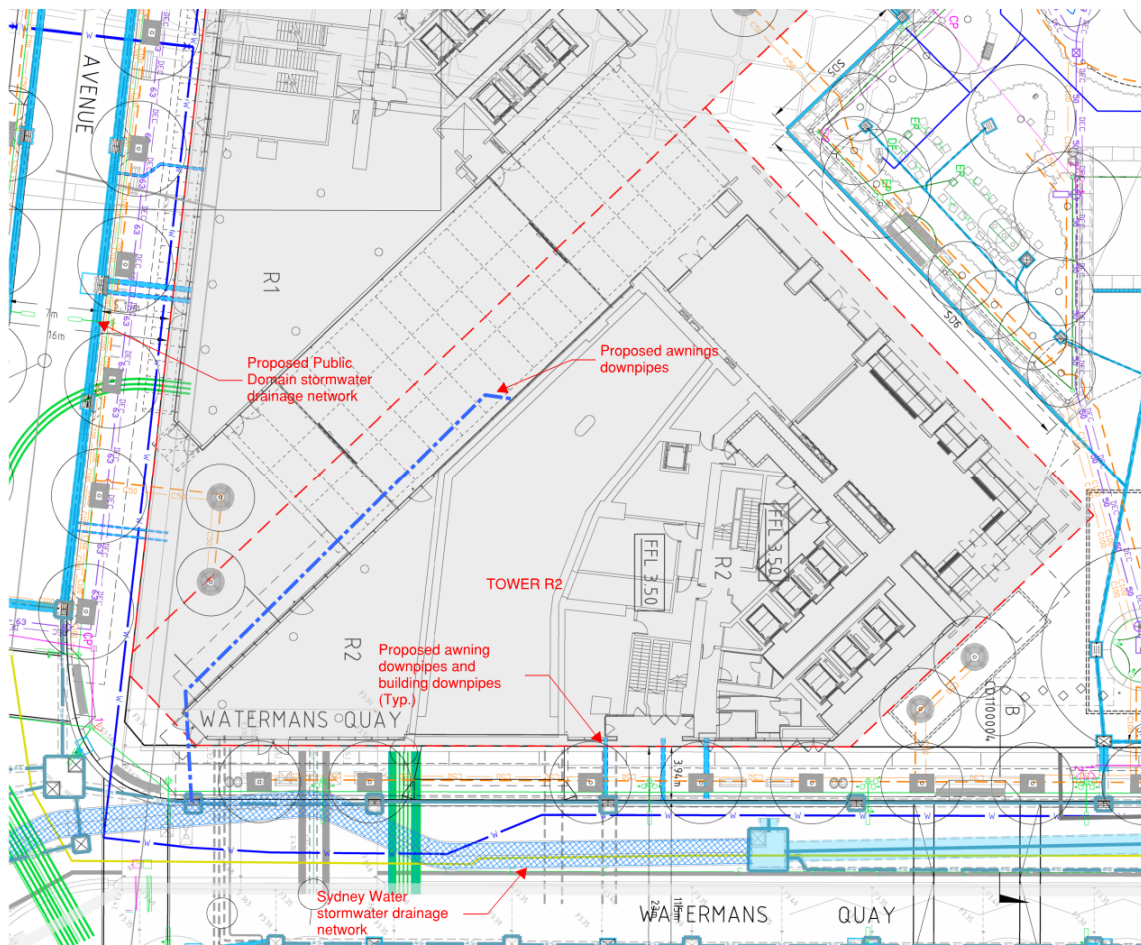


Figure 4-1 Proposed drainage strategy for Building R4B

The stormwater drainage network designed for the public domain area has been designed to cater for the stormwater runoff from the proposed towers.

4.2 External Stormwater Drainage

External stormwater drainage infrastructure has been approved by Sydney Water, constructed and is in operation.

Diversion of the existing stormwater assets traversing the Barangaroo South site has been considered as part of the Block 4 Remediation DA (SSD 5897) and the Stage 1B Basement Application (SSD 6960). Diversion of existing Sydney Water assets was approval by Sydney Water in consultation with the Barangaroo Delivery Authority (BDA), Transport for NSW and NSW Roads and Maritime Services (RMS). The recently built stormwater diversion works included a new trunk line within Watermans Quay, which have been constructed adjacent to the Stage 1B Basement structure and discharges to Darling Harbour. The diversion works have been designed to convey peak flows from the external catchment to ensure no adverse flood impact within Hickson Road.

This diversion has also been designed to cater for the predicted future harbour water level increases due to climate change, generally in accordance with currently relevant NSW Government and City of Sydney policies.

Modelling has shown that no overland flows from the external catchments are expected to drain through the site in storm events up to and including the 1% AEP event (refer to Barangaroo South Flood Study prepared by Cardno dated February 2015).

4.3 Public Domain Stormwater Drainage

4.3.1 Water Quality

The public domain stormwater drainage network is currently under construction as part of the public domain works and drain the stormwater runoff from Tower R4B to the stormwater treatment devices near the intersection of Watermans Quay and Barangaroo Ave. Figure 4-2 shows the location of the existing stormwater treatment devices.

