

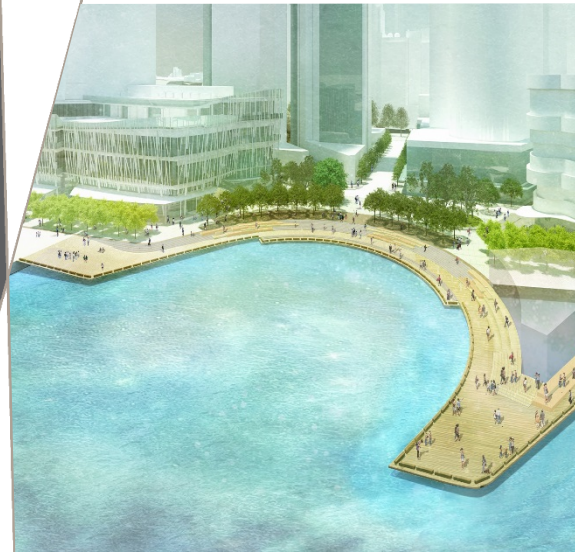
Stormwater Management and Civil Infrastructure Report

Barangaroo South – Stage 1B Public Domain

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Prepared for
Lendlease Building Pty Ltd

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Appendix A STAGE 1B PUBLIC DOMAIN CIVIL DRAWINGS

1 Project Appreciation

1.1 Introduction

This Stormwater Management and Civil Infrastructure Report supports a State Significant Development Application (SSD 7944) submitted to the Minister for Planning pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The Development Application (DA) seeks approval for construction of public domain works within Stage 1B at Barangaroo South as described in **Section 1.3**.

1.2 Scope of this Report

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) in respect of *SSD 7944 Stage 1B Public Domain Works*, specifically as outlined below:

2. Public Domain and Access

- Outline specific design features, including but not limited to:
 - Footpaths and pavements, parking areas (including bicycle), roads and/or rights of carriageways
 - Affected services , utility poles and service pits
 - Civil and stormwater infrastructure

6. Water Quality and Contamination

- Undertake an assessment of the potential impacts on water quality of Darling Harbour.
- Assess the impacts of the proposal on surface and groundwater quality and hydrology, for construction and operation.
- Assessment of any volumetric water licensing requirements (including those for ongoing water take following completion of the project).
- A detailed and consolidated site water balance and identification of an adequate and secure water supply for the life of the development.
- The assessment must include details of proposed erosion and sediment controls (during construction), the proposed stormwater management system (during operations), and management and mitigation measures for the containment of pollutants (e.g. fuel and sewage) and prevention of potential water quality impacts during construction and operation.
- Assess the potential for the development to intercept groundwater, including annual water volumes of groundwater proposed to be taken by the activity (including through inflow and seepage) from each groundwater source as defined by the relevant water-sharing plan.
- Identification of any water licensing requirements or other approvals required under the Water Act 1912 or Water Management Act 2000.

12. Infrastructure Provision

- Detail the existing infrastructure on-site and identify possible impacts on any such infrastructure from the proposal.
- Detail the proposed infrastructure that will service the development and demonstrate that the site can be suitably serviced. This is to include lighting details and measure to mitigate light spill and potential impacts to the amenity of sensitive receivers surrounding the site, including residential and commercial premises.
- Detail measures to mitigate the impacts of the proposal on any infrastructure items, including proposed relocation.

1.3 Overview of Proposed Development

The Public Domain DA (SSD 7944) seeks approval for the all public domain works within Stage 1B of the Barangaroo South Site and the additional area of Hickson Park added in the approval of Concept Plan MOD 8. These works include typical public domain features such as street paving, street furniture, lighting and planting. Additional items such as shade/weather protection structures, outdoor seating and an amenities building are also included in the design of the public domain. Various services and infrastructures such as lighting and water supply are incorporated into the proposed works where relevant.

1.4 Site Description

Barangaroo is located on the north-western edge of the Sydney Central Business District (CBD), bound 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 dominated by large CBD commercial tenants.

The Barangaroo site has been divided into three distinct redevelopment areas (from north to south) – Headland Park, Central Barangaroo and Barangaroo South.

The Stage 1B Public Domain Site area is located within Barangaroo South as shown in **Figure 1-1**. The DA Site is located on land generally known and identified in the approved Concept Plan MP06_0162 (as modified) as Blocks 4A, 4B and Y and part of the public domain area between those blocks and Block 5.

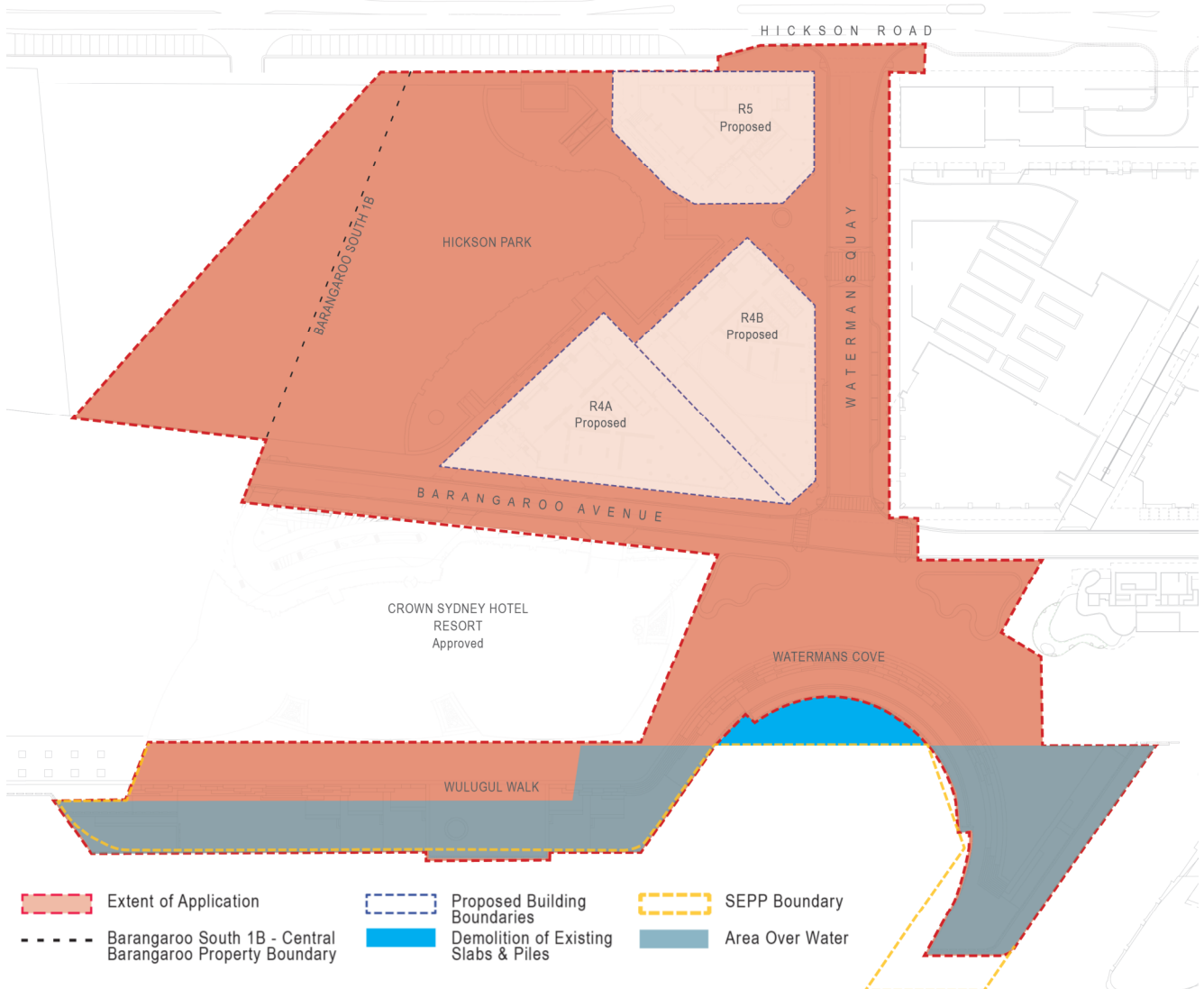


Figure 1-1 Stage 1B Public Domain Development Application (SSD 7944) Site Location Plan

1.5 Related Documents

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

1. *Barangaroo South Flood Study* CS7300 (15-0132), Revision 1, dated March 2015 prepared by Cardno.
2. *Barangaroo Sewer, Water and Recycled Water Masterplan Report*, dated March 2015, prepared by Warren Smith & Partners.
3. *Barangaroo South – Stage 1B Basement, Stormwater Management and Infrastructure Servicing Strategy* (15-0128), Revision 10, dated August 2016, prepared by Cardno.

2 Project Description

2.1 Preceding and Concurrent Works

Works that will be undertaken within the Stage 1B site either prior to the commencement of or concurrent with the proposed Stage 1B Public Domain works (which are the subject of SSD 7944) include:

- Works subject to a separate development consent that were recently assessed and approved as a State Significant Development (Application No. SSD 5897), including:
 - Remediation of contaminated land within the Stage 1B site (also referred to as Block 4), which forms part of the EPA Declaration Area N21122, in accordance with a Remedial Action Plan;
 - Construction of a groundwater retention wall system around the perimeter of the Stage 1B site;
 - Carrying out remediation works within the perimeter of the groundwater retention wall to ultimately allow the EPA to revoke the Declaration Area and ensure the Stage 1B development area is suitable for the intended future uses of the land;
 - Diversion and augmentation of stormwater drainage infrastructure to the south of the proposed Block 4 groundwater retention wall and north of the existing Stage 1A basement; and
 - Bulk excavation of part of the Stage 1B development area within the groundwater retention wall.
- Works subject to a separate development consent associated with the proposed Stage 1B basement structure beneath the proposed Public Domain works (SSD 6960), including:
 - Excavation of any material outside the scope of work completed under SSD 5897 and within the extent of the proposed basement structure to approximately -14 mAHd.
 - Works associated with the provision, diversion and protection of utility services to allow for the construction of the proposed basement structure.
 - Construction of a four-level basement structure and associated vehicular ramps within the perimeter retention wall completed under SSD 5897.
 - Trunk drainage above the ground slab and associated temporary landscaping.
 - Temporary vehicular access from Watermans Quay.
- Works associated with the proposed residential building R4A that are subject to a separate development consent that is currently being assessed (SSD 6964).
- Works associated with the proposed residential building R4B that are subject to a separate development consent that is currently being assessed (SSD 6965).
- Works associated with the proposed residential building R5 that are subject to a separate development consent that is currently being assessed (SSD 6966).
- Works associated with the Crown Sydney Hotel Resort that are subject to a separate development consent that was recently assessed and approved (SSD 6957), including:
 - Construction of a three level basement structure and associated vehicle ramps beneath the proposed Stage 1B Public Domain.
 - Construction of a five-storey podium building and 71 storey tower building.

2.2 Proposed Works

The works to be assessed under the DA that is the subject of this Stormwater Management and Civil Infrastructure Report include:

- The construction of Watermans Cove and a public pier along the foreshore between Barangaroo South Stage 1A and Central Barangaroo (Wulugul Walk).

- Public Domain works associated with Hickson Park including a grassed area, tree planting and a public amenities building.
- Completion of the Barangaroo South street system including Watermans Quay and Barangaroo Avenue.
- Typical Public Domain features including trees and other landscape features, walkways, street paving, street furniture, stormwater drainage, lighting and wayfinding signage.
- Provision of services and infrastructure including water, power (for lighting), three-phase power (for public events) and communications to enable use of the Public Domain for a range of activities.

The scope of work is presented in the drawings listed in the following table.

Drawing No.	Revision	Drawing Title
B1B_CD2000000	6	Cover Sheet
B1B_CD2000002	12	General Arrangement
B1B_CD2000010	12	Siteworks Plan Sheet 1
B1B_CD2000011	12	Siteworks Plan Sheet 2
B1B_CD2000012	12	Siteworks Plan Sheet 3
B1B_CD2000030	12	Pavement, Signage and Linemarking Plan Sheet 1
B1B_CD2000031	12	Pavement, Signage and Linemarking Plan Sheet 2
B1B_CD2000032	12	Pavement, Signage and Linemarking Plan Sheet 3
B1B_CD2100001	16	Services Coordination Plan Sheet 1
B1B_CD2100002	16	Services Coordination Plan Sheet 2
B1B_CD2100003	16	Services Coordination Plan Sheet 3
B1B_CD2500001	13	Typical Cross Sections Sheet 1
B1B_CD2500002	14	Typical Cross Sections Sheet 2
B1B_CD2500003	14	Typical Cross Sections Sheet 3
B1B_CD2500003	06	Typical Cross Sections Sheet 4
B1B_CD2500003	04	Typical Cross Sections Sheet 5
B1B_CD900001	10	Internal Catchment Plan
B1B_CD900002	12	External Catchment Plan

2.3 Planning Context

Approval for the proposed scope of work that is the subject of this DA is being sought from the Minister for Planning under Part 4 of the *Environmental Planning and Assessment Act 1979*.

3 Integrated Water Management Strategy

3.1 Relevant SEARs

This section addresses the following SEAR for SSD 7944:

- *A detailed and consolidated site water balance and identification of an adequate and secure water supply for the life of the development.*

3.2 Overview of Barangaroo South Integrated Water Management

The objective of the Barangaroo South Integrated Water Management Strategy is to achieve a positive water balance based on exporting recycled water from the site in greater quantity than potable water is imported.

This objective will be achieved through a site-wide approach that focuses on:

- Potable water demand reduction, including a commitment to achieve a reduction in potable water consumption compared to a standard practice development.
- Water balance modelling, including:
 - Review of potential sources of both potable and non-potable water;
 - Investigation of sewer mining;
 - Assessment of appropriate treatment measures; and
 - Further development of existing conceptual water balance model.

3.3 Water Balance

The proposed water balance model for Barangaroo South (Stage 1A and Stage 1B) is presented in the document titled *Barangaroo Sewer, Water and Recycled Water Masterplan Report* (Warren Smith & Partners, March 2015). This report outlines anticipated demands for potable and recycled water, sewage discharge to the Barangaroo South Recycled Water Treatment Plant (RWTP) and volume of sewer mining from Sydney Water's existing system in Hickson Road. A schematic presenting anticipated water demands and sewage loadings is reproduced as **Figure 3-2**.

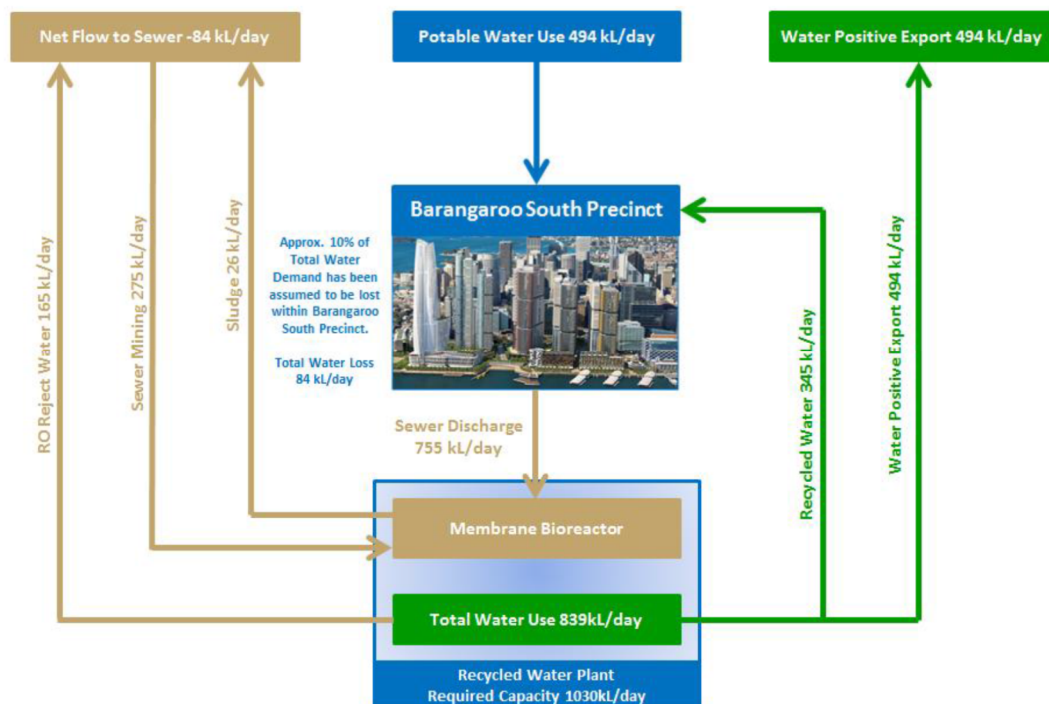


Figure 3-1 Barangaroo South Water Balance Schematic

Source: Warren Smith & Partners, March 2015

It is noted that the projected potable and recycled water demands within Barangaroo South presented in **Figure 3-2** account for residential, commercial, retail, tourism and community uses.

3.4 Public Domain Water Demands and Sewage Loadings

Anticipated water demands and sewage loadings associated with the proposed Stage 1B Public Domain works are summarised as follows:

- **Potable Water**
 - Water bubblers within Hickson Park, Wulugul Walk and Watermans Cove
 - Amenities building adjacent to Hickson Road
 - Irrigation of Hickson Park (alternative water supply option)
- **Recycled Water**
 - Amenities building adjacent to Hickson Road (for toilet flushing)
 - Irrigation of Hickson Park (base case water supply option, subject to satisfaction of licensing and water quality requirements). It is noted that recycled water will need to be treated to a standard required for dual reticulation end use in accordance with the *NSW Guidelines for Management of Private Recycled Water Schemes*
- **Sewage Loading**
 - Amenities building adjacent to Hickson Road (to discharge to the Barangaroo South RWTP via a connection to the proposed sewer line in the Stage 1B basement)

4 Water Licensing and Approvals

4.1 Relevant SEARs

This section addresses the following SEARs for SSD 7944:

- *Assessment of any volumetric water licensing requirements (including those for ongoing water take following completion of the project).*
- *Identification of any water licensing requirements or other approvals required under the Water Act 1912 or Water Management Act 2000.*

4.2 Water Act 1912

Under the *Water Act 1912*, a water licence must be obtained for extraction of groundwater via any type of bore, well, spearpoint or groundwater interception scheme for all purposes except to take water from an aquifer under a basic landholder right.

The proposed public domain works will not require any groundwater extraction works. Therefore, a license under the *Water Act 1912* will not be required for the proposed scope of work under SSD 7944.

4.3 Water Management Act 2000

The *Water Management Act 2000* applies to areas of New South Wales that have a water sharing plan. As the proposed works do not include any activities that are governed by a water sharing plan, a licence under the *Water Management Act 2000* will not be required for the proposed works.

5 Water Quality

5.1 Relevant SEARs

This section addresses the following SEARs for SSD 7944:

- *Undertake an assessment of the potential impacts on water quality of Darling Harbour.*
- *Assess the impacts of the proposal on surface and groundwater quality and hydrology, for construction and operation.*
- *Assess the potential for the development to intercept groundwater, including annual water volumes of groundwater proposed to be taken by the activity (including through inflow and seepage) from each groundwater source as defined by the relevant water sharing plan.*

5.2 Background

An assessment of potential water quality impacts was prepared to accompany SSD 5897 for the Block 4 Remediation and Land Forming Works (WorleyParsons, 2013), which are currently being undertaken and will precede the proposed works to be assessed under SSD 7944.

Potential impacts of the proposed works and proposed management, mitigation and monitoring measures are generally consistent with those covered under SSD 5897. The measures implemented for the works under SSD 5897 comply with the requirements of the following:

- National Water Quality Management Strategy: Australian Guidelines for Fresh and Marine Water Quality (ANZECC/ARMCANZ) – the ANZECC Guideline
- Water Quality Objectives in NSW (OEH)
- Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (OEH).

A summary of the broad water quality objectives that apply to the Stage 1B Public Domain is presented in the following sections.

5.3 Surface Water

This section addresses the potential water quality and hydrology impacts of surface water generated by both upstream external catchments and the extent of the Stage 1B Public Domain works.

5.3.1 Hydrology

The existing condition of the Stage 1B site is such that it is impervious and consists of an asphalt surface. The site will remain impervious as a result of the remediation and land forming works that will precede construction of the Stage 1B basement due to the construction of an odour control structure over the extent of the remediation works.

The Stage 1B Public Domain works will consist of both impervious areas (e.g. road and footpath pavements) and pervious areas (e.g. grassed area within Hickson Park). As a result of the proposed public domain works, the overall impervious fraction of the site will reduce compared to the pre-development scenario. This reduction in impervious fraction will result in a reduction in the volume of surface water runoff from the site towards Darling Harbour, which will have a positive impact on surface water hydrology discharging to Darling Harbour.

5.3.2 Surface Water Quality

As discussed further in **Section 8**, implementation of erosion and sediment control measures will ensure that the quality of the surface water runoff from both external and internal catchments is maintained at acceptable levels during the construction. The requirements for the surface water quality management are outlined in the *Water and Stormwater Management Sub-Plan* for the Stage 1B Public Domain works.

Surface water quality post-construction of the proposed works will be managed through the implementation of a number of measures that will capture and treat surface water runoff prior to discharge to the Darling Harbour. These proposed measures are discussed further in **Section 6.4.3**.

5.4 Groundwater

5.4.1 Existing Geological Conditions

The following subsurface conditions have been identified across the wider Barangaroo site, including the extent of the Stage 1B Public Domain:

- Hardstand consisting of concrete, asphalt and bitumen from ground level to a maximum depth of approximately 0.5 metres below ground level (bgl).
- Road base fill to a maximum depth of approximately 0.5 metres bgl.
- Fill material consisting of sandstone, building rubble, bricks, concrete and silty gravelly sand with black staining and odours up to 18 metres bgl.
- Marine Clay / Sand between 3 metres bgl and 33 metres bgl.
- Bedrock of varying quality between 1.3 metres bgl and 33 metres bgl.

5.4.2 Hydrogeology

A geotechnical assessment was undertaken by Coffey to accompany the Block 4 Remediation and Land Forming Works (SSD 5897). A summary of the findings included in this report pertaining to groundwater is presented below:

- The highest observed astronomical tide is RL 1.075 mAHD and the existing mean high spring water level is RL 0.67 mAHD. Groundwater tidal level fluctuations were recorded adjacent to the existing caisson wall and were found to be very similar to tidal movements within Darling Harbour.
- At Hickson Road, groundwater monitoring suggested that the magnitude of groundwater fluctuation is approximately one-quarter of the observed normal tidal amplitude at Darling Harbour, suggesting at least a moderate tidal influence on groundwater levels across the extent of the site.

5.4.3 Groundwater Interception Works

There are no groundwater interception works proposed as part of the Stage 1B Public Domain works during either construction or operation. Construction of the Stage 1B Public Domain works will have minimal potential to intercept groundwater, as the majority of works will be undertaken above the level of the groundwater table. The construction of some stormwater pits adjacent to Watermans Cove and along Wulugul Walk will require dewatering due to the level of the groundwater table, which fluctuates due to rising and falling tides. Any sump pumps that would be required for dewatering would discharge to the on-site groundwater treatment plant.

5.4.4 Groundwater Quality

The proposed works under SSD 7944 are considered unlikely to have an impact on the groundwater quality either during or after construction. The preceding remediation works and basement construction works are considered likely to have a positive impact on groundwater quality due to the removal of the contaminated material that is currently affecting the quality of the groundwater within the site.

5.4.5 Groundwater Management during Construction

No specific groundwater management controls will be required during construction of the Stage 1B Public Domain works, as no groundwater interception works are proposed.

6 Stormwater Drainage

6.1 Catchments

6.1.1 External Catchments

Delineation of catchments that drain towards Stage 1B has been undertaken based on NSW Land & Property Information contour data, detailed ground survey, site inspections and ALS data. The external catchment area draining to the Stage 1B development site is approximately 5.3 ha. The extent of external sub-catchment areas adjacent to Stage 1B is presented in drawing CD2900002 in **Appendix A**. Details of the catchments are as follows:

- Catchment A:** This catchment has a total area of approximately 2.83 ha that discharges into Gas Lane and Jenkins Street through a 600mm diameter pipe and a 750mm diameter pipe and then into an existing 1200mm diameter pipe that traverses the Stage 1B Residential development site prior to ultimately discharging directly into Darling Harbour.
- Catchment B:** This catchment has a total area of approximately 2.29 ha that discharges into the existing Hickson Road stormwater drainage network prior to ultimately discharging into Darling Harbour through a series of varying diameter pipes traversing the Stage 1B Residential development site.
- Catchment C:** This catchment has a total area of approximately 0.15 ha that discharges into the stormwater diversion works that were constructed within Hickson Road and Watermans Quay as part of the Stage 1A works.

6.1.2 Internal Catchments

Based on the current Site Concept Plan (Modification No. 8) the development site have been divided into four main sub-catchments as shown in Figure 6-1.

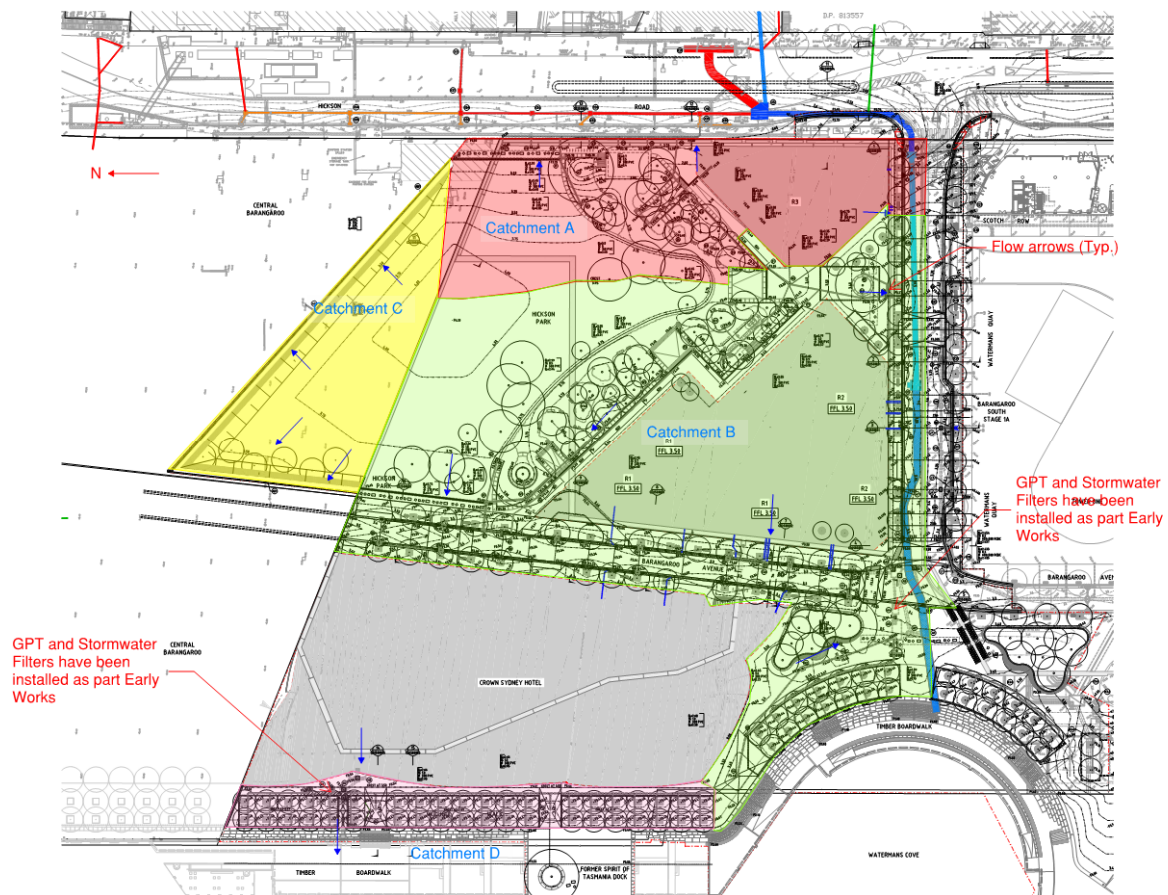


Figure 6-1 Catchment Plan

Table 6-1 provides a brief summary of the sub-catchments and the drainage strategy.

Table 6-1 Catchment Descriptions

Catchment	Area (ha)	Descriptions
A	0.48	Catchment includes the eastern section of Hickson Park and Building R3. Stormwater runoff drains to the existing stormwater drainage network in Hickson Road.
B	1.45	Catchment includes the western section of Hickson Park, Building R1 and R2, Watermans Quay, Barangaroo Avenue and the waterfront area between the Watermans Cove and Barangaroo Avenue. The proposed stormwater drainage network will convey the stormwater runoff to the gross pollutant traps and stormwater filters for treatment before discharges to the existing Sydney Water stormwater culverts.
C	0.28	Catchment includes the northern section of Hickson Park that is located inside Barangaroo Central site. Stormwater runoff from the park will sheet flow onto the Barangaroo Central site. Stormwater then follows the existing flowpath to Darling Harbour.
D	0.21	Catchment includes the waterfront area between Crown Sydney Hotel and Darling Harbour (Wulugul Walk). The stormwater runoff is directed to the proposed stormwater treatment train, near the north-western corner of the site, then drains to Darling Harbour.

A detailed catchment plan is shown on Drawing CD2900001 in **Appendix A**, which provides details of sub-catchment areas and approximate directions of flow within the Stage 1B site.

6.2 Overland Flow and Flooding

6.2.1 Historic Flood Data

Detailed ground survey and site inspections have been used to define existing overland flow paths adjacent to Barangaroo South.

City of Sydney has confirmed that there is no available historical flood data for the Barangaroo site or the external catchments to the site; however, localised flooding is known to have occurred within the bounds of Hickson Road adjacent to Barangaroo South.

Anecdotal evidence is available that suggests that in March 2006, flooding of the commercial building at 30 Hickson Road (The Bond) and residential building at 38 Hickson Road occurred to a depth of approximately 20mm after over 100mm of rainfall fell in the Sydney CBD over a 24 hour period. This storm event was estimated to have had an average recurrence interval (ARI) of between 2 and 5 years.

6.2.2 Pre-Development Overland Flow Paths

Prominent overland flow paths adjacent to Stage 1B are described as follows:

- i. **Catchment 1:**
 1. Overland flow splits at the intersection of Gas Lane and Jenkins Street with the majority of the flow diverting to the north between 30 Hickson Road (The Bond) and 34 Hickson Road; entering the existing Hickson Road subsurface stormwater drainage network.

ii. **Catchment 2:**

1. North and South on Hickson Road towards an existing low point generally located in front of The Bond"; and
2. Through the Stage 1B development site.

6.2.3 Impact of Proposed Development

The key changes to overland flow paths and effects on existing stormwater infrastructure as a result of the development of Stage 1B will be as follows:

- a. The existing stormwater pipes for the external catchment that traverse the site are to be relocated due to the conflict with the Stage 1B basement footprint;
- b. The *Sydney Harbour Foreshores and Waterways Area DCP 2005* requires that where seawalls are permitted, the top of the seawall should be 2.6 metres above the Zero Fort Denison Tide Gauge (ZFDTG), which is equivalent to 1.675 mAHD.
- c. City of Sydney's *Interim Floodplain Management Policy* (May 2014) requires consideration of the potential impacts of climate change in the assessment of proposed development. Specifically, Council's Policy requires that allowances in the *NSW Coastal Planning Guideline: Adapting to Sea Level Rise* (August 2010, recently withdrawn from publication) be met, and that an allowance of 0.9 metre sea level rise above 2009 mean sea level is to be considered;
- d. Stage 1A has been set with a promenade height of RL 2.90. This allows a grade to be achieved across the site from the proposed buildings. It is envisaged that Stage 1B will adopt a similar strategy in order to integrate with Stage 1A; and
- e. Considering existing levels on Hickson Road and the proposed building FFL within the Stage 1B site, it has been proposed to divert overland flow that would have traversed the eastern site boundary from Hickson Road into an upgraded pit and pipe network within Hickson Road and through the site. No changes to the proposed passage of overland flow to the north of the Stage 1B site are proposed.

6.3 External Stormwater Drainage

Detailed ground survey and site inspections have allowed for a detailed assessment of existing stormwater drainage network as documented below.

6.3.1 Existing External Stormwater Network

The existing stormwater network is characterised by a series of in-ground piped stormwater systems (typically between 300mm and 1800mm in diameter) draining Hickson Road and other external catchments through the Barangaroo site and ultimately into Darling Harbour. An overview of the external stormwater drainage network prior to construction works at Barangaroo South is presented in **Figure 4-1**. Additional details are presented in Drawing CD2900002 (refer to **Appendix A**).

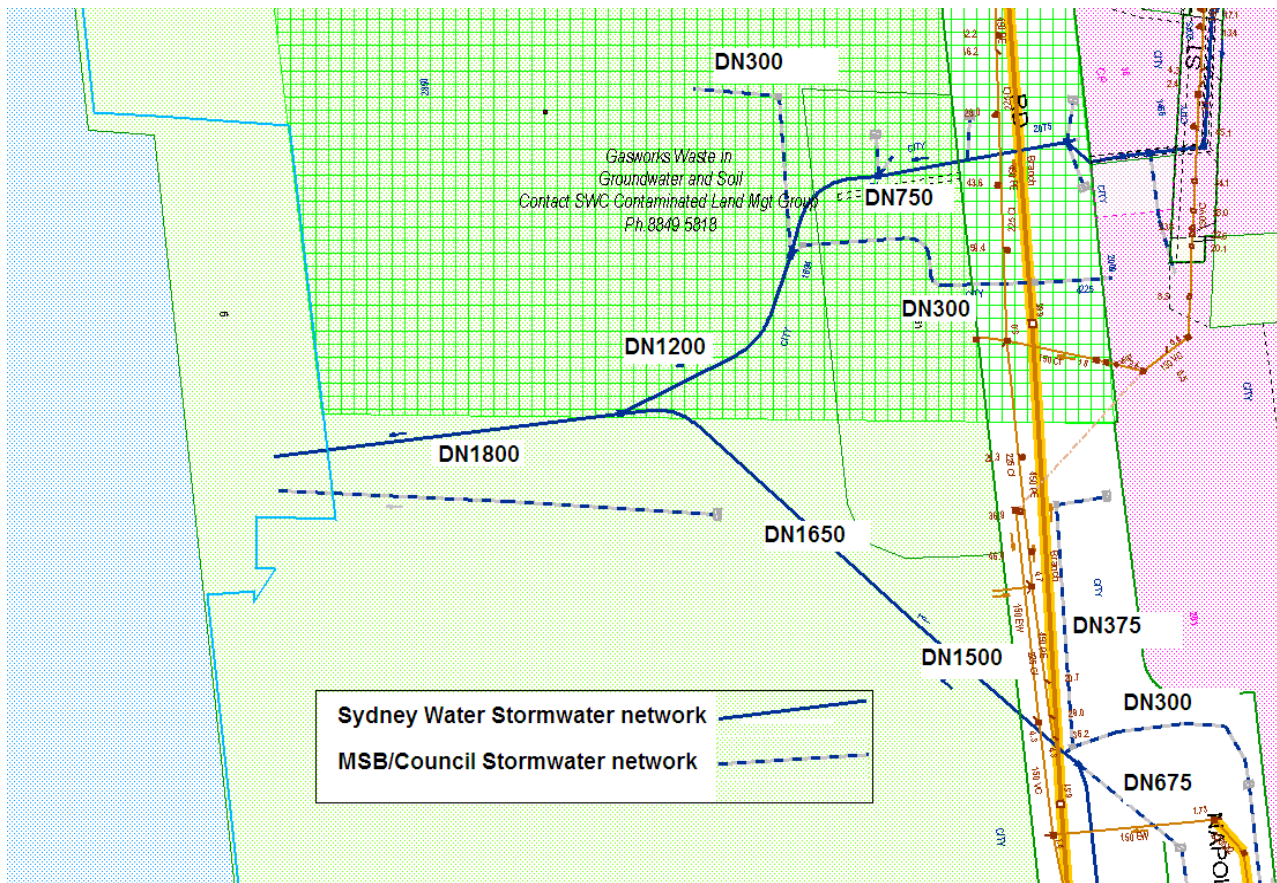


Figure 6-2 Stormwater Infrastructure prior to construction work at Barangaroo South

As part of the Stage 1A works, a concrete pipe and box culvert diversion has been constructed. This diversion has the capacity to capture and convey storm events up to the 100-year ARI event and has been adopted to alleviate flooding within Hickson Road in the vicinity of the Sussex Hotel.

6.3.2 Proposed External Stormwater Strategy

As a result of the proposed Stage 1B basement works (currently being assessed under SSD 6960), works to divert external stormwater drainage around the extent of the Stage 1B works will be required. The design of these works is currently being undertaken and coordinated with Sydney Water and City of Sydney. Sydney Water has granted approval for the Stage 1B stormwater diversion works.

The proposed finished ground levels within the Stage 1B development are such that the existing overland flow paths through the site will be obstructed. Therefore, the approved design incorporates a stormwater drainage network outside the Stage 1B site including a pit and pipe network along with maintaining overland flow north along Hickson Road and through Central Barangaroo (refer to Drawing CD9000102 in **Appendix A**). This network will include grated surface inlet pits in Hickson Road to capture and divert overland flow around Stage 1B and ultimately into Darling Harbour. The intent of the proposed diversion works is to manage the impact of the development on the external stormwater drainage network and to ensure no net increase in flood levels along Hickson Road.

As part of the approval process, comment was sought and acceptance received from CoS regarding the proposed stormwater diversion works.

6.3.3 Proposed Hickson Road Levels

Hickson Road is the main collector road to the Barangaroo (Barangaroo South and Central) Development and will be reconstructed to provide better access to the proposed surface levels in the development site. The concept design provided to Cardno at this stage (yet to be finalised) indicates the road will have a one-way cross-fall from west to east; the western kerb line will be raised to match the proposed development site level at RL 3.50m. Stormwater drainage network in Hickson Road will need to be redesigned to suit future road levels.

6.4 Internal Stormwater Drainage

6.4.1 Design Criteria

The proposed stormwater drainage network has been designed to provide:

- a. Low flows directed through water quality measures (nominally up to a 3-month ARI event); and
- b. Internal site drainage with a capacity to capture and convey all storm events up to the 100-year ARI event.

6.4.2 Design Standards

The internal stormwater drainage network will be designed generally in accordance with the following standards and guidelines:

- a) *Australian Rainfall and Runoff Volume 1 and 2*;
- b) *NSW Floodplain Development Manual 2005*;
- c) City of Sydney, *Interim Floodplain Management Policy* (May 2014);
- d) City of Sydney, *Sydney Streets Technical Specification, Part A4 Drainage Design*, Version 2, 2016;
- e) Any other applicable City of Sydney design standards, guidelines and policies;
- f) *Sydney Harbour Foreshores and Waterways Area Development Control Plan 2005*;
- g) *AS3500 – Stormwater and Drainage Design codes*;
- h) *AS3725 – Loads on Buried Concrete Pipes*;
- i) *Water Sensitive Urban Design; Book 1 – Policy* (Landcom, 2009), which is considered current best-practice for stormwater management in NSW and suggests the following targets for the reduction of pollutant mean annual load:
 - 85% for Total Suspended Solids (TSS)
 - 65% for Total Phosphorus (TP)
 - 45% for Total Nitrogen (TN).
- j) *Emi-5 Stormwater Green Stars (2 points)*, which recommends the following targets for stormwater quantity management and reduction of pollutant mean annual load:
 - 1.5-year ARI post-development peak flows not exceeding 1.5-year ARI pre-development peak flows;
 - 90% reduction of GP;
 - 80% reduction of TSS;
 - 60% reduction of TP;
 - 45% reduction of TN; and
 - 90% reduction of Free Oils.

The target reductions from each of the above design requirements will be met.

6.4.3 Internal Stormwater Drainage Strategy

Catchment A

The stormwater runoff from the eastern section of Hickson Park and Building R3 drains to the proposed internal pit and pipe network, which will be connected to the existing stormwater drainage network in Hickson Road.

The surface runoff from the open grassed area will be treated by a Stormwater360 Enviropod to remove gross pollutants from the stormwater. The Enviropod will be installed in the stormwater pit that connects to the proposed grated trench drain.

There is a 3m deep soil zone in Hickson Park, which is located on top of the basement. A sub-surface drainage system has been designed to convey the water at the bottom of the deep soil zone to the proposed stormwater

pits (Y1-Y7) and drains to the existing stormwater pit (X31) in Hickson Road. A flap valve will be installed in the Pit X31 to prevent sea water ingress to the subsoil drainage system. Figure 6-2 shows the drainage layout that connects to the Hickson Road stormwater drainage network.

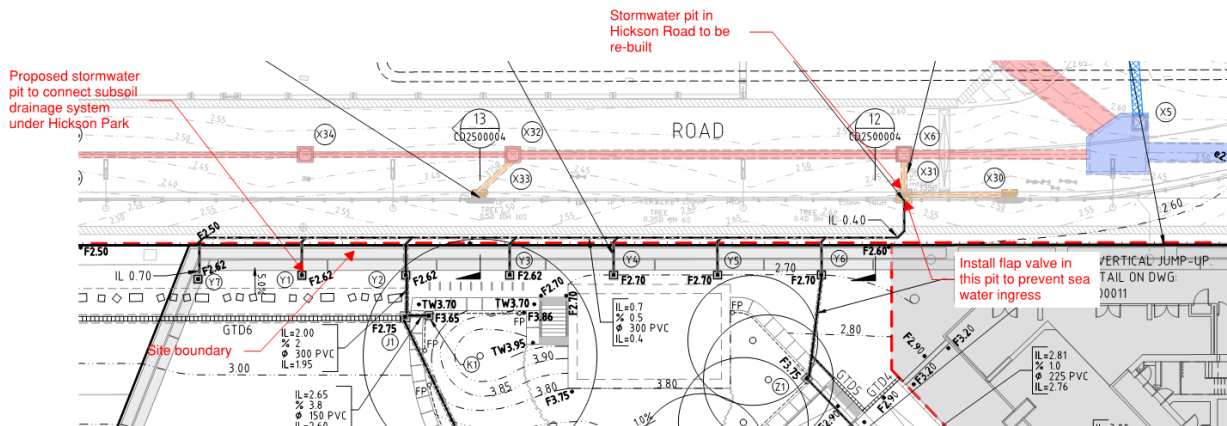


Figure 6-3 Stormwater drainage layout along Hickson Road frontage

Pit X31 and the associated outlet pipe will be reconstructed to suit the invert level of the subsoil drainage system.

In the previous design for DA, there are three direct connection to the existing Hickson Road stormwater network. The updated design will reduce the number of crossings over/under the existing Sydney Water watermain and will provide an easier maintenance regime to prevent seawater ingress into the subsoil pipes.

Catchment B

The drainage strategy for Catchment B has been designed to capture and convey all flows during storm events up to and including the 100-year ARI storm within the pit and pipe network to the proposed stormwater treatment train. The current internal drainage strategy is presented on the Siteworks drawings contained in **Appendix A** and is summarised below.

The Stage 1B Residential internal stormwater drainage network will connect to the existing 1800mm diameter pipe located west of Barangaroo Avenue, between Stages 1A and 1B. This network will collect flow from the proposed residential buildings (R1 and R2), public domain area, Barangaroo Avenue and Watermans Quay. Treatable flows (nominally up to a 3-month ARI event, subject to further design) will be diverted to the proposed stormwater treatment train. The existing 1800mm pipe that outlets into Darling Harbour will remain.

The stormwater treatment train for the ultimate development of Stage 1B will incorporate water sensitive urban design (WSUD) principles to remove gross pollutants, suspended solids and nutrients. The treatment train may consist of a range of measures, including (but not limited to):

- Tree Pits
- Gross Pollutant Traps (e.g. Stormwater360 Enviropods or equivalent)
- Proprietary tertiary treatment measures such as cartridge filtration (e.g. Stormwater360 Stormfilter).

Catchment C (Barangaroo Central)

The proposed Hickson Park consists of a large open grassed area spanning across the Barangaroo Stage 1B site boundary and into the Barangaroo Central area (Refer to Catchment C in Figure 6-1). The surface grading of the park has a crest along the Stage 1B site boundary to direct stormwater runoff within Stage 1B site to be treated by the proposed stormwater treatment train.

As an interim measure, stormwater runoff in the Barangaroo Central area will follow the proposed Hickson Park grading and sheet flow across the park and onto the existing hard paved area. The stormwater runoff then follows the existing overland flow path to the nearest stormwater drainage pits and drains to Darling Harbour as the pre-development state. The proposed park will transform the existing hard paved area to an

open turf area, which would improve the stormwater quality and reduce the peak flows in Barangaroo Central site.

In the ultimate development scenario, when Barangaroo Central are developed, stormwater drainage network and treatment train will be provided to collect the stormwater runoff from the proposed park. Barangaroo Central development is subject to a separate development application.

Catchment D

The stormwater runoff from the waterfront area between the Crown Hotel and Darling Harbour will be directed to the proposed tree pits and stormwater pits. The stormwater flow will be treated by:

- Gross Pollutant Traps (e.g. Stormwater360 Enviropods or equivalent); and
- Proprietary tertiary treatment measures such as cartridge filtration (e.g. Stormwater360 Stormfilter).

The stormwater treatment train also treats stormwater runoff from the Crown Hotel site.

7 Finished Surface Levels

The current design strategy for minimum floor and ground levels within Stage 1B are driven by :

- > Potential worst-case future water levels within Darling Harbour;
- > Minimum deep soil zone in Hickson Park;
- > The existing and future Hickson Road level; and
- > Flood level in Hickson Road.

7.1 Water Level in Darling Harbour

Main building floor levels are primarily governed by future harbour water levels. The potential worst-case future HAT level is predicted to rise to RL 1.975 mAHD by the year 2100. Allowing 600mm freeboard for storm surge and wave action, it is recommended that all major pedestrian thoroughfares and accessible areas are at or above RL 2.575 mAHD.

Timber boardwalks are proposed adjacent to Watermans Cove and Darling Harbour to enable pedestrians closer access to the water, but only where the main alternative access is at or higher than RL 2.575 mAHD. These proposed timber boardwalks are currently above the existing HAT level and are likely to remain so for the design life of the structures.