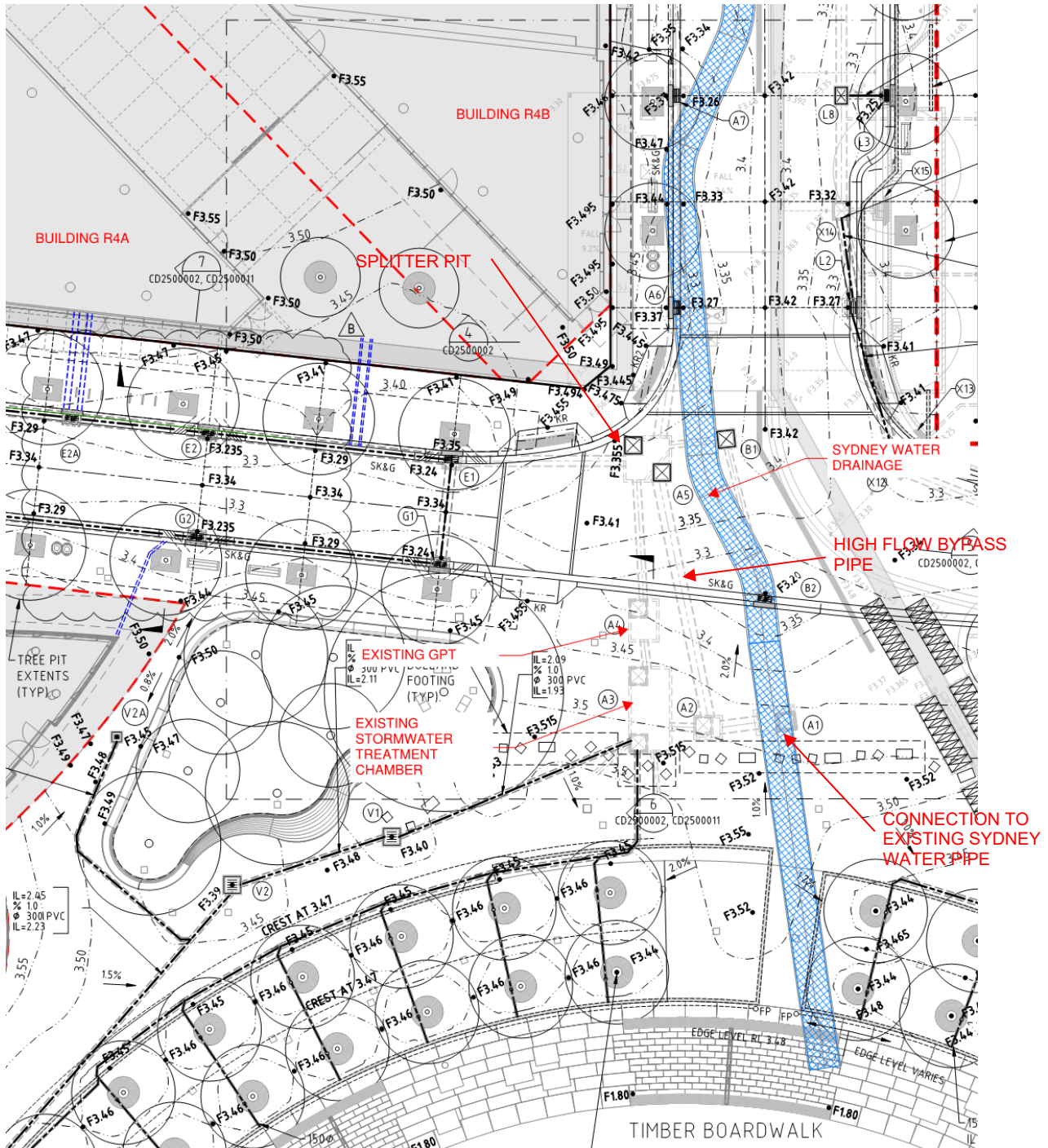


Figure 4-2 Stormwater Treatment Train Layout

The stormwater treatment train has been designed to treated the stormwater runoff from Barangaroo Stage 1B area, including the proposed residential tower R4B, MUSIC modelling has been undertaken and the results showed the treatment train is capable to meet City of Sydney stormwater quality objectives: 85% Total Suspended Solids, 65% Total Phosphorus, 45% Total Nitrogen and 90% Gross Pollutants. The stormwater treatment train design methodology is outlined in the Stormwater Management Strategy Report prepared by Cardno on 14/7/2015.

4.3.2 Water Quantity

Barangaroo Stage 1B is located adjacent to Darling Harbour, therefore, stormwater detention is not required for the proposed development site. The public domain stormwater drainage network has been designed to capture and convey all storm events up to the 1% AEP and with allowance for 50% blockage on all sag pits. The public domain drainage has been designed to cater the stormwater flow from Tower R4B, therefore detention is also not required for the proposed buildings.

5 Conclusion

This report addresses the provision of infrastructure and water management issues relating to the proposed modification of residential Building R4B with an additional 8 levels, as required under SSD 6965.

On the basis of the works proposed under the Stage 1B Basement DA (SSD 6960) and under SSD 6965, the infrastructure strategy is capable of servicing the amended Building R4B. Any impacts associated with construction of the proposed works will be suitably mitigated through a range of measures, including temporary service provision where required.

Based on the content of previous reports prepared for the proposed basement within Stage 1B of the Barangaroo South development, adequate stormwater infrastructure to service the R4B development site has been incorporated into the base design.