As per **Section 6.4**, the internal roof, podium and road drainage network will be designed to cater for storm events up to the 100-year ARI event.

The development of Stage 1A includes a sea wall with a minimum height of 2.5mAHD, graduating incrementally to a nominal site ground level of 3.4mAHD. This minimum height is:

- Greater than the current 1 in 100-year design still water level for Sydney Harbour (1.435 mAHD) plus an additional 0.9m to accommodate mean sea level rise (2.335mAHD);
- 825mm above the top of seawall level nominated in the *Sydney Harbour Foreshores and Waterways Area DCP 2005* (1.675mAHD); and
- Able to be incrementally increased in the future to respond to actual demonstrated sea level changes.

It is recommended that ground levels within the Stage 1B Public Domain should be set at a minimum of RL3.35, though an appropriate relationship with existing buildings and ground levels in Stage 1A must also be achieved.

7.2 Deep Soil Zone

The surface grading in Hickson Park has been designed to include a 3m deep soil zone as required in the Sydney Landscape Code, City of Sydney. The proposed basement level under Hickson Park ranges between

RL 0.70m and RL 1.10m, therefore, the highest point in the park is at RL 4.20m and grade towards Barangaroo Avenue or Hickson Road as shown in Figure 6-1.

7.3 Hickson Road

The section of Hickson Road, along the frontage of Barangaroo Stage 1B and Barangaroo Central, has a level generally varies between RL 2.40m and RL 2.70m. As part of the overall development strategy, the proposed road level in front of the Barangaroo development site would be approximately between RL 3.20m and RL 3.50m. The proposed Stage 1B surface grading requires to consider the interim stage and the ultimate stage. The ultimate grading design is on hold as the road level in Hickson Road is yet to be finalised.

7.4 Flood Level

The 1% AEP flood level in Hickson Road is at approximately RL 2.67m (in front of The Bond Residential), refer to the Barangaroo South Flood Study prepared for Barangaroo South Stage 1A and 1B. The proposed building floor level has been designed to provide a minimum 500mm freeboard from the 1% AEP water level.

8 Erosion and Sediment Control

This section addresses the following SEAR for SSD 7944:

- *The assessment must include details of proposed erosion and sediment controls (during construction), the proposed stormwater management system (during operations), and management and mitigation measures for the containment of pollutants (e.g. fuel and sewage) and prevention of potential water quality impacts during construction and operation.*

As part of the works, erosion and sedimentation controls shall be designed, installed and maintained throughout the duration of construction works in accordance with *Managing Urban Stormwater - Soils & Construction Volume 1* (Landcom, 2004).

It is noted that the majority of erosion and sediment control measures required for the construction of the Stage 1B basement will be established as part of the works to be completed under SSD 5897 and will be maintained through the duration of the construction of the Stage 1B public domain works. The requirements for erosion and sediment control measures are outlined in the *Water and Stormwater Management Sub-Plan* for the Stage 1B Public Domain works.

Prior to any earthworks commencing on site, all erosion and sediment control measures will need to be implemented in accordance with the above specifications. These measures shall generally include, as necessary:

- Installation of A-Class hoarding around the perimeter of the site;
- Installation of truck wash down facilities at each point of exit from the site;
- Installation of sediment fencing around disturbed areas, including any stockpiled topsoil;
- Placement of geotextile bags filled with sand and/or gravel around and along existing and proposed catch drains and stormwater drainage pits;
- Installation of water monitoring facilities within Darling Harbour.

In order to minimise the volume of polluted stormwater runoff generated by site works, stormwater within and adjacent to the site will generally be managed by diverting clean rainfall and runoff from any disturbed areas. Measures that will be implemented to prevent the ingress of surface water runoff into excavation areas include bunds, silt fences and drainage diversions. Proposed drainage diversion works are discussed in **Section 6.3.2** and detailed on Drawing CD2900002 included in **Appendix A**.

The preferred hierarchy for management of water onsite is as follows:

- Minimising the volume of contaminated water during the works wherever possible by directing surface water away from excavations, depressions, pits and stockpiles by the construction of drainage works such as bunds and diversion drains. Sediment basin(s) may be employed as deemed necessary for the collection of surface water for maintenance of water quality and/or re-use;
- Recycling water, where possible, by reusing on site as dust suppression or for other site operations including wheel washing and truck washing subject to suitable treatment measures; and
- Discharging to the adjacent stormwater drainage network via overland flow or formal reticulation or to sewer, with or without treatment, will be as per regulatory guidelines and in accordance with the licensed discharge for the works.

Surface water and groundwater management structures will be frequently monitored in accordance with a site-specific *Water and Stormwater Management Sub-Plan*.

Overall water quality shall be assessed with harbour monitoring. Final locations of harbour monitors will be to future detail.

9 Water & Stormwater Management Plan

Lendlease commits to the preparation of a detailed Water and Stormwater Management Plan that addresses water quality and water monitoring requirements for the duration of construction works associated with the development of Stage 1B. The Water and Stormwater Management Plan will include construction phase control measures to be implemented for Stage 1B and will be incorporated into an overarching site-specific Environmental, Construction and Site Management Plan.

The Water and Stormwater Management Plan will address the following:

Water Monitoring

- a. Criteria for nominating areas and different sources of site water as clean or contaminated;
- b. Water monitoring protocols and decision criteria for whether site water will be directed to stormwater, a wastewater treatment plant, to sewer or to a liquid waste facility;
- c. Water discharge criteria and monitoring frequency for relevant parameters;

Stormwater and Sediment Controls

- a. A detailed description of measures for stormwater and sediment control for specific locations on the site; and
- b. Silt curtain arrangements for the protection of Darling Harbour as a secondary protection control.

10 Roads and Walkways

10.1 Relevant SEARs

This section addresses the following SEAR for SSD 7944:

2. Public Domain and Access

- Outline specific design features, including but not limited to:
 - footpaths and pavements, parking areas (including bicycle), roads and/or rights of carriageways
 - civil and stormwater infrastructure

10.2 General

The proposed road layout is based upon the Concept Plan included in the approval of MOD 8 (approved 28 June 2016) and is consistent with the established design standards and planning framework. Roads and associated footway areas have been designed so not to preclude future dedication to City of Sydney.

10.3 Design Standards

The road and walkway network has been designed generally in accordance with the following standards and guidelines:

- City of Sydney standards, policies and guidelines
- Austroads Guidelines
- Australian Standards including:
 - AS2890.1 – Parking facilities: Off-street parking
 - AS2890.2 – Parking facilities: Off-street commercial vehicle facilities
 - AS1742 – Manual of uniform traffic control devices
 - AS1428 – Design for access and mobility

10.4 Design Vehicle

Table 10-1 summarises the design vehicles for which the roads within Stage 1B have been designed:

Table 10-1 Summary of design vehicles for Stage 1B road network

Interim Arrangement (prior to development of Central Barangaroo)	Ultimate Arrangement (upon completion of Central Barangaroo development)
• 12.5 m truck access along Watermans Quay and Barangaroo Avenue south of Watermans Quay; • 9.8 m garbage truck to access the Stage 1B basement and Crown basement; and • Passenger vehicles to the northern end of Barangaroo Avenue.	• 12.5 m truck access along Watermans Quay and Barangaroo Avenue • 9.8 m garbage truck to access the Stage 1B basement and Crown basement

Design turning paths were modelled using Austroads 2013 vehicle templates in the AutoTURN software package to determine where local increases in pavement width were required to ensure the design vehicle could negotiate turns and bends safely with adequate clearances.

Where necessary, 'No Stopping' signs will be provided to ensure that required turning areas are free of parked vehicles.

10.5 Road Geometry and Width

Road geometry design has been undertaken in accordance with the approved Concept Plan. A summary of the road type characteristics is described in **Table 10-2**.

Table 10-2 Summary of Roads Characteristics

Road Name	Road Pavement Width	Comments
Watermans Quay	11.5m	- Northern footpath 4 metres wide - Southern footpath generally 7.5 metres wide, except at taxi bay. - Taxi bay on the southern side of Watermans Quay 2.1 metres wide.
Barangaroo Avenue	7.0m	- Eastern footpath 5.15 metres wide - Western footpath (adjacent to approved Crown Hotel) 3.85 metres wide

Typical road sections are presented on Drawings CD2500001, CD2500002, CD2500003 and CD2500004 are included in **Appendix A**.

10.6 Road and Walkway Grading

Due to the relatively flat nature of the site, roads have generally been designed using a 'sawtooth' grading system with a series of localised sags and crests. Typically, road cross fall has been maintained at 3%.

10.7 Road and Walkway Pavements

The northern half of Watermans Quay will be constructed on in-situ material, between the existing Stage 1A basement and the proposed Stage 1B basement structures. The southern half of Watermans Quay will be constructed over the existing Stage 1A basement.

The majority of Barangaroo Avenue will be constructed over the proposed Crown Hotel basement structure. There will be a section of Barangaroo Avenue approximately 50 metres long that will be constructed above in-situ material.

Road pavement designs have been prepared and presented in **Table 10-3** and **Table 10-4**.

Table 10-3 Road Pavement Design for Barangaroo Avenue (Section located on the basement structure)

Pavement Material	Depth
Wearing Course - Asphaltic Concrete (AC10)	30mm
Base Course – Asphaltic Concrete (AC14)	55mm
Base Course – Asphaltic Concrete (AC14)	55mm
Primer Seal	10mm
Base Course (DGB20)	200mm
Sub Base (cement stabilised sand with 4% by mass cementitious content)	variable thickness

Table 10-4 Road Pavement Design for Barangaroo Avenue (Section outside of the basement structure) and Watermans Quay

Pavement Material	Depth
Wearing Course - Asphaltic Concrete (AC10)	30mm
Base Course – Asphaltic Concrete (AC14)	55mm
Base Course – Asphaltic Concrete (AC14)	55mm
Primer Seal	10mm
Base Course (DGB20)	200mm
Suitable fill compacted to 98% MMDD	200mm
Reinforced Concrete Slab (32MPa) with SL82 Mesh)	200mm

10.8 Intersections

There will be two intersections within and adjacent to the Stage 1B site:

- Hickson Road / Watermans Quay (signalised)
- Watermans Quay / Barangaroo Avenue (unsignalised)

The primary vehicular access to the site will be via the intersection at Hickson Road and Watermans Quay.

Vehicular access between the Stage 1A and 1B sites will be via a continuation of Barangaroo Avenue through the Stage 1B site. Barangaroo Avenue will be approximately aligned in a north-south direction and will continue to the northern site boundary. Signage will be put in place to indicate that Barangaroo Avenue is a no through road until the time when the continuation of the road alignment through the Central Barangaroo development site is constructed. In addition, a temporary vehicular crossing will be provided on the eastern side of Barangaroo Avenue to allow vehicles to make a three-point turn at the northern boundary and to minimise disruption of traffic exiting the Crown porte cochere as much as possible.

10.9 Footpaths

Footpaths within the Watermans Quay and Barangaroo Avenue road reserves will be provided in accordance with Council's standard drawings with no provision for shared paths. Footpaths will generally be designed with 1 to 2.5% crossfall.

11 Utility Service Provision

11.1 Relevant SEARs

This section addresses the following SEARs for SSD 7944:

2. Public Domain and Access

- *Outline specific design features, including but not limited to:*
 - *services where affected, utility poles and service pits*

12. Infrastructure Provision

- *Detail the existing infrastructure on-site and identify possible impacts on any such infrastructure from the proposal.*
- *Detail the proposed infrastructure that will service the development and demonstrate that the site can be suitably serviced. This is to include lighting details and measure to mitigate light spill and potential impacts to the amenity of sensitive receivers surrounding the site, including residential and commercial premises.*
- *Detail measures to mitigate the impacts of the proposal on any infrastructure items, including proposed relocation.*

11.2 General

Infrastructure that will be constructed as part of the Stage 1B development will include potable water, recycled water, sewerage, chilled water (for heating, ventilation and air conditioning), natural gas, electrical and telecommunications. Detailed design of all infrastructure services is currently being undertaken.

The following sections provide an overview of the proposed infrastructure that will service the Stage 1B Public Domain works. Further details regarding existing and proposed utility services that will service the Stage 1B development are contained in the report titled *Stormwater Management and Infrastructure Servicing Strategy* (Cardno, August 2015), which was lodged under SSD 6960.

11.3 Proposed Utility Services

Approval for provision of the following utility services is being sought under the Stage 1B Public Domain DA (SSD 7944).

11.3.1 Potable Water

Minor water reticulation lines will be required to service public domain areas including the proposed amenities building adjacent to Hickson Road and bubblers along Wulugul Walk. Connections for these will be provided from the proposed 250mm diameter ring main that will be constructed within the Stage 1B site.

Final details, routing and location of assets are to be agreed with Sydney Water during detailed design development.

11.3.2 Recycled Water

Dual reticulation quality recycled water, compliant with the *NSW Guidelines for Management of Private Recycled Water Schemes* will be supplied for irrigation of Public Domain areas. The design and operation of the irrigation system require a risk assessment of the use of recycled water.

Recycled water will be supplied for sub-surface irrigation of Hickson Park and the proposed tree planters across the extent of the Stage 1B Public Domain works. The irrigation strategy for the public domain open space areas will be resolved during design development.

Recycled water will also be connected to the proposed Amenities Building for toilet flushing and other non-potable uses.

Connections to the existing recycled water mains within Stage 1A or planned recycled water mains within Stage 1B would be made to supply recycled water to the Stage 1B Public Domain. Final routing and location of connection points would be resolved during detailed design.

11.3.3 Chilled Water

No chilled water services will be required to service the proposed Stage 1B Public Domain works.

11.3.4 Sewerage

A sewerage connection requires from the proposed amenities building adjacent to Hickson Road. Provision for a main sewer line from Central Barangaroo has been made adjacent to the eastern wall of the proposed Stage 1B basement. The preferred servicing option would be to provide a connection to this line, which would discharge to the Barangaroo RWTP.

11.3.5 Natural Gas

No gas services will be required to service the proposed Stage 1B Public Domain works.

11.3.6 Electricity and Lighting

Anticipated electricity loads associated with the development of the Stage 1B Public Domain include the following:

- Performing spaces
- Temporary event areas
- Wireless access points
- Information kiosks
- Street lighting within Watermans Quay and Barangaroo Avenue
- Path and feature lighting within Hickson Park, Watermans Cove and Wulugul Walk
- Security cameras
- Irrigation infrastructure

Within the Stage 1B site, private embedded network cabling and substations will be established to service the building and other site loads. The electricity reticulation system will be provided through conduits and pits located at the ground plane level within the streets and walkways. Distribution boards will be positioned on the ground plane for the supply of general power and lighting. These boards will be located within suitable rooms or cupboards and made accessible to authorised personnel only.

Final locations and integration of power supplies into the public domain will be identified through design development.

All electrical works will comply with the requirement of the following:

- National Construction Code (formerly Building Code of Australia)
- Relevant Australian Standards

11.3.7 Telecommunications

As part of the Stage 1B Public Domain works, communications lines will be extended from the future Stage 1B basement and will utilise risers within the proposed residential tower buildings on the ground plane, extending into a pit and pipe network along the street and walkways within the Stage 1B public domain.

Communications conduits will be installed underneath the footpaths adjacent to electricity conduits and will provide service to security cameras that will be installed throughout the Stage 1B Public Domain.

Wireless Access Points (WAPs) will be distributed throughout the Public Domain to enable basic data connectivity to the public. The WAPs will be collocated with lighting poles and suitable architectural structural elements where appropriate.

No additional mobile phone augmentation is expected for the Stage 1B Public Domain in addition to works that will be installed for the Stage 1B Basement.

Communications works shall comply with the requirements of the following:

- National Construction Code (formerly Building Code of Australia)
- Relevant Australian Standards
- Governing Statutory Authorities
- Vendor-specific guidelines

11.4 Existing and Planned Utility Services

The following sections describe both existing utility services and planned utility services that are subject to separate development approvals.

11.4.1 Potable Water

To service the Stage 1B site and the Crown Hotel development, a connection will be made to the existing 300mm diameter watermain in Hickson Road. From this connection, a 250mm diameter potable water main will be constructed along the internal road network. The new main will generally be located as follows:

- Under the roadway on the northern side of Watermans Quay.
- Under the footpath on the eastern side of Barangaroo Avenue (above the proposed Crown Hotel basement, and on in-situ material between the existing Stage 1A basement and the proposed Crown Hotel basement).
- Under Hickson Park (above the proposed Crown Hotel and Stage 1B basement structures)

The proposed alignment of the proposed potable water main is presented on the Services Coordination drawings contained in **Appendix A**.

11.4.2 Recycled Water

The recycled water supply to Stage 1B and the Crown Hotel developments will be drawn from the central Recycled Water Treatment Plant (RWTP) that is located in the Stage 1A basement. The RWTP is currently operational and treats wastewater from the Barangaroo South development as well as a sewer mining connection from an existing Sydney Water sewerage line in Hickson Road.

Recycled water will be treated in accordance with Australian Recycled Water guidelines and reticulated throughout the Stage 1A and 1B developments for non-potable uses including landscape irrigation and toilet flushing.

Recycled water mains are generally to be located within the Stage 1B basement (subject to a license from Sydney Water and to the requirements of *NSW Guidelines for Management of Private Recycled Water Schemes*), reticulating to customer recycled water meters that will be located within the basement. The recycled water mains for Stage 1B will be extended from the existing termination point within the Stage 1A basement.

Indicative pipework associated with the proposed recycled water network within Stage 1B is presented on the Services Coordination drawings contained in **Appendix A**.

11.4.3 Chilled Water

A centralised chilled water plant and a harbour heat rejection system have been constructed as part of Stage 1A works to provide reticulated chilled water to the Barangaroo South buildings, including the Stage 1B and Crown Hotel developments. Chilled water will be reticulated throughout the Barangaroo South development within a privately owned pipe network.

11.4.4 Sewerage

Provision of wastewater services connections to the Stage 1B and the Crown Hotel developments has been addressed through the Site Servicing Strategy as agreed with Sydney Water.

Sewerage from Stage 1B and the Crown Hotel development will discharge to the central RWTP located in the Stage 1A basement.

11.4.5 Natural Gas

The proposed gas servicing strategy for Stage 1B is currently being developed with Jemena, the gas asset owner and manager for the area. Jemena has confirmed that there is adequate capacity to service the Stage 1B development from the existing 110mm low-pressure gas main in Hickson Road.

There is currently a combined servicing strategy being considered by Jemena for the supply of gas to Stage 1B and the Crown Hotel development:

- Construction of a new low-pressure gas ring main within Hickson Road adjacent to the Stage 1B site to service the development,
- Construction of a high-pressure connection from Hickson Road to the eastern site boundary, with a private network of low-pressure mains to be constructed within the Crown Hotel basement to service the Crown Hotel development

The preferred option for the supply of gas to Stage 1B is currently being negotiated with Jemena.

A separate high-pressure gas customer service would supply the Crown hotel site and would be provided under a separate application.

11.4.6 Electricity

The electrical services that will be required for Stage 1B can be broadly separated into three categories:

- Common infrastructure, including high voltage infrastructure that will be privately owned and operated.
- Basement
- Podium, including Public Domain

The scope of electrical services that will service Stage 1B includes low voltage reticulation, main switchboards and distribution boards, standby power, energy metering, earthing and lighting protection, lighting and controls, exit and emergency escape lighting and small power reticulation.

Electricity infrastructure, which will consist of a 33kV network with substations located in the Stage 1A and Stage 1B basements, will be owned and operated by Lendlease as a private embedded network. This will be configured in a triplex configuration and will provide a similar level of redundancy to the 11kV CBD system.

The substations within the Stage 1A site (currently under operation) and Stage 1B site (planned future works, subject to a separate application) will have sufficient capacity to service the anticipated load for the Stage 1B Public Domain works.

11.4.7 Telecommunications

The scope of communications services that will ultimately be provided for Stage 1B and the Crown Hotel development (subject to separate applications) includes lead-in telecommunications service provider infrastructure, distribution, an Integrated Communications Network (ICN), Master Antenna Television System (MATV) and in-building (i.e. basement) mobile coverage / distributed antenna system.

A single lead-in connection will be provided to the Stage 1B site indicatively from Hickson Road. An allowance will be made for a primary telecommunications provider with spare capacity for up to two additional future service providers. Private fibre services may be interfaced directly to Barangaroo South Stage 1A. These works will all be subject to separate future applications.

Reticulation within the site will generally be in dedicated carrier cable trays at a high level in the Stage 1B basement to individual building node rooms. These works will be subject to approval under the Stage 1B Basement DA (SSD 6960).

12 Conclusion

This report supports a State Significant Development Application (SSD 7944) submitted to the Minister for Planning pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979*. The Development Application (DA) seeks approval for construction of the Stage 1B Public Domain and associated works at Barangaroo South.

The completed design of proposed stormwater management measures will result in no adverse impact on surrounding neighbours or public spaces due to adjusted overland flow paths around the Barangaroo South development. Details are to be developed and integrated into the ground plane design and detailed in the design development phase.

The internal drainage system will capture and convey storm events up to and including the 100-year ARI event to Darling Harbour whilst also providing water quality treatment through a comprehensive treatment train.

The climate change has induced sea level rise predicted for 2100 poses a risk to the effectiveness of the existing local stormwater drainage system in the Barangaroo area. However, the proposed diversion seems to improve the capacity and to allow for the future climate change-driven impacts that may increase the harbour water levels.

All required utility services to support the development, at a level of technology and innovation required for Barangaroo South, will be provided. Lendlease undertakes necessary arrangements and obtains necessary approvals for water supply, power supply, communications, sewer and stormwater connections from the relevant authorities, as required.

Barangaroo South – Stage 1B Public Domain

APPENDIX A

STAGE 1B PUBLIC DOMAIN CIVIL DRAWINGS

BARANGAROO SOUTH

STAGE 1B - PUBLIC DOMAIN WORKS

100% ISSUE FOR TENDER

CIVIL & STRUCTURAL



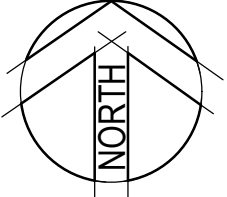
Cardno (NSW/ACT) Pty Ltd | ABN 95 001 145 035
Level 9, The Forum, 203 Pacific Highway
St. Leonards, NSW 2065
Tel: 02 9496 7700 Fax: 02 9439 5170
Web: www.cardno.com.au



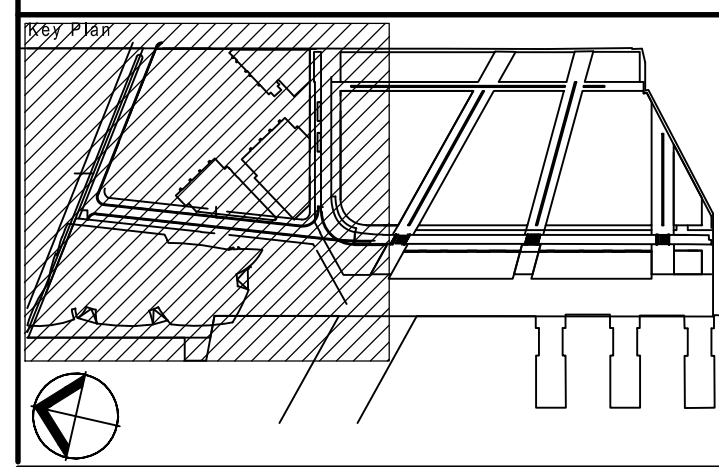
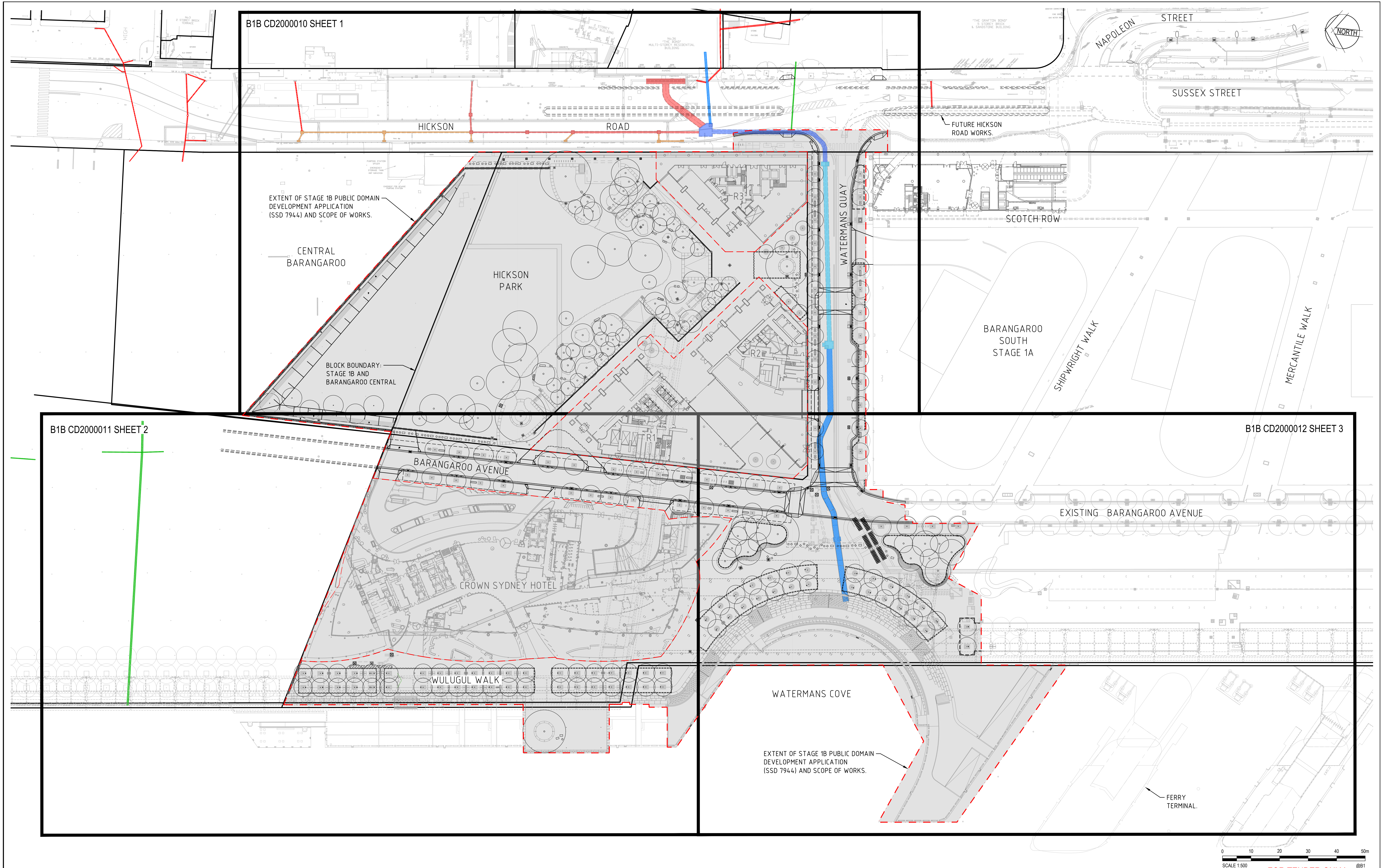
ONE SYDNEY HARBOUR



LOCALITY PLAN
N.T.S.



SCHEDULE OF DRAWINGS - INTERNAL (ISSUE FOR SSD 7944)		
DRAWING No.	DESCRIPTION	REVISION
B1B CD2000000	TITLE SHEET	06
B1B CD2000001	NOTES AND LEGENDS	06
B1B CD2000002	GENERAL ARRANGEMENT PLAN	12
B1B CD2000005	DEMOLITION PLAN SHEET 1	12
B1B CD2000006	DEMOLITION PLAN SHEET 2	12
B1B CD2000010	SITEWORKS PLAN SHEET 1	12
B1B CD2000011	SITEWORKS PLAN SHEET 2	12
B1B CD2000012	SITEWORKS PLAN SHEET 3	12
B1B CD2000014	WATERMANS QUAY AND BARANGAROO AVENUE INTERSECTION PLAN	04
B1B CD2000015	GROUND PLANE SLAB GRADING PLAN	09
B1B CD2000017	SUBGRADE PLAN SHEET 1	04
B1B CD2000018	SUBGRADE PLAN SHEET 2	04
B1B CD2000019	SUBGRADE PLAN SHEET 3	04
B1B CD2000025	RETAINING WALL SETOUT PLAN SHEET 1	05
B1B CD2000026	RETAINING WALL SETOUT PLAN SHEET 2	05
B1B CD2000027	RETAINING WALL SETOUT PLAN SHEET 3	05
B1B CD2000030	PAVEMENT AND SIGNAGE AND LINEMARKING SHEET 1	12
B1B CD2000031	PAVEMENT AND SIGNAGE AND LINEMARKING SHEET 2	12
B1B CD2000032	PAVEMENT AND SIGNAGE AND LINEMARKING SHEET 3	12
B1B CD2000040	PAVEMENT JOINTING PLAN SHEET 1	05
B1B CD2000041	PAVEMENT JOINTING PLAN SHEET 2	05
B1B CD2000042	PAVEMENT JOINTING PLAN SHEET 3	05
B1B CD2100001	SERVICE COORDINATION PLAN SHEET 1	16
B1B CD2100002	SERVICE COORDINATION PLAN SHEET 2	16
B1B CD2100003	SERVICE COORDINATION PLAN SHEET 3	16
B1B CD2100010	CROWN PROPOSED WATERMAIN CROSSING PLAN AND SECTIONS	06
B1B CD2100011	CROWN PROPOSED COMMUNICATIONS PLAN AND LONGITUDINAL SECTION	06
B1B CD2100020	SMARTPOLES & BOLLARDS PLAN SHEET 1	05
B1B CD2100021	SMARTPOLES & BOLLARDS PLAN SHEET 2	05
B1B CD2100022	SMARTPOLES & BOLLARDS PLAN SHEET 3	05
B1B CD2100023	SMARTPOLES & BOLLARDS PLAN SHEET 4	05
B1B CD2100025	SMARTPOLES & BOLLARDS FOOTING DETAILS SHEET 1	07
B1B CD2100026	SMARTPOLES & BOLLARDS FOOTING DETAILS SHEET 2	04
B1B CD2500001	TYPICAL CROSS SECTIONS SHEET 1	13
B1B CD2500002	TYPICAL CROSS SECTIONS SHEET 2	14
B1B CD2500003	TYPICAL CROSS SECTIONS SHEET 3	14
B1B CD2500004	TYPICAL CROSS SECTIONS SHEET 4	06
B1B CD2500005	TYPICAL CROSS SECTIONS SHEET 5	04
B1B CD2500010	DELINEATION SECTIONS SHEET 1	06
B1B CD2500011	DELINEATION SECTIONS SHEET 2	06
B1B CD2500012	DELINEATION SECTIONS SHEET 3	06
B1B CD2500013	DELINEATION SECTIONS SHEET 4	06
B1B CD2600001	STORMWATER DRAINAGE LONGITUDINAL SECTIONS SHEET 1	07
B1B CD2800001	SITEWORKS DETAILS SHEET 1	08
B1B CD2800010	STORMWATER DETAILS SHEET 1	08
B1B CD2800011	STORMWATER DETAILS SHEET 2	08
B1B CD2800020	RETAINING WALL FOOTING DETAILS SHEET 1	05
B1B CD2800030	STRUCTURAL DETAILS TREE PIT GRATE SHEET 1	06
B1B CD2800031	STRUCTURAL DETAILS TREE PIT GRATE SHEET 2	06
B1B CD2800032	STRUCTURAL DETAILS TREE PIT GRATE SHEET 3	06
B1B CD2800050	STRUCTURAL DETAILS LANDSCAPE SEATING SHEET 1	04
B1B CD2800051	STRUCTURAL DETAILS LANDSCAPE SEATING SHEET 2	04
B1B CD2800055	STRUCTURAL DETAILS LANDSCAPE STAIRS SHEET 1	04
B1B CD2800056	STRUCTURAL DETAILS LANDSCAPE STAIRS SHEET 2	01
B1B CD2900001	INTERNAL CATCHMENT PLAN	10
B1B CD2900002	EXTERNAL CATCHMENT PLAN	12
B1B CD2900015	TURNING PATHS PLAN SHEET 1	08
B1B CD2900016	TURNING PATHS PLAN SHEET 2	08
B1B CD2900018	BASEMENT TURNING PATHS PLAN SHEET 1	08
B1B CD2900019	BASEMENT TURNING PATHS PLAN SHEET 2	08



Rev	Item	Revision Description	Date	Rev	Item	Revision Description	Date
12		100% IFT	22.03.19				
11		95% IFT (RE-ISSUED FOR COORDINATION)	15.03.19				
10		95% IFT (FOR COORDINATION)	12.03.19				
09		90% IFT (RE-ISSUED)	19.12.18				
08		90% IFT	03.12.18				
07		50% IFT	03.10.18				
06		STAGE 4A ISSUE	13.04.18				
05		STAGE 4A DRAFT ISSUE	06.04.18				
04		ISSUED FOR DEVELOPMENT APPLICATION	17.03.17				
03		INCORPORATING MINOR AMENDMENTS	30.11.16				
02		INCORPORATING CLIENT REVIEW	25.11.16				
01		ISSUE FOR SSD 7944	25.10.16				

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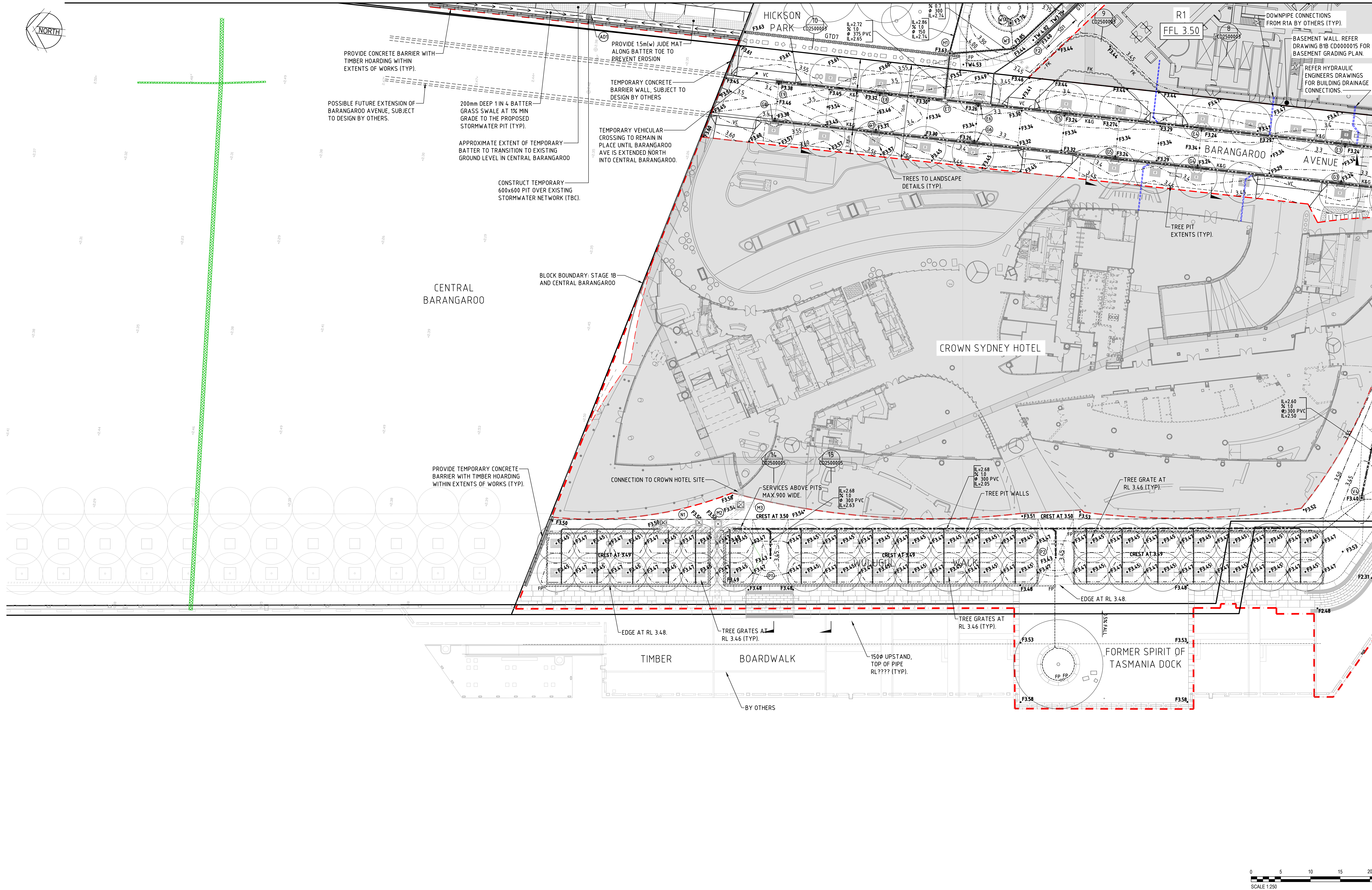
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Shaping the Future

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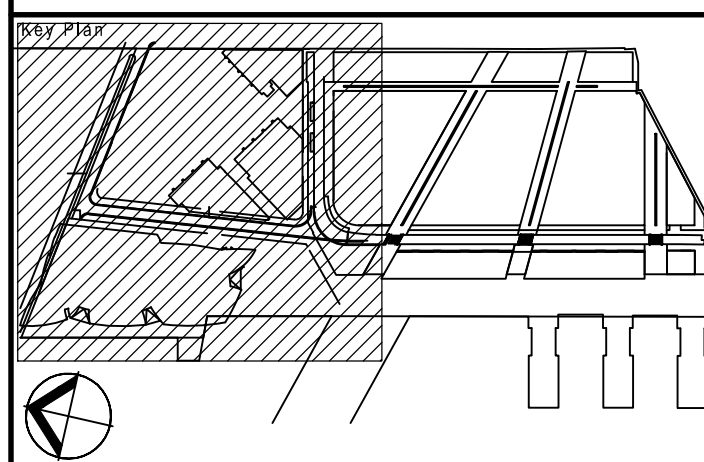
Lead Architects	RSHP Australia Pty Ltd Rashad Haidar (Principal Architect) RAIA NSW ARB 9484 Sydney NSW 2000	Principal		Project	BARANGAROO SOUTH
Collaborating Architects	Lend Lease Graham W Jones Principal Architect FRAIA NSW ARB 4005 ABN 67 000 098 162	Developer	Lend Lease	Project Management & Construction	Lend Lease
Consultant	30 The Bond 30 Hickson Road Millers Point NSW 2000	Design	Lend Lease	Scale	1:500
				Project No.	161804
				Site No.	B1B CD2000002
				Drawing No.	12
				Revision	

FOR TENDER ONLY
NOT TO BE USED FOR CONSTRUCTION PURPOSES

REFER DRAWING B1B CD2000010 FOR CONTINUATION



REFER DRAWING B1B CD2000012 FOR CONTINUATION



Rev.	Item	Revision Description	Date	Rev.	Item	Revision Description	Date
12	100% IFT		22.03.19				
11	95% IFT (RE-ISSUED FOR COORDINATION)		15.03.19				
10	95% IFT (FOR COORDINATION)		12.03.19				
09	90% IFT (RE-ISSUED)		19.12.18				
08	90% IFT		03.12.18				
07	50% IFT		03.10.18				
06	STAGE 4A ISSUE		13.04.18				
05	STAGE 4A DRAFT ISSUE		06.04.18				
04	ISSUED FOR DEVELOPMENT APPLICATION		17.03.17				
03	INCORPORATING MINOR AMENDMENTS		20.11.16				
02	INCORPORATING CLIENT REVIEW		15.11.16				
01	ISSUE FOR SSD T946		25.10.16				

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Lead Architects	RSHP Australia Pty Ltd Ivan Harkness Principal Architect RAIA NSW ARB 8484 Sydney NSW 2000	Principal	lendlease	Project	BARANGAROO SOUTH	Title	STAGE 1B - PUBLIC DOMAIN WORKS SITEWORKS PLAN SHEET 2
Collaborating Architects	Lend Lease Graham W Jones Principal Architect FRAIA NSW ARB 4005 ABN 67 000 098 162	Developer	Lend Lease	Project Management & Construction	Lend Lease	Drawn By	MDH
Consultant	30 The Bond 30 Hickson Road Mills Point NSW 2000	Design	Lend Lease	Scale	1:250	Designed	MV
						Checked	TH
						Approves By	
						Date	0CT'16
						Project No.	161804
						Site No.	B1B CD2000011
						Drawing No.	
						Revision	12

[illegible]

Lead Architects	RSHP Australia Pty Ltd Ivan Harbour Principal Architect RAIA NSW ARB 8484 Sydney NSW 2000
Collaborating Architects	Lend Lease Graham W Jones Principal Architect FRAIA NSW ARB 4005 ABN 97 000 098 162

Principal		
Developer	Lend Lease	
Project Management & Construction	Lend Lease	
Design	Lend Lease	
30 The Bond 30 Hickson Road Millers Point NSW 2000		
		www.lendlease.com
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Project

BARANGAROO SOUTH

MP

Title				
STAGE 1B – PUBLIC DOMAIN WORKS				
SITeworks PLAN				
SHEET 3				
Drawn By	Designed	Checked	Approved By	Date
MDH	MV	TM		OCT-16
Scale				
1:250				
Project No.	Site No.	Drawing No.	Revision	
161804	B1B	CD2000012	12	

PAVEMENT TYPE 1
INTERNAL ACCESS ROAD
 30mm THICKNESS ASPHALTIC CONCRETE (AC10) ON
 55mm THICKNESS ASPHALTIC CONCRETE (AC14) ON
 55mm THICKNESS ASPHALTIC CONCRETE (AC14) ON
 TACK COAT ON
 200mm THICKNESS BASECOURSE (IDGB 20) ON
 CEMENT STABILISED SAND WITH 4% BY MASS CEMENTITIOUS
 CONTENT BLENDED WITH FLYASH ON
 STRUCTURAL SLAB
 CBR 15%,
 DESA = 9.2×10^5

INTERNAL ACCESS ROAD
40mm THICKNESS ASPHALTIC CONCRETE (AC14) ON
55mm THICKNESS ASPHALTIC CONCRETE (AC14) ON
55mm THICKNESS ASPHALTIC CONCRETE (AC14) ON
TACK COAT ON
200mm THICKNESS BASECOURSE (DGB 20) ON
CEMENT STABILISED SAND WITH 4% BY MASS CEMENTITIOUS
CONTENT BLENDED WITH FLYASH ON
STRUCTURAL SLAB
CBR 15%,
DESA = 9.2×10^5

30mm THICKNESS ASPHALTIC CONCRETE (AC10) ON
55mm THICKNESS ASPHALTIC CONCRETE (AC14) ON
55mm THICKNESS ASPHALTIC CONCRETE (AC14) ON
TACK COAT ON
200mm THICKNESS BASECOURSE (DGB20) ON
VARIABLE THICKNESS SUITABLE FILL COMPACTED TO 98%
MMD ON
200mm THICKNESS REINFORCED CONCRETE SLAB (32MPa)
WITH SL82 MESH (50mm TOP AND BOTTOM COVER).
CBR 3%
DESA = 9.2×10^5

EXTERNAL ACCESS ROAD FOOTPATH
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS
DETAILS ON
160mm THICKNESS REINFORCED CONCRETE SLAB (32 MPa)
WITH SL92 MESH (45mm TOP COVER) ON
100mm THICKNESS BASECOURSE (DGB 20) ON
SUITABLE FILL COMPACTED TO 98% MMDD
DESIGN LOAD 12.5KPa

EXTERNAL ACCESS ROAD FOOTPATH
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS
DETAILS ON
160mm THICKNESS REINFORCED CONCRETE SLAB (32 MPa)
WITH SL92 MESH (45mm TOP COVER) ON
STRATACELL

ACCESS DRIVEWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS
DETAILS ON
200mm THICKNESS REINFORCED CONCRETE SLAB (32 MPa)
WITH SL92 MESH (50mm TOP & BOTTOM COVER) ON
100mm THICKNESS BASECOURSE (DGB 20) ON
SUITABLE FILL COMPACTED TO 98% MMDD
DESIGN LOAD 12.5 KPa

PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS
DETAILS ON
200mm THICKNESS REINFORCED CONCRETE SLAB (32 MPa)
WITH SL92 MESH (50mm TOP & BOTTOM COVER) ON
STRATACELL

HICKSON PARK AND INTERNAL WALKWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS
DETAILS ON
160mm THICKNESS REINFORCED CONCRETE SLAB (32 MPa)
WITH SL92 MESH (45mm TOP COVER) ON
100mm THICKNESS BASECOURSE (DGB 20) ON
SUITABLE FILL COMPACTED TO 98% MMDD
DESIGN LOAD 12.5KPa

160mm THICKNESS REINFORCED CONCRETE SLAB (32 MPa)
WITH SL92 MESH (45mm TOP COVER) ON
STRATACELL

WATER FRONT PROMENADE PEDESTRIAN WALKWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS DETAILS ON
160mm THICKNESS REINFORCED CONCRETE SLAB (32MPa)
WITH SL92 MESH (45mm TOP COVER) ON
100mm THICKNESS BASECOURSE (DGB20) ON
SUITABLE FILL COMPACTED TO 98% MMDD
WET (90.3%)

WATER FRONT PROMENADE PEDESTRIAN WALKWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS DETAILS ON
160mm THICKNESS REINFORCED CONCRETE SLAB (32MPa)
WITH SL92 MESH (45mm TOP COVER) ON
STRATACELL

WATER FRONT PROMENADE PEDESTRIAN WALKWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS DETAILS ON
200mm THICKNESS REINFORCED CONCRETE SLAB (32MPa)
WITH SL92 MESH (45mm TOP COVER) ON
100mm THICKNESS BASECOURSE (DGB20) ON
SUITABLE FILL COMPACTED TO 98% MMDD
MIN CBR 3%

PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS DETAILS ON
200mm THICKNESS REINFORCED CONCRETE SLAB (32MPa)
WITH SL92 MESH (45mm TOP COVER) ON
STRATACELL

WATER FRONT PROMENADE PEDESTRIAN WALK
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS DETAILS OF
160mm THICKNESS REINFORCED CONCRETE SLAB (32MPa)
WITH SL92 MESH (45mm TOP COVER) ON
100mm THICKNESS BASECOURSE (DGB20) ON
SUITABLE FILL COMPACTED TO 98% MMDD
MIN CBR 3%

WATER FRONT PROMENADE PEDESTRIAN WALKWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS DETAILS ON
160mm THICKNESS REINFORCED CONCRETE SLAB (32MPa)
WITH SL92 MESH (45mm TOP COVER) ON
STRATACELL

TIMBER BROADWALK
DESIGN BY OTHERS

TIMBER BROADWALK
DESIGN BY OTHERS ON
STRATACELL

PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS DETAILS ON
190mm THICKNESS REINFORCED CONCRETE SLAB (32 MPA) WITH
SL72 MESH TOP AND BOTTOM (50mm COVER) ON
VARIABLE THICKNESS BASECOURSE (DGB 20) MAX. 150mm ON
VARIABLE THICKNESS SUITABLE FILL COMPACTED TO 98% MMDD
200mm THICKNESS REINFORCED CONCRETE SLAB (32MPa) WITH SL8
MESH (50mm TOP AND BOTTOM COVER).

PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS DETAILS ON 190mm THICKNESS REINFORCED CONCRETE SLAB (32 MPA) WITH SL72 MESH TOP AND BOTTOM (50mm COVER) ON CEMENT STABILISED SAND WITH 4% BY MASS CEMENTITIOUS CONTENT BLENDED WITH FLYASH ON EXISTING STRUCTURAL SLAB

NOTE:
REFER DWG: B1B CD2000017 TO B1B CD2000019
FOR FULL EXTENT OF STRATACELL.

REFER DRAWING B1B CD2000031 FOR CONTINUATION

REFER DRAWING B1B CD2000032 FOR CONTINUATION

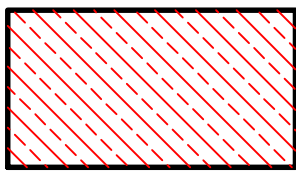
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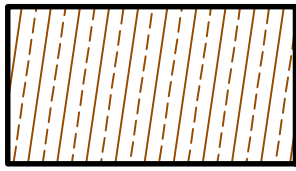


Lead Architects  RSHP Australia Pty Ltd Ivan Hutton Principal Architect 6/24A NSW Arts Centre Sydney NSW 2000		Principal  lendlease		Project  BARANGAROO SOUTH		NOT TO BE USED FOR CONSTRUCTION PURPOSES STAGE 1B - PUBLIC DOMAIN WORKS PAVEMENT AND SIGNAGE AND LINEMARKING SHEET 1	
Collaborating Architects Lend Lease Graham W Jones Principal Architect 6/24A NSW Arts Centre Sydney NSW 2000		Developer Lend Lease Project Management & Construction Lend Lease Design Lend Lease				Drawn By: MDH Designed: MV Checked: TM Approved By: Date: 01/16 Scale: 1:250	
Consultant ABN 97 000 098 162 50 The Bond 50 Hickson Road Milers Point NSW 2000 www.lendlease.com		These designs, plans and specifications are the copyright there is no the property of Lend Lease and must not be used, reproduced or copied in whole or in part without the written permission of Lend Lease.		Project No. 161804		Site No. Drawing No. B1B CD2000030	
				Revision 12			

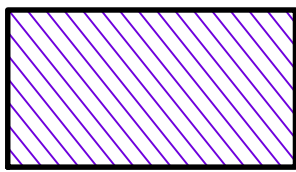
PAVEMENT LEGEND



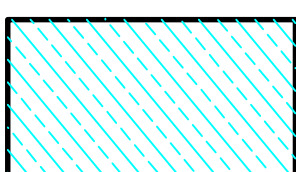
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55mm THICKNESS ASPHALTIC CONCRETE (AC14) ON
55mm THICKNESS ASPHALTIC CONCRETE (AC14) ON
TACK COAT ON
200mm THICKNESS BASECOURSE (DGB 20) ON
CEMENT STABILISED SAND WITH 4% BY MASS CEMENTITIOUS
CONTENT BLENDED WITH FLYASH ON
STRUCTURAL SLAB
CBR 15%
DESA = 9.2x10⁶



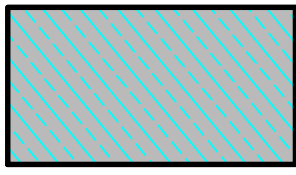
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INTERNAL ACCESS ROAD
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55mm THICKNESS ASPHALTIC CONCRETE (AC14) ON
55mm THICKNESS ASPHALTIC CONCRETE (AC14) ON
TACK COAT ON
200mm THICKNESS BASECOURSE (DGB 20) ON
CEMENT STABILISED SAND WITH 4% BY MASS CEMENTITIOUS
CONTENT BLENDED WITH FLYASH ON
STRUCTURAL SLAB
CBR 15%
DESA = 9.2x10⁶



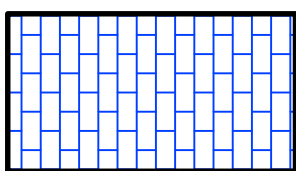
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ACCESS ROAD
30mm THICKNESS ASPHALTIC CONCRETE (AC10) ON
55mm THICKNESS ASPHALTIC CONCRETE (AC14) ON
55mm THICKNESS ASPHALTIC CONCRETE (AC14) ON
TACK COAT ON
200mm THICKNESS BASECOURSE (DGB20) ON
VARIABLE THICKNESS SUITABLE FILL COMPACTED TO 98%
MMDD ON
200mm THICKNESS REINFORCED CONCRETE SLAB (32MPa)
WITH SL82 MESH (50mm TOP AND BOTTOM COVER).
CBR 3%
DESA = 9.2x10⁶



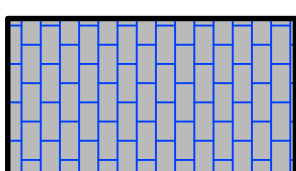
PAVEMENT TYPE 4
EXTERNAL ACCESS ROAD FOOTPATH
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS
DETAILS ON
160mm THICKNESS REINFORCED CONCRETE SLAB (32 MPa)
WITH SL92 MESH (45mm TOP COVER) ON
100mm THICKNESS BASECOURSE (DGB 20) ON
SUITABLE FILL COMPACTED TO 98% MMDD
DESIGN LOAD 12.5KPa



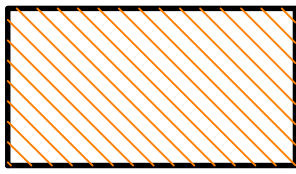
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EXTERNAL ACCESS ROAD FOOTPATH
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS
DETAILS ON
160mm THICKNESS REINFORCED CONCRETE SLAB (32 MPa)
WITH SL92 MESH (45mm TOP COVER) ON
STRATACELL



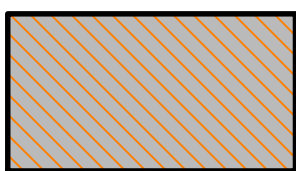
PAVEMENT TYPE 6
ACCESS DRIVEWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS
DETAILS ON
200mm THICKNESS REINFORCED CONCRETE SLAB (32 MPa)
WITH SL92 MESH (50mm TOP & BOTTOM COVER) ON
100mm THICKNESS BASECOURSE (DGB 20) ON
SUITABLE FILL COMPACTED TO 98% MMDD
DESIGN LOAD 12.5KPa



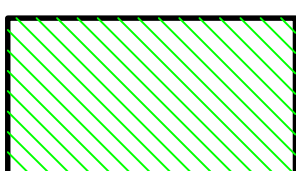
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ACCESS DRIVEWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS
DETAILS ON
200mm THICKNESS REINFORCED CONCRETE SLAB (32 MPa)
WITH SL92 MESH (50mm TOP & BOTTOM COVER) ON
STRATACELL



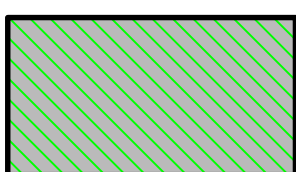
PAVEMENT TYPE 8
HICKSON PARK AND INTERNAL WALKWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS
DETAILS ON
160mm THICKNESS REINFORCED CONCRETE SLAB (32 MPa)
WITH SL92 MESH (45mm TOP COVER) ON
100mm THICKNESS BASECOURSE (DGB 20) ON
SUITABLE FILL COMPACTED TO 98% MMDD
DESIGN LOAD 12.5KPa



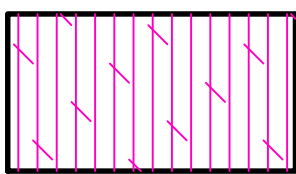
PAVEMENT TYPE 9
HICKSON PARK AND INTERNAL WALKWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS
DETAILS ON
160mm THICKNESS REINFORCED CONCRETE SLAB (32 MPa)
WITH SL92 MESH (45mm TOP COVER) ON
STRATACELL



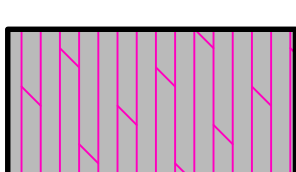
PAVEMENT TYPE 10
WATER FRONT PROMENADE PEDESTRIAN WALKWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS DETAILS ON
160mm THICKNESS REINFORCED CONCRETE SLAB (32MPa)
WITH SL92 MESH (45mm TOP COVER) ON
100mm THICKNESS BASECOURSE (DGB20) ON
SUITABLE FILL COMPACTED TO 98% MMDD
MIN CBR 3%



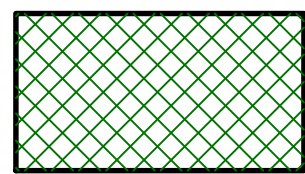
PAVEMENT TYPE 11
WATER FRONT PROMENADE PEDESTRIAN WALKWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS DETAILS ON
160mm THICKNESS REINFORCED CONCRETE SLAB (32MPa)
WITH SL92 MESH (45mm TOP COVER) ON
STRATACELL



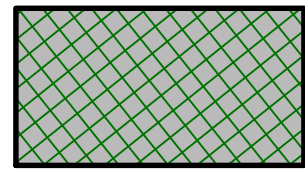
PAVEMENT TYPE 12
WATER FRONT PROMENADE PEDESTRIAN WALKWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS DETAILS ON
200mm THICKNESS REINFORCED CONCRETE SLAB (32MPa)
WITH SL92 MESH (45mm TOP COVER) ON
100mm THICKNESS BASECOURSE (DGB20) ON
SUITABLE FILL COMPACTED TO 98% MMDD
MIN CBR 3%



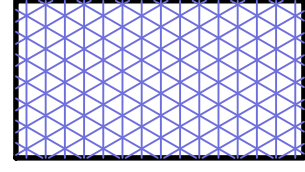
PAVEMENT TYPE 13
WATER FRONT PROMENADE PEDESTRIAN WALKWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS DETAILS ON
200mm THICKNESS REINFORCED CONCRETE SLAB (32MPa)
WITH SL92 MESH (45mm TOP COVER) ON
STRATACELL



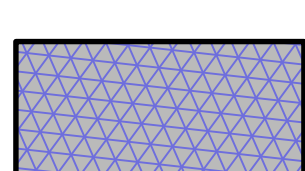
PAVEMENT TYPE 14
WATER FRONT PROMENADE PEDESTRIAN WALKWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS DETAILS ON
160mm THICKNESS REINFORCED CONCRETE SLAB (32MPa)
WITH SL92 MESH (45mm TOP COVER) ON
100mm THICKNESS BASECOURSE (DGB20) ON
SUITABLE FILL COMPACTED TO 98% MMDD
MIN CBR 3%



PAVEMENT TYPE 15
WATER FRONT PROMENADE PEDESTRIAN WALKWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS DETAILS ON
160mm THICKNESS REINFORCED CONCRETE SLAB (32MPa)
WITH SL92 MESH (45mm TOP COVER) ON
STRATACELL



PAVEMENT TYPE 16
TIMBER BOARDWALK
DESIGN BY OTHERS



PAVEMENT TYPE 17
TIMBER BOARDWALK
DESIGN BY OTHERS ON
STRATACELL



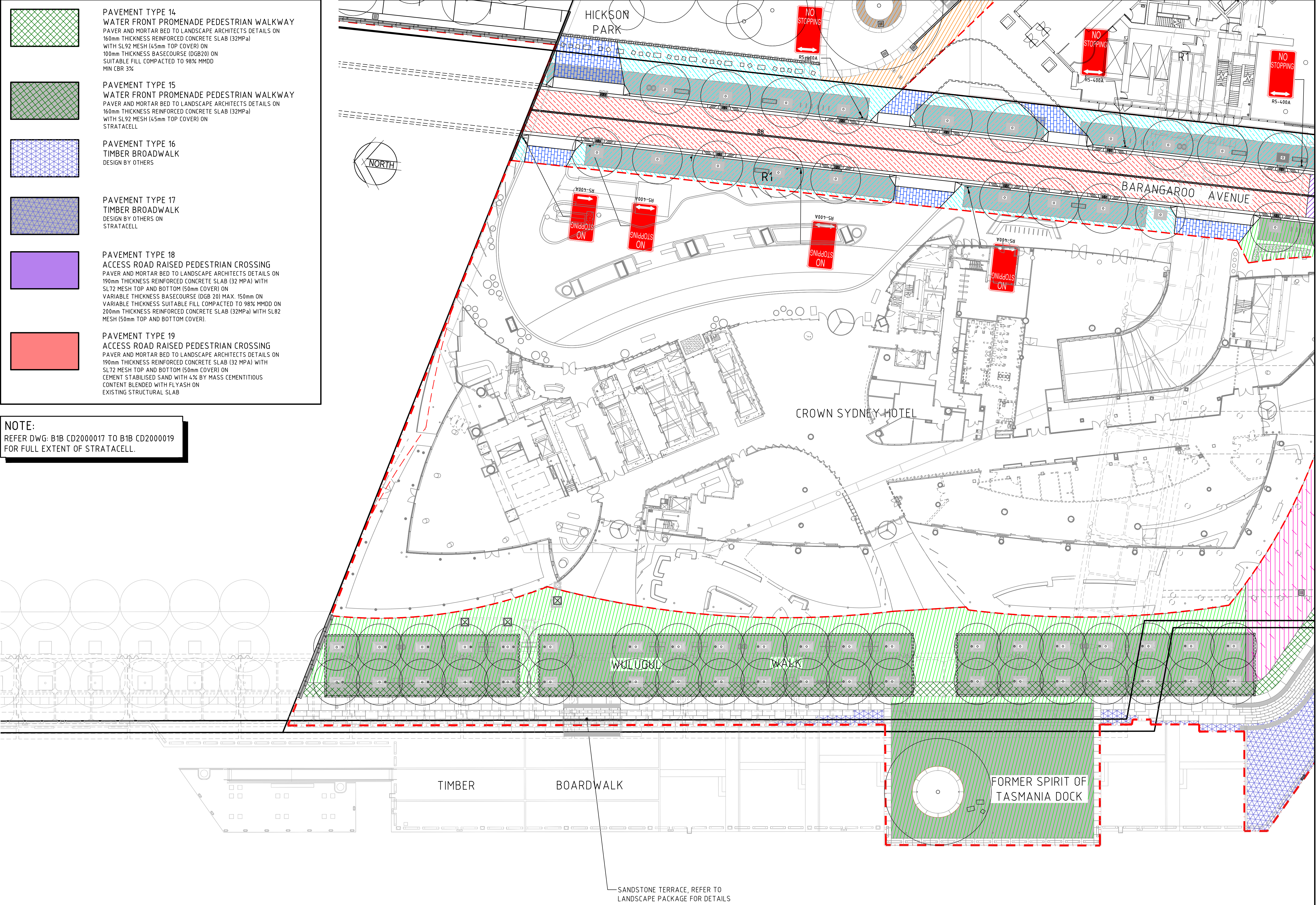
PAVEMENT TYPE 18
ACCESS ROAD RAISED PEDESTRIAN CROSSING
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS DETAILS ON
190mm THICKNESS REINFORCED CONCRETE SLAB (32 MPa) WITH
SL72 MESH TOP AND BOTTOM (50mm COVER) ON
VARIABLE THICKNESS BASECOURSE (DGB 20) MAX. 150mm ON
VARIABLE THICKNESS SUITABLE FILL COMPACTED TO 98% MMDD ON
200mm THICKNESS REINFORCED CONCRETE SLAB (32MPa) WITH SL82
MESH (50mm TOP AND BOTTOM COVER).



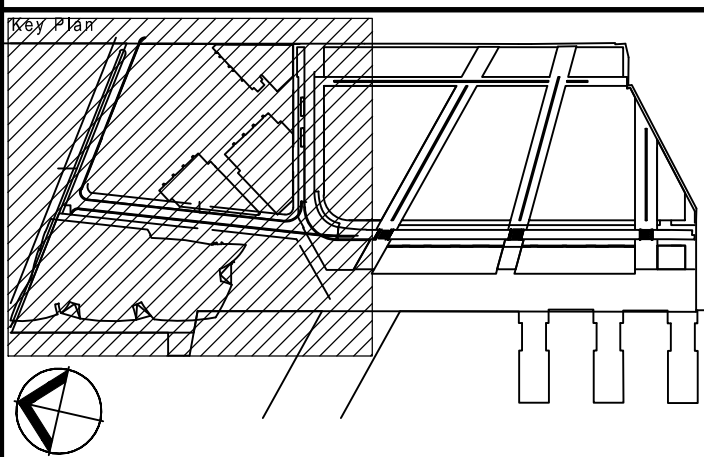
PAVEMENT TYPE 19
ACCESS ROAD RAISED PEDESTRIAN CROSSING
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS DETAILS ON
190mm THICKNESS REINFORCED CONCRETE SLAB (32 MPa) WITH
SL72 MESH TOP AND BOTTOM (50mm COVER) ON
CEMENT STABILISED SAND WITH 4% BY MASS CEMENTITIOUS
CONTENT BLENDED WITH FLYASH ON
EXISTING STRUCTURAL SLAB

NOTE:
REFER DWG: B1B CD2000017 TO B1B CD2000019
FOR FULL EXTENT OF STRATACELL.

REFER DRAWING B1B CD2000030 FOR CONTINUATION



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Rev.	Item	Revision Description	Date	Rev.	Item	Revision Description	Date
12		100% IFT	22.03.19				
11		95% IFT (RE-ISSUED FOR COORDINATION)	15.03.19				
10		95% IFT (FOR COORDINATION)	12.03.19				
09		90% IFT (RE-ISSUED)	19.12.18				
08		90% IFT	03.12.18				
07		50% IFT	03.10.18				
06		STAGE 4A ISSUE	13.04.18				
05		STAGE 4A DRAFT ISSUE	06.04.18				
04		ISSUED FOR DEVELOPMENT APPLICATION	17.03.17				
03		INCORPORATING MINOR AMENDMENTS	30.11.16				
02		INCORPORATING CLIENT REVIEW	15.11.16				
01		ISSUE FOR SSD 794.4	25.10.16				

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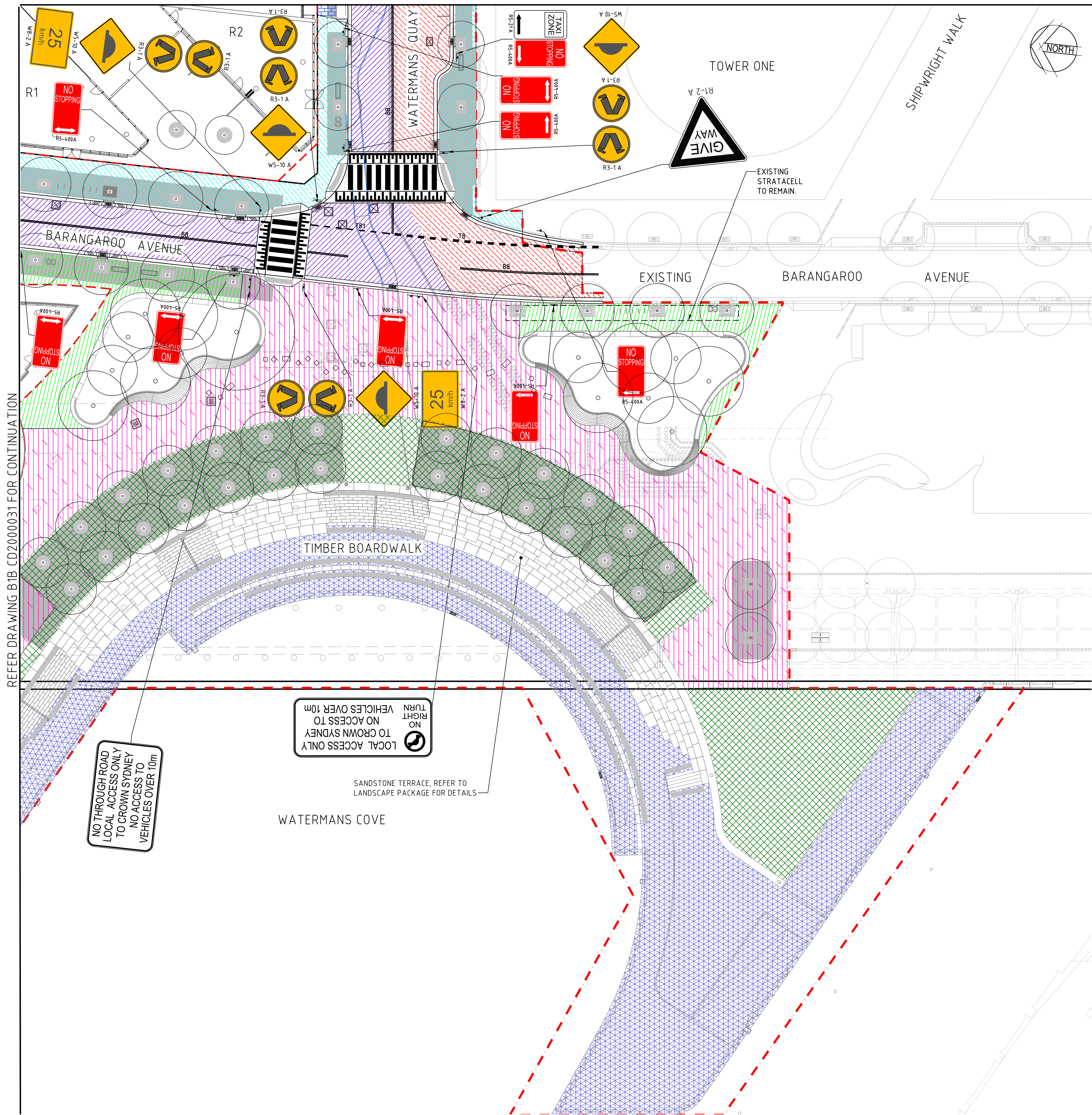
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Collaborating Architects	Lend Lease Graham W Jones Principal Architect FRAIA NSW ARB 4005 ABN 97 000 088 162
Consultant	

Principal	lendlease
Developer	Lend Lease
Project Management & Construction	Lend Lease
Design	Lend Lease
30 The Bond 30 Hickson Road Marrs Point NSW 2000	www.lendlease.com

Project	BARANGAROO SOUTH
MP	

STAGE 1B - PUBLIC DOMAIN WORKS PAVEMENT AND SIGNAGE AND LINEMARKING SHEET 2	
Drawn By MDH	Designed MDH
Checked TM	Approved By Date OCT 16
Scale 1:250	
Project No. 161804	Site No. B1B
Drawing No. CD2000031	Revision 12

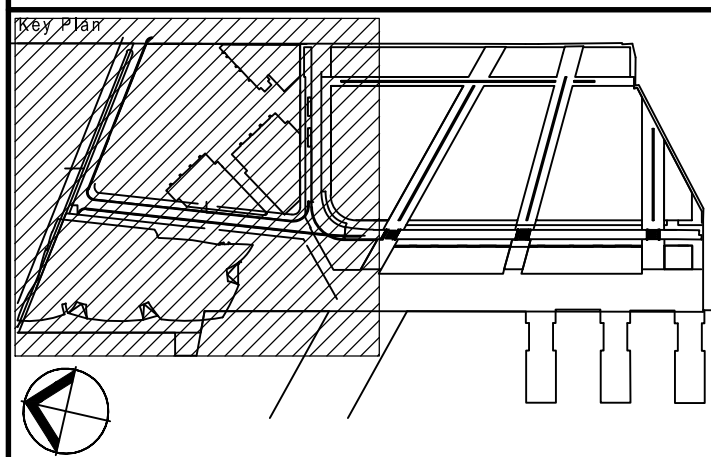


PAVEMENT LEGEND

- PAVEMENT TYPE 1**
INTERNAL ACCESS ROAD
30mm THICKNESS ASPHALTIC CONCRETE (AC10) ON
55mm THICKNESS ASPHALTIC CONCRETE (AC14) ON
55mm THICKNESS ASPHALTIC CONCRETE (AC14) ON
TACK COAT ON
200mm THICKNESS BASECOURSE (DGB 20) ON
CEMENT STABILISED SAND WITH 4% BY MASS CEMENTITIOUS
CONTENT BLENDED WITH FLYASH ON
STRUCTURAL SLAB
CBR 15%,
DESA = 9.2x10³
- PAVEMENT TYPE 2**
INTERNAL ACCESS ROAD
40mm THICKNESS ASPHALTIC CONCRETE (AC14) ON
55mm THICKNESS ASPHALTIC CONCRETE (AC14) ON
55mm THICKNESS ASPHALTIC CONCRETE (AC14) ON
TACK COAT ON
200mm THICKNESS BASECOURSE (DGB 20) ON
CEMENT STABILISED SAND WITH 4% BY MASS CEMENTITIOUS
CONTENT BLENDED WITH FLYASH ON
STRUCTURAL SLAB
CBR 15%,
DESA = 9.2x10³
- PAVEMENT TYPE 3**
ACCESS ROAD
30mm THICKNESS ASPHALTIC CONCRETE (AC10) ON
55mm THICKNESS ASPHALTIC CONCRETE (AC14) ON
55mm THICKNESS ASPHALTIC CONCRETE (AC14) ON
TACK COAT ON
200mm THICKNESS BASECOURSE (DGB20) ON
VARIABLE THICKNESS SUITABLE FILL COMPACTED TO 98%
MMD ON
200mm THICKNESS REINFORCED CONCRETE SLAB (32MPa)
WITH SL82 MESH (50mm TOP AND BOTTOM COVER).
CBR 3%,
DESA = 9.2x10³
- PAVEMENT TYPE 4**
EXTERNAL ACCESS ROAD FOOTPATH
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS
DETAILS ON
160mm THICKNESS REINFORCED CONCRETE SLAB (32 MPa)
WITH SL92 MESH (45mm TOP COVER) ON
100mm THICKNESS BASECOURSE (DGB 20) ON
SUITABLE FILL COMPACTED TO 98% MMD
DESIGN LOAD 12.5KPa
- PAVEMENT TYPE 5**
EXTERNAL ACCESS ROAD FOOTPATH
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS
DETAILS ON
160mm THICKNESS REINFORCED CONCRETE SLAB (32 MPa)
WITH SL92 MESH (45mm TOP COVER) ON
STRATACELL
- PAVEMENT TYPE 6**
ACCESS DRIVEWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS
DETAILS ON
200mm THICKNESS REINFORCED CONCRETE SLAB (32 MPa)
WITH SL92 MESH (50mm TOP & BOTTOM COVER) ON
100mm THICKNESS BASECOURSE (DGB 20) ON
SUITABLE FILL COMPACTED TO 98% MMD
DESIGN LOAD 12.5KPa
- PAVEMENT TYPE 7**
ACCESS DRIVEWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS
DETAILS ON
200mm THICKNESS REINFORCED CONCRETE SLAB (32 MPa)
WITH SL92 MESH (50mm TOP & BOTTOM COVER) ON
STRATACELL
- PAVEMENT TYPE 8**
HICKSON PARK AND INTERNAL WALKWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS
DETAILS ON
160mm THICKNESS REINFORCED CONCRETE SLAB (32 MPa)
WITH SL92 MESH (45mm TOP COVER) ON
100mm THICKNESS BASECOURSE (DGB 20) ON
SUITABLE FILL COMPACTED TO 98% MMD
DESIGN LOAD 12.5KPa
- PAVEMENT TYPE 9**
HICKSON PARK AND INTERNAL WALKWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS
DETAILS ON
160mm THICKNESS REINFORCED CONCRETE SLAB (32 MPa)
WITH SL92 MESH (45mm TOP COVER) ON
STRATACELL
- PAVEMENT TYPE 10**
WATER FRONT PROMENADE PEDESTRIAN WALKWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS DETAILS ON
160mm THICKNESS REINFORCED CONCRETE SLAB (32MPa)
WITH SL92 MESH (45mm TOP COVER) ON
100mm THICKNESS BASECOURSE (DGB20) ON
SUITABLE FILL COMPACTED TO 98% MMD
MIN CBR 3%
- PAVEMENT TYPE 11**
WATER FRONT PROMENADE PEDESTRIAN WALKWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS DETAILS ON
160mm THICKNESS REINFORCED CONCRETE SLAB (32MPa)
WITH SL92 MESH (45mm TOP COVER) ON
STRATACELL
- PAVEMENT TYPE 12**
WATER FRONT PROMENADE PEDESTRIAN WALKWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS DETAILS ON
200mm THICKNESS REINFORCED CONCRETE SLAB (32MPa)
WITH SL92 MESH (45mm TOP COVER) ON
100mm THICKNESS BASECOURSE (DGB20) ON
SUITABLE FILL COMPACTED TO 98% MMD
MIN CBR 3%
- PAVEMENT TYPE 13**
WATER FRONT PROMENADE PEDESTRIAN WALKWAY
PAVER AND MORTAR BED TO LANDSCAPE ARCHITECTS DETAILS ON
200mm THICKNESS REINFORCED CONCRETE SLAB (32MPa)
WITH SL92 MESH (45mm TOP COVER) ON
STRATACELL

NOTE:
REFER DWG: B1B CD2000017 TO B1B CD2000019
FOR FULL EXTENT OF STRATACELL.

0 5 10 15 20 25m
SCALE 1:250
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Rev.	Item	Revision Description	Date	Rev.	Item	Revision Description	Date
12		100% IFT	22.03.19				
11		95% IFT (RE-ISSUED FOR COORDINATION)	15.03.19				
10		95% IFT (FOR COORDINATION)	12.03.19				
09		90% IFT (RE-ISSUED)	19.12.18				
08		90% IFT	03.12.18				
07		50% IFT	03.10.18				
06		STAGE 4A ISSUE	13.04.18				
05		STAGE 4A DRAFT ISSUE	06.04.18				
04		ISSUED FOR DEVELOPMENT APPLICATION	17.03.17				
03		INCORPORATING MINOR AMENDMENTS	30.11.16				
02		INCORPORATING CLIENT REVIEW	15.11.16				
01		ISSUE FOR SSD 794/4	25.10.16				

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Lead Architects	RSHP Australia Pty Ltd Ran Harpaz Principal Architect RAA NSW ARB 8484 Sydney NSW 2000	Principal	lendlease	Project	BARANGAROO SOUTH
Collaborating Architects	Lend Lease Graham W Jones Principal Architect FRAIA NSW ARB 4005 ABN 97 000 088 162	Developer	Lend Lease	Stage 1B - PUBLIC DOMAIN WORKS PAVEMENT AND SIGNAGE AND LINEMARKING SHEET 3	
Consultant	30 The Bond 30 Hickson Road Marrs Point NSW 2000 www.lendlease.com	Project Management & Construction	Lend Lease	Drawn By	MDH
		Design	Lend Lease	Designed By	MDH
				Checked	MDH
				Approved By	MDH
				Date	OCT 16
				Scale	1:250
				Project No.	161804
				Site No.	B1B
				Drawing No.	CD2000032
				Revision	12

EXISTING SERVICES LEGEND

- SERVICES
- W WATER SERVICES
 - W WATER LEAD IN LINE
 - E ELECTRICAL SERVICES
 - S SEWER SERVICES
 - T TELSTRA AND OPTICAL FIBRE SERVICES
 - OP OPTUS SERVICE
 - G GAS SERVICES
 - SW STORMWATER SERVICES
 - RS RTA SERVICES
 - EXISTING SYDNEY WATER STORMWATER

SERVICES DENOTED BY "C" HAS BEEN COMPILED FROM "CARDNO A.U.S" INFORMATION. SEWER DENOTED BY "H" HAS BEEN COMPILED BY "RYGATE SURVEYORS". STORMWATER DENOTED BY "S" HAS BEEN COMPILED BY "CARDNO SURVEYORS AND ORIGINAL DATA BASE INFORMATION SUPPLIED BY SYDNEY CITY COUNCIL". ALL OTHER DATA HAS BEEN COMPILED FROM DIAL BEFORE YOU DIG INFORMATION. D ESTIMATED DEPTHS FROM EXISTING SURFACE LEVEL. HL INVERT OF PIPE OR CONDUIT. OL OBVERT OF PIPE OR CONDUIT.

PROPOSED SERVICES LEGEND

- PROPOSED SERVICES
- 1 PROPOSED COMMUNICATIONS
 - 2 PROPOSED WIRELESS ACCESS POINT
 - DS PROPOSED DIGITAL SIGN
 - CP PROPOSED COMMUNICATIONS PIT
 - ICN PROPOSED ICN RACK
 - PROPOSED POTABLE WATER
 - PROPOSED FIRE
 - PROPOSED WATER ACCESS POINT
 - PROPOSED STORMWATER
 - PROPOSED GAS (BY OTHERS)
 - PROPOSED RECYCLED WATER
 - PROPOSED NATURAL GAS
 - PROPOSED FIRE SERVICE
 - PROPOSED DISTRICT COOLING PLANT WATER
 - PROPOSED LIGHTING CONTROL CABLEWAY
- PROPOSED SERVICES
- PROPOSED SEWER
 - PROPOSED IRRIGATION LINE PIPEWORK
 - PROPOSED IRRIGATION OUTLET
 - PROPOSED IRRIGATION OUTLET
 - PROPOSED RECYCLED WATER IRRIGATION LINE
 - PROPOSED IRRIGATION DECODER CABLE
 - PROPOSED IRRIGATION CONDUIT
 - PROPOSED IRRIGATION POTABLE WATER
 - PROPOSED ELECTRICAL AND LIGHTING
 - PROPOSED ELECTRICAL DISTRIBUTION BOARD
 - PROPOSED LIGHTING
 - PROPOSED ELECTRICAL OUTLET
 - PROPOSED ELECTRICAL PIT
 - PROPOSED ELECTRICAL DRINKING FOUNTAIN
 - PROPOSED SOIL ACCESS PIT

FOR INFORMATION ONLY

THIS PLAN HAS BEEN PREPARED TO SHOW EXISTING AND PROPOSED SERVICES ONLY FOR COORDINATION PURPOSES ONLY AND IS NOT TO BE USED FOR CONSTRUCTION. REFER TO SERVICE SPECIFIC DRAWINGS FOR DETAILS OF EACH PROPOSED SERVICE.

GROUND CONDITIONS AND SITE CONSTRAINTS VARY AND AFFECT THE ACCURACY OF THE VERTICAL TOLERANCE FOR THE SERVICES SHOWN. WHILE REASONABLE CARE HAS BEEN TAKEN IN THE PREPARATION OF INFORMATION WITH RESPECT TO ALIGNMENT AND DEPTH, CARDNO DOES NOT WARRANT THE ACCURACY OF THIS INFORMATION AND IT SHOULD ONLY BE USED TO INFORM DESIGN. CARDNO RECOMMENDS THAT CONFIRMATION OF ALL SERVICE DEPTHS BY PHYSICAL LOCATION BE PERFORMED FOR ALL CRITICAL SERVICES, SERVICES CROSSINGS AND/OR CLASHES WHERE DESIGN REQUIRES GREATER ACCURACY. ALL SERVICES SHOULD BE PHYSICALLY CONFIRMED BY THE CONTRACTOR PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.

NOTES

- ANY SERVICE THROUGH THE DIAPHRAGM WALL WILL NEED TO BE COORDINATED WITH THE RELEVANT SERVICE AUTHORITIES, STRUCTURAL AND GEOTECHNICAL ENGINEERS.
- SERVICES SHOWN CONCEPTUALLY AS PER ARCHITECTS SERVICE ALLOCATIONS.
- SERVICES WITHIN WULUGUL WALK AND ADJACENT TO WATERMANS COVE SUBJECT TO DESIGN DEVELOPMENT.
- FEATURE LIGHTING NOT SHOWN FOR CLARITY.

NOTES

SERVICE COORDINATION PLAN ISSUED FOR INFORMATION ONLY. WE DON'T GUARANTEE THE LOCATION OF ANY SERVICES.

CENTRAL
BARANGAROO

HICKSON
PARK

BARANGAROO
SOUTH
STAGE 1A

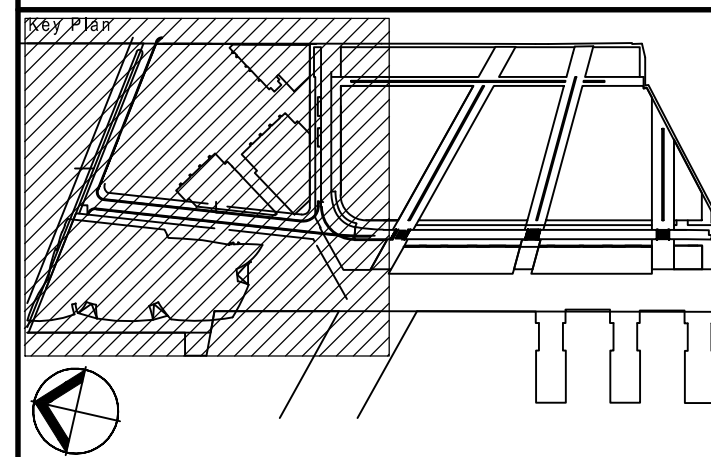
REFER DRAWING B1B CD2100002 FOR CONTINUATION

REFER DRAWING B1B CD2100003 FOR CONTINUATION

NOTE:
REFER DRAWING PACKAGE DWG: B1B CD1000000 TO
B1B CD1800012 FOR CONSTRUCTED EARLY WORKS SERVICES

0 5 10 15 20 25m
SCALE 1:250 @B1

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Rev.	Item	Revision Description	Date	Rev.	Item	Revision Description	Date
14	95% IFT (FOR COORDINATION)		22.03.19				
13	ISSUED FOR INFORMATION		28.02.19				
12	90% IFT (RE-ISSUED)		19.12.18				
11	50% IFT		05.10.18				
10	50% IFT		03.10.18				
09	STAGE 4A ISSUE		13.04.18				
08	STAGE 4A DRAFT ISSUE		06.04.18				
07	RE-ISSUED FOR DEVELOPMENT APPLICATION		20.04.17				
06	RE-ISSUED FOR DEVELOPMENT APPLICATION		17.04.17				
05	ISSUED FOR DEVELOPMENT APPLICATION		17.03.17				
04	INCORPORATING MINOR AMENDMENTS		14.12.12				
03	INCORPORATING MINOR AMENDMENTS		20.11.16				
02	INCORPORATING CLIENT REVIEW		25.11.16	16	100% IFT		22.03.19
01	ISSUE FOR SSO 7944		25.10.16	15	95% IFT (RE-ISSUED FOR COORDINATION)		25.03.19

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Principal
lendlease
Developer
Project Management & Construction
Design
Lend Lease
Lend Lease
Lend Lease

Project
BARANGAROO SOUTH
MP

STAGE 1B - PUBLIC DOMAIN WORKS
SERVICE COORDINATION PLAN
SHEET 1
Drawn By: MDH
Designed: MHV
Checked: TM
Approved By: [Signature]
Scale: 1:250
Project No: 161804
Site No: B1B
Drawing No: CD2100001
Revision: 16

EXISTING SERVICES LEGEND

W	WATER SERVICES
V	WATER LEAD IN LINE
E	ELECTRICAL SERVICES
S	SEWER SERVICES
T	TELSTRA AND OPTICAL FIBRE SERVICES
OP	OPTUS SERVICE
G	GAS SERVICES
SW	STORMWATER SERVICES
RS	RTA SERVICES
ESW	EXISTING SYDNEY WATER STORMWATER

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STORMWATER DENOTED BY "S" HAS BEEN COMPILED BY "CARDNO SURVEYORS AND ORIGINAL DATA BASE INFORMATION SUPPLIED BY SYDNEY CITY COUNCIL".
ALL OTHER DATA HAS BEEN COMPILED FROM DIAL BEFORE YOU DIG INFORMATION.
D ESTIMATED DEPTHS FROM EXISTING SURFACE LEVEL
IL INVERT OF PIPE OR CONDUIT
OL OBVERT OF PIPE OR CONDUIT

PROPOSED SERVICES LEGEND

1	PROPOSED COMMUNICATIONS
2	PROPOSED WIRELESS ACCESS POINT
DS	PROPOSED SECURITY CAMERA
DS	PROPOSED DIGITAL SIGN
CP	PROPOSED COMMUNICATIONS PIT
ICN	PROPOSED ICN RACK
W	PROPOSED POTABLE WATER
F	PROPOSED FIRE
W	PROPOSED WATER ACCESS POINT
W	PROPOSED STORMWATER
G	PROPOSED GAS (BY OTHERS)
R	PROPOSED RECYCLED WATER
N	PROPOSED NATURAL GAS
D	PROPOSED FIRE SERVICE
C	PROPOSED DISTRICT COOLING PLANT WATER
L	PROPOSED LIGHTING CONTROL CABLEWAY
S	PROPOSED SEWER
I	PROPOSED IRRIGATION LINE PIPEWORK
O	PROPOSED IRRIGATION OUTLET
C50	PROPOSED IRRIGATION OUTLET
63	PROPOSED RECYCLED WATER IRRIGATION LINE
DEC	PROPOSED IRRIGATION DECODER CABLE
C50	PROPOSED IRRIGATION CONDUIT
C100	PROPOSED IRRIGATION CONDUIT
75	PROPOSED IRRIGATION POTABLE WATER
E	PROPOSED ELECTRICAL AND LIGHTING
E	PROPOSED ELECTRICAL DISTRIBUTION BOARD
L	PROPOSED LIGHTING
E	PROPOSED ELECTRICAL OUTLET
EP	PROPOSED ELECTRICAL PIT
EP	PROPOSED ELECTRICAL DRINKING FOUNTAIN
EP	PROPOSED SOIL ACCESS PIT

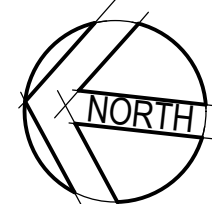
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- SERVICES SHOWN CONCEPTUALLY AS PER ARCHITECTS SERVICE ALLOCATIONS.
- SERVICES WITHIN WULUGUL WALK AND ADJACENT TO WATERMANS COVE SUBJECT TO DESIGN DEVELOPMENT
- FEATURE LIGHTING NOT SHOWN FOR CLARITY.



REFER DRAWING B1B CD2100001 FOR CONTINUATION

HICKSON PARK

R1

BARANGAROO AVENUE

PROPOSED ELECTRICAL AND COMMUNICATIONS CONDUITS, REFER TO AURECON DESIGN DOCUMENTATION DWG: B1B-ED-0000000 TO B1B-ED-80014.02 AND FOR DETAIL (TYP).

CROWN SYDNEY HOTEL

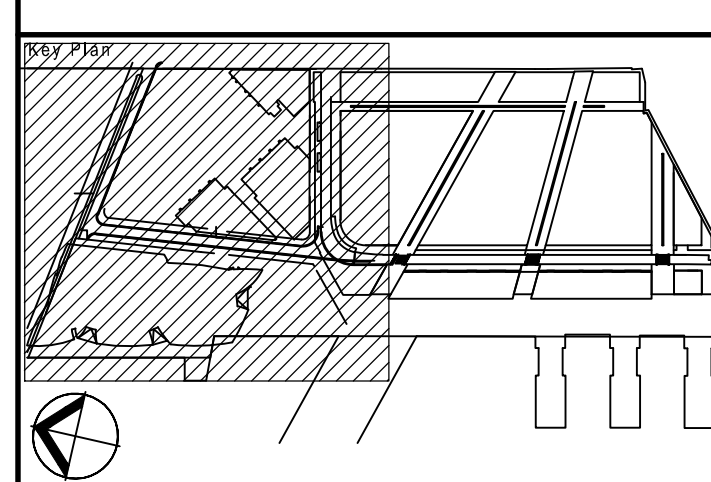
FORMER SPIRIT OF TASMANIA DOCK

PROPOSED DOMESTIC COLD WATER, REFER WS&P DWG: B1B-HD-106100 TO B1B-HD-1062003 DETAIL (TYP).

NOTE:
REFER DRAWING PACKAGE DWG: B1B CD1000000 TO B1B CD1800012 FOR CONSTRUCTED EARLY WORKS SERVICES

0 5 10 15 20 25m
SCALE 1:250 @B1

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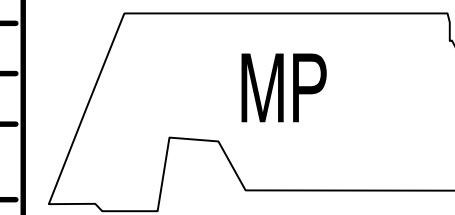


14	95% IFT (FOR COORDINATION)	12.03.19			
13	ISSUED FOR INFORMATION	28.02.19			
12	90% IFT (RE-ISSUED)	19.12.18			
11	50% IFT	05.10.18			
10	50% IFT	03.10.18			
09	STAGE 4A ISSUE	13.04.18			
08	STAGE 4A DRAFT ISSUE	06.04.18			
07	RE-ISSUED FOR DEVELOPMENT APPLICATION	20.04.17			
06	RE-ISSUED FOR DEVELOPMENT APPLICATION	17.04.17			
05	ISSUED FOR DEVELOPMENT APPLICATION	17.03.17			
04	INCORPORATING MINOR AMENDMENTS	14.12.12			
03	INCORPORATING MINOR AMENDMENTS	20.11.16			
02	INCORPORATING CLIENT REVIEW	25.11.16	16	100% IFT	22.03.19
01	ISSUE FOR SSD 7944	25.10.16	15	95% IFT (RE-ISSUED FOR COORDINATION)	15.03.19
Rev.	Item	Revision Description	Date	Rev.	Item

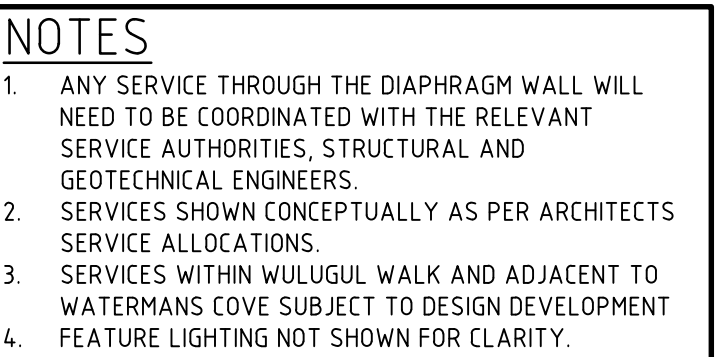
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Collaborating Architects	Lend Lease Graham W Jones Principal Architect FRAIA NSW ARB 4005 ABN 67 000 098 162	Developer	Lend Lease	Project Management & Construction	Lend Lease
Consultant	30 The Bond 30 Hickson Road Millers Point NSW 2000 www.lendlease.com	Design	Lend Lease		



Drawn By	MDH	Designed	MV	Checked	TM	Approves By	Date
Scale	1:250						0CT16
Project No.	161804	Site No.	B1B	Drawing No.	CD2100002	Revision	16

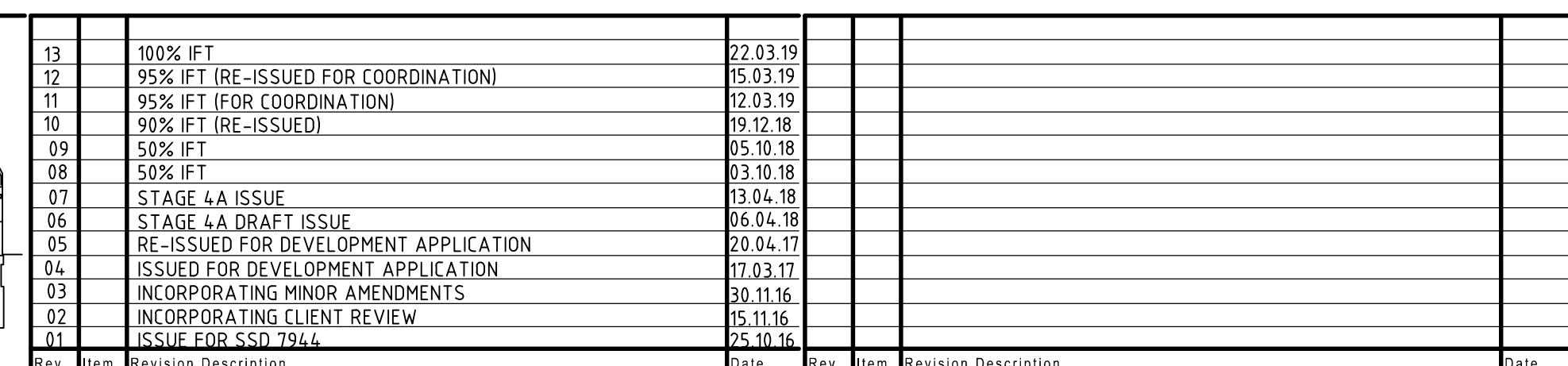
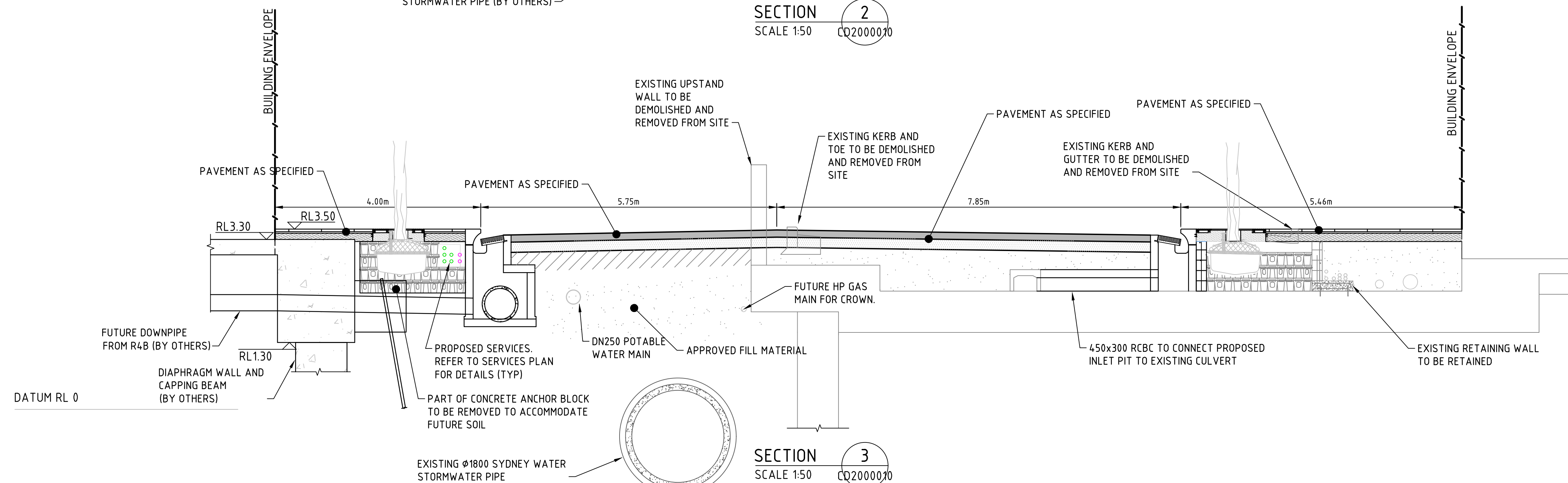


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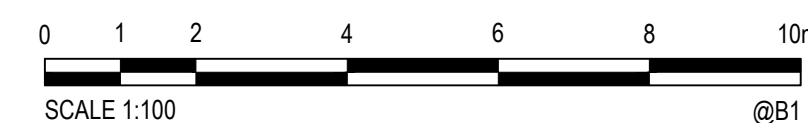
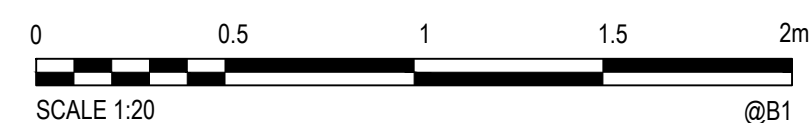
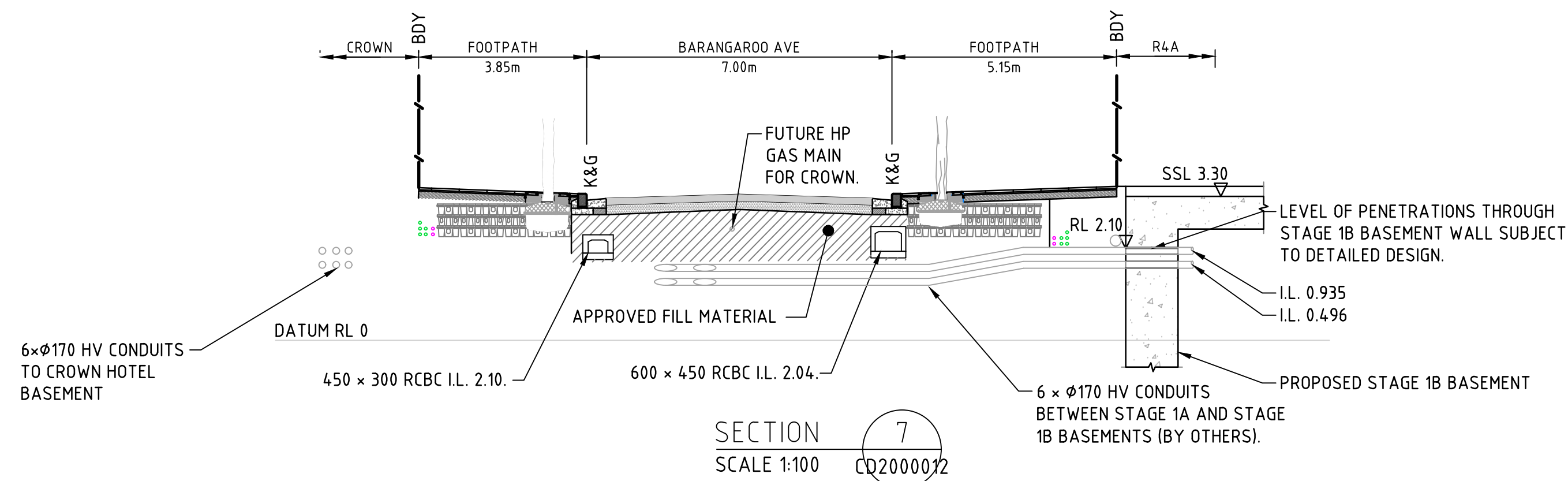
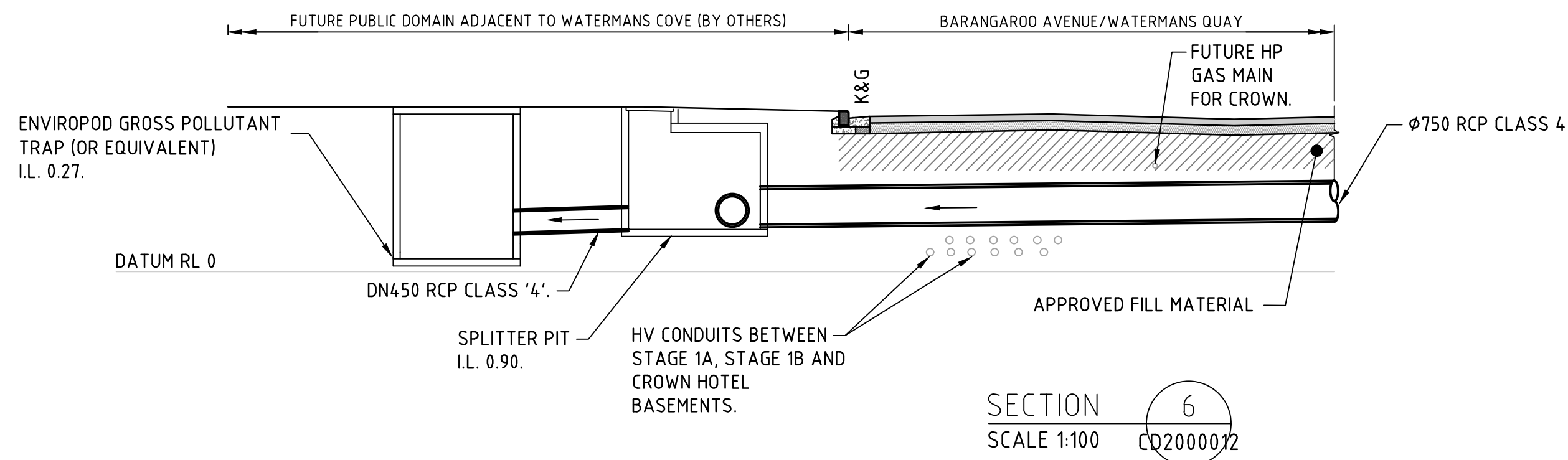
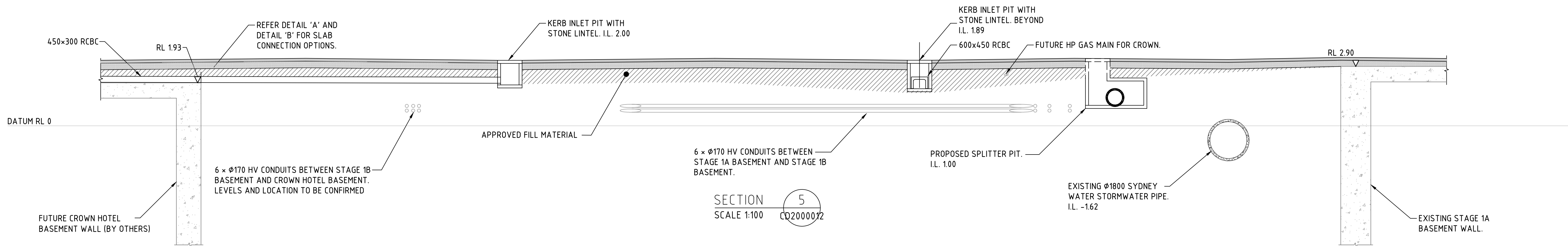
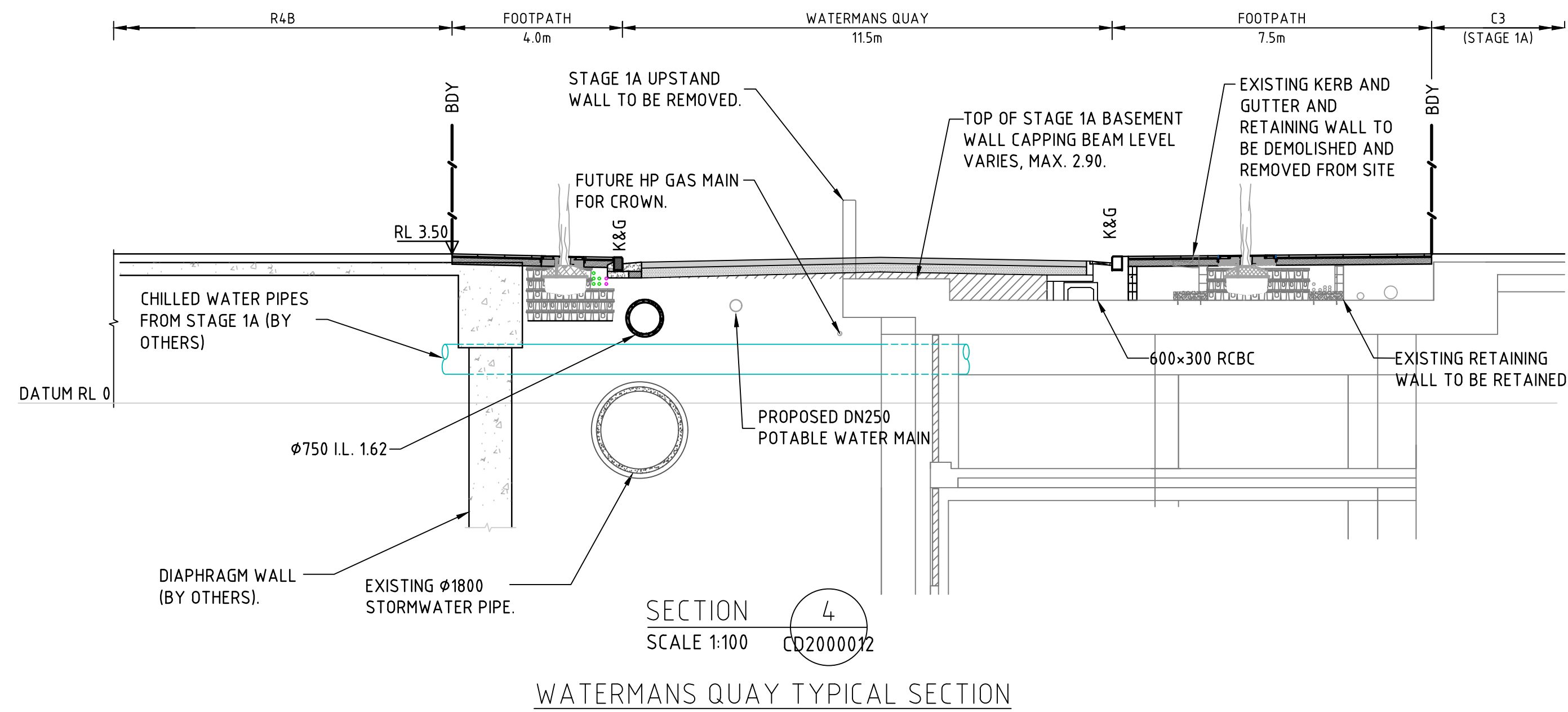
STAGE 1B - PUBLIC DOMAIN WORKS			
SERVICE COORDINATION PLAN			
SHEET 3			
Drawn By	Designed	Checked	Approved By
MDH	MV	TM	
Scale			Date
1:250			OCT'16
Project No.	Site No.	Drawing No.	Revision
161804	B1B	CD2100003	16



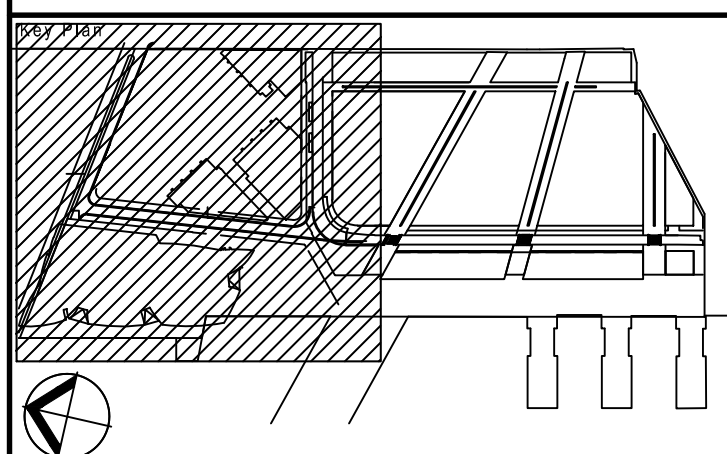
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Lead Architects  RSHP Australia Pty Ltd Ivan Harbord Principal Architect RAIA NSW ARB 8484 Sydney NSW 2000		Principal  lenlease	Project  BARANGAROO SOUTH	NOT TO BE USED FOR CONSTRUCTION OR SALE STAGE 1B - PUBLIC DOMAIN WORKS TYPICAL CROSS SECTIONS SHEET 1	
Collaborating Architects Lend Lease Graham W Jones Principal Architect RAIA NSW ARB 4005 ABN 97 000 098 162		Developer Project Management & Construction Design	Lend Lease Lend Lease Lend Lease		
Consultant 30 The Bond 30 Hickson Road Mirre Point NSW 2000 www.lenlease.com		Drawn By MDH		Unsigned MV	Checked TM
		Approved By 		Date OCT'16	
		Scale AS SHOWN		Project No. 161804	
		B/S No. B1B		Drawing No. CD25000001	Revision 13



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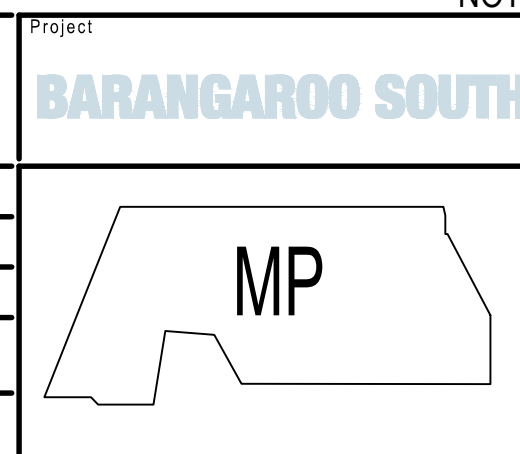
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14	100% IFT		22.03.19				
13	95% IFT (RE-ISSUED FOR COORDINATION)		15.03.19				
12	95% IFT (FOR COORDINATION)		12.03.19				
11	90% IFT (RE-ISSUED)		19.12.18				
10	90% IFT		03.12.18				
09	50% IFT		05.10.18				
08	50% IFT		03.10.18				
07	STAGE 4A ISSUE		19.04.18				
06	STAGE 4A DRAFT ISSUE		06.04.18				
05	RE-ISSUED FOR DEVELOPMENT APPLICATION		20.04.17				
04	ISSUED FOR DEVELOPMENT APPLICATION		17.03.17				
03	INCORPORATING MINOR AMENDMENTS		30.11.16				
02	INCORPORATING CLIENT REVIEW		15.11.16				
01	ISSUE FOR SSD 1914		25.10.16				

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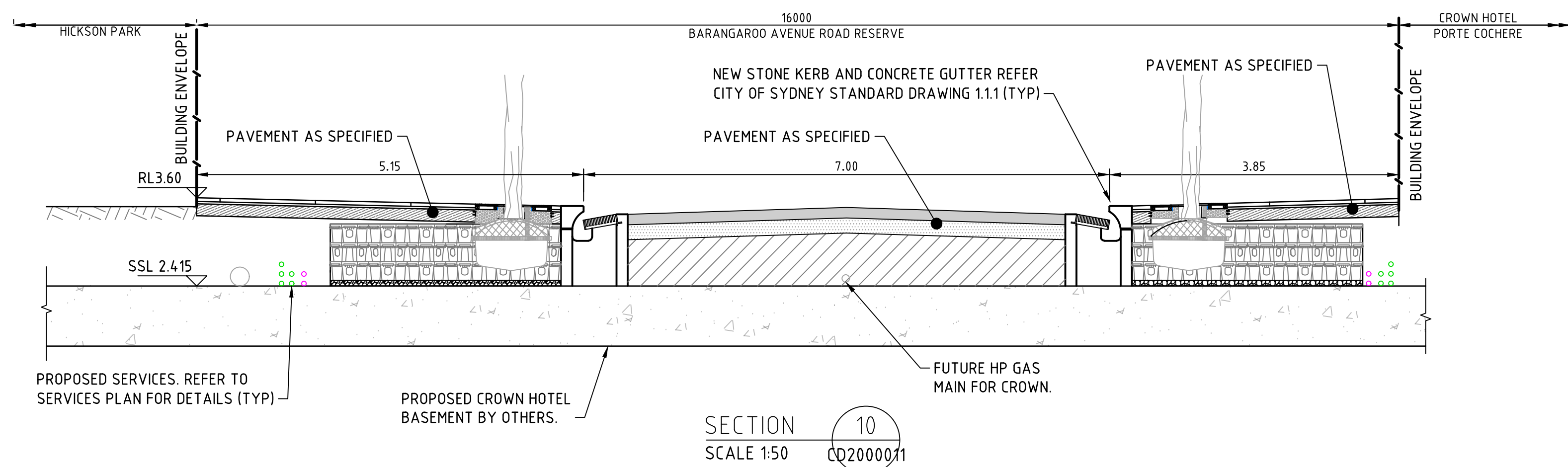
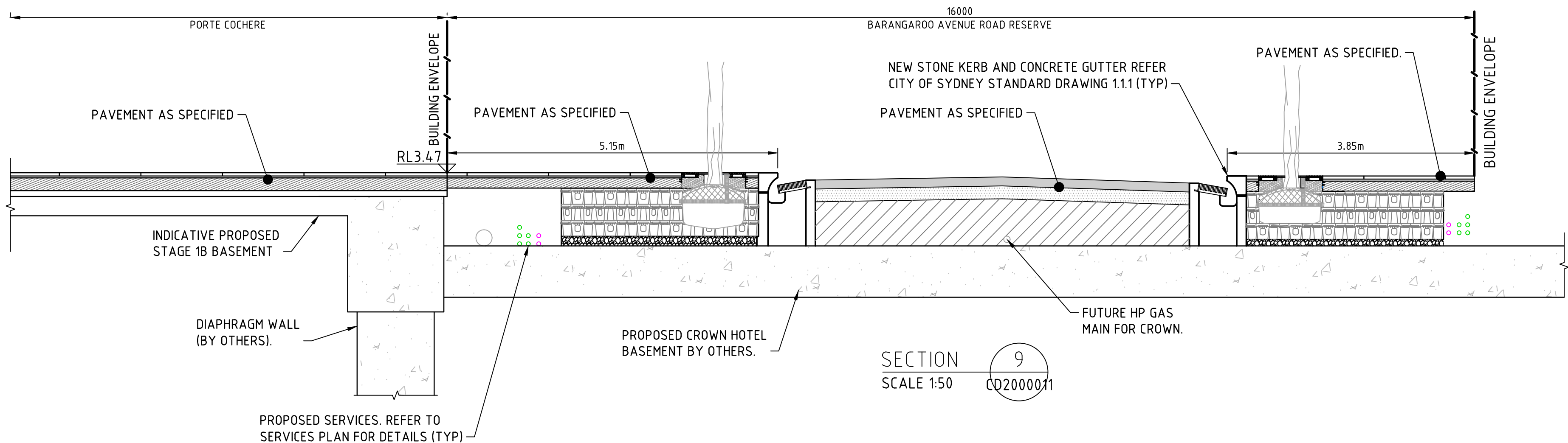
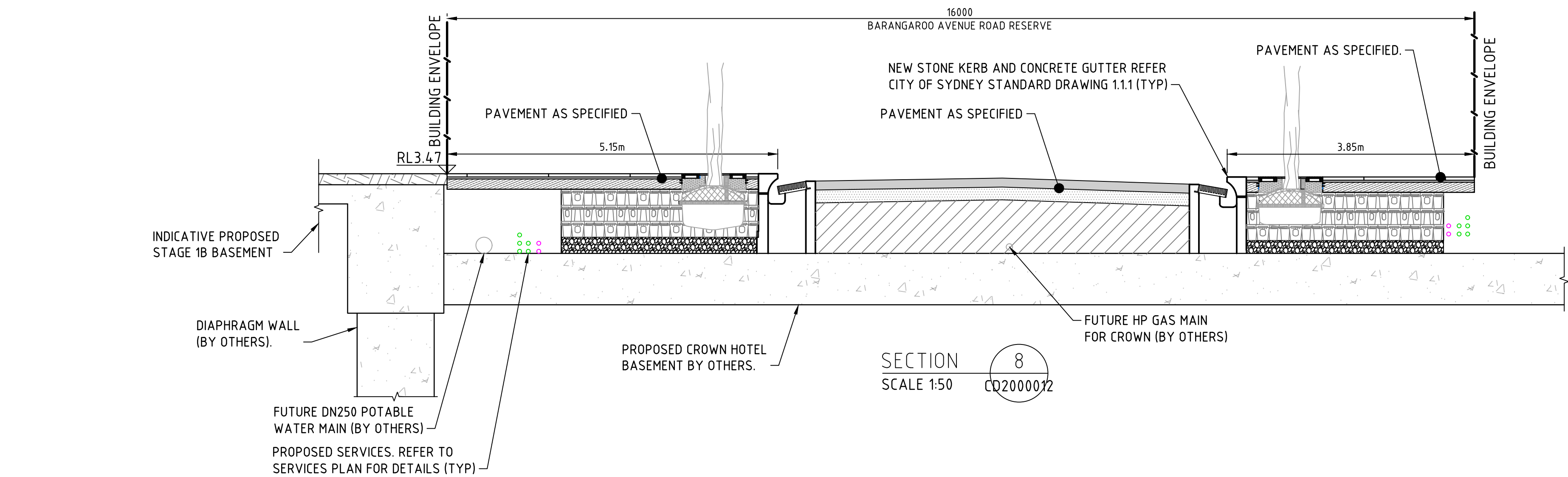


Lead Architects	RSHP Australia Pty Ltd RSH Australia Pty Ltd Principal Architect RSH Australia Pty Ltd Sydney NSW 2000
Collaborating Architects	Lend Lease Graham W Jones Principal Architect FRAJA NSW ARB 4005 ABN 97 000 088 162
Consultant	

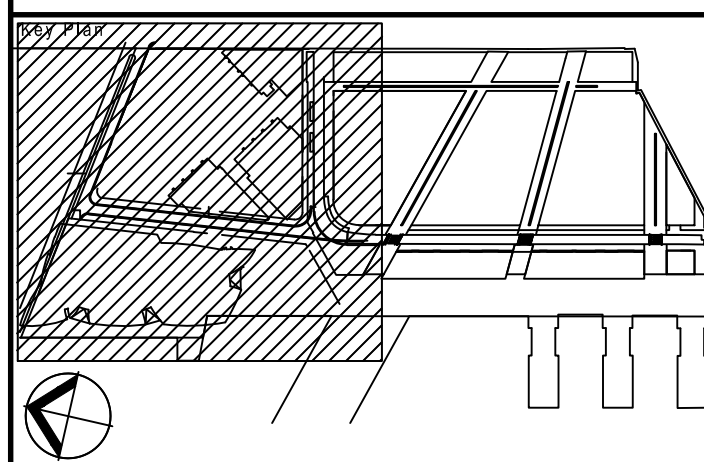
Principal	Lend Lease
Developer	Lend Lease
Project Management & Construction	Lend Lease
Design	Lend Lease
30 The Bond 30 Hickson Road Millers Point NSW 2000	www.lendlease.com



STAGE 1B - PUBLIC DOMAIN WORKS TYPICAL CROSS SECTIONS SHEET 2				
Drawn By	Designed	Checked	Approved By	Date
MDH	MV	TM		DCT'16
Scale	AS SHOWN			
Project No.	Site No.	Drawing No.	Revision	
161804	B1B	CD2500002	14	



BARANGAROO AVENUE TYPICAL SECTIONS



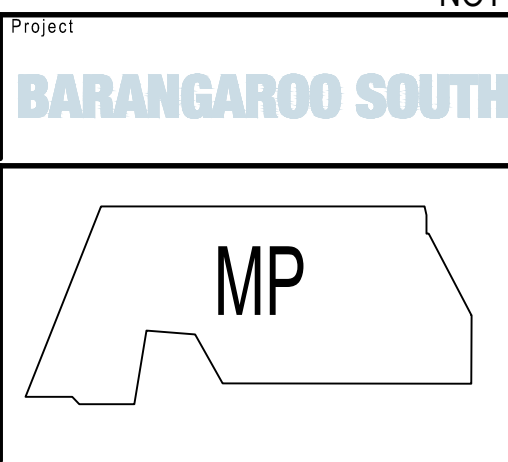
Rev.	Item	Revision Description	Date	Rev.	Item	Revision Description	Date
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13		95% IFT (RE-ISSUED FOR COORDINATION)	15.03.19				
12		95% IFT (FOR COORDINATION)	12.03.19				
11		90% IFT (RE-ISSUED)	19.12.18				
10		90% IFT	03.12.18				
09		50% IFT	05.10.18				
08		50% IFT	03.10.18				
07		STAGE 4A ISSUE	13.04.18				
06		STAGE 4A DRAFT ISSUE	06.04.18				
05		RE-ISSUED FOR DEVELOPMENT APPLICATION	20.04.17				
04		ISSUED FOR DEVELOPMENT APPLICATION	17.03.17				
03		INCORPORATING MINOR AMENDMENTS	30.11.16				
02		INCORPORATING CLIENT REVIEW	15.11.16				
01		ISSUE FOR SSD 7944	25.10.16				

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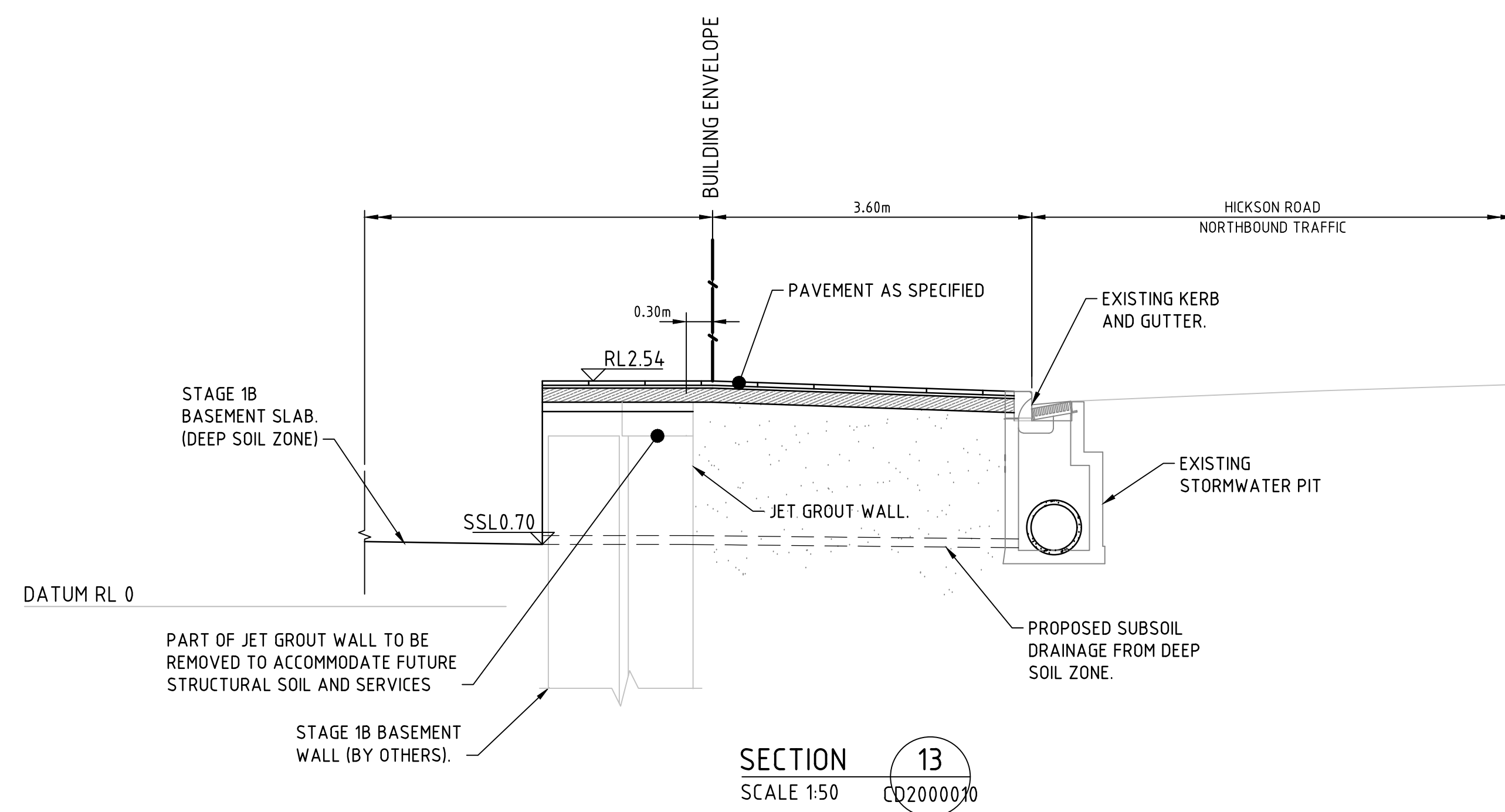
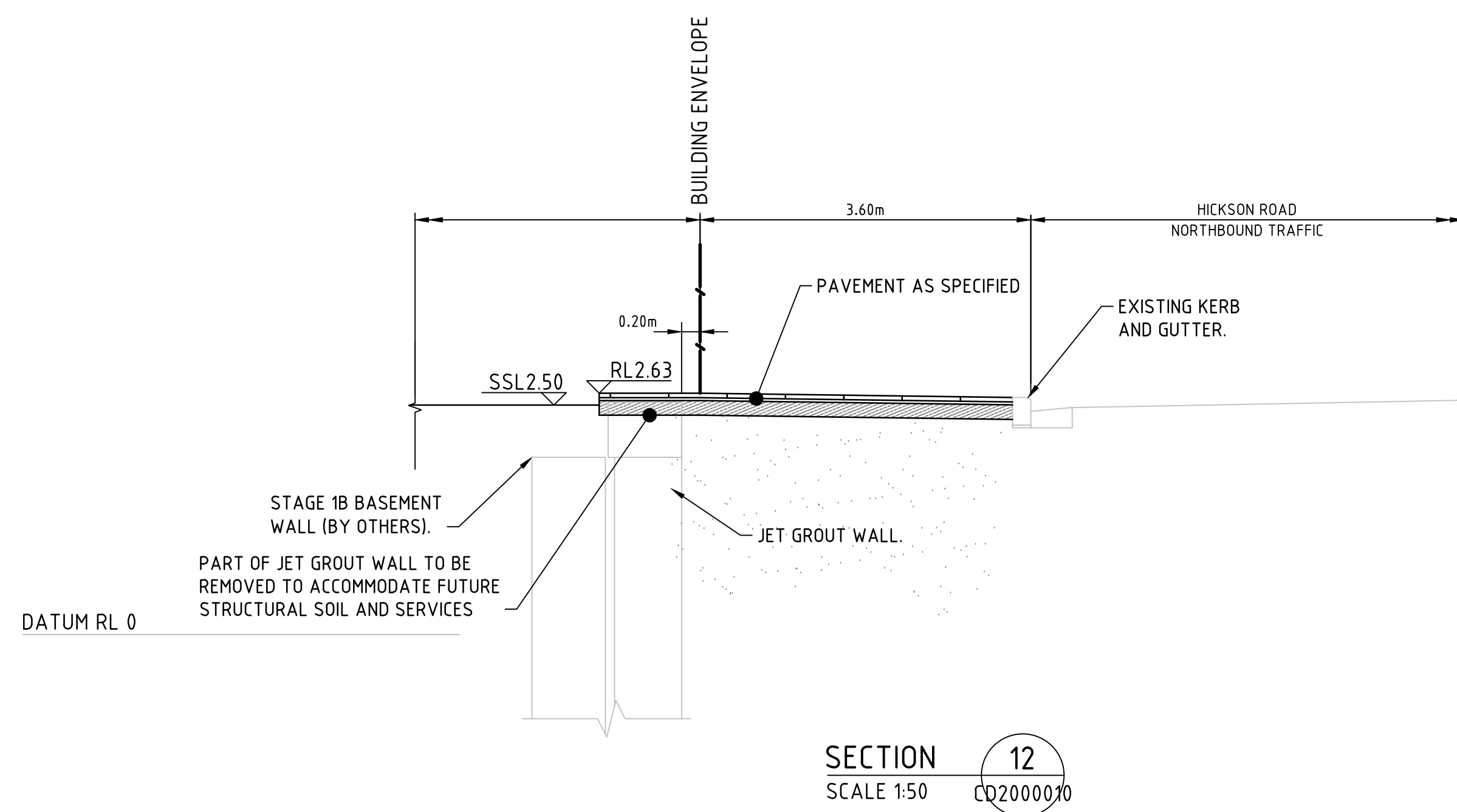
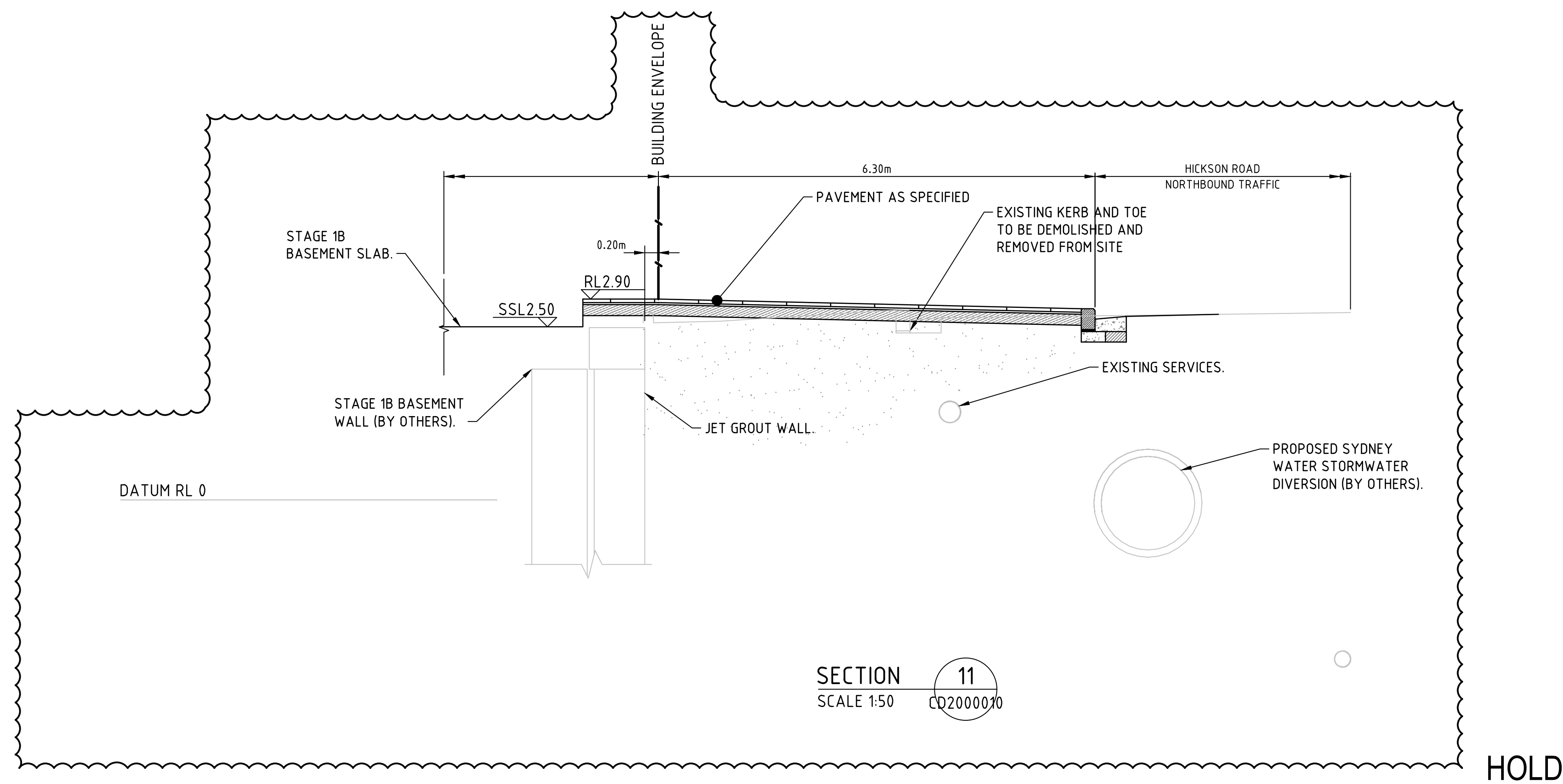
Lead Architects	RSHP Australia Pty Ltd Ivan Harwood Principal Architect RAIA NSW ARB 9484 Sydney NSW 2000
Collaborating Architects	Lend Lease Graham W Jones Principal Architect FRAIA NSW ARB 4005 ABN 87 000 098 162
Consultant	

Principal	Lend Lease
Developer	Lend Lease
Project Management & Construction	Lend Lease
Design	Lend Lease
30 The Bond 30 Hickson Road Millers Point NSW 2000	www.lendlease.com

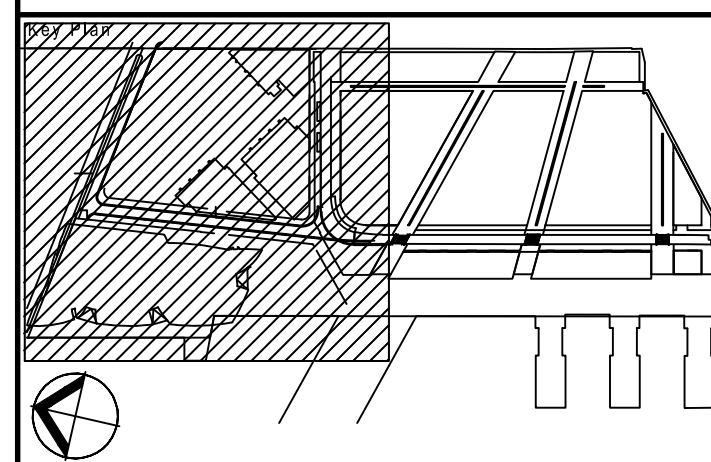


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Project No.	161804	Site No.	B1B	Drawing No.	CD2500003	Revision	14
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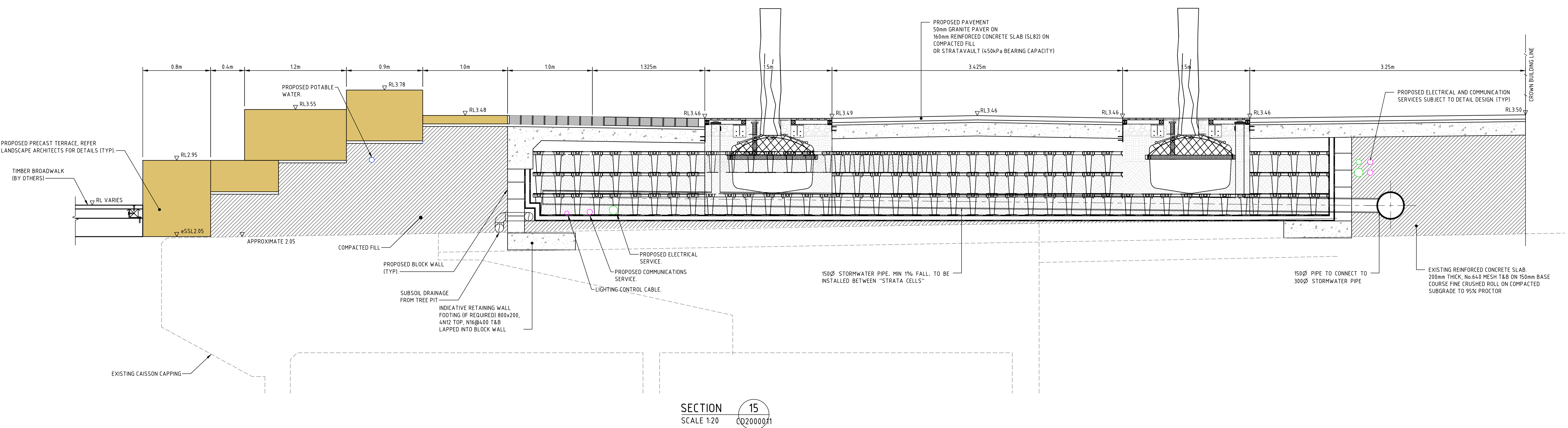
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Lead Architects  RSHP Australia Pty Ltd Ivan Hatherly Principal Architect RAIA NSW ARB 0454	Principal  lendlease	Project  BARANGAROO SOUTH	Title STAGE 1B - PUBLIC DOMAIN WORKS TYPICAL CROSS SECTIONS SHEET 4
Collaborating Architects Lend Lease Graham W Jones Principal Architect FRAIA NSW ARB 4005 ABN 97 000 086 162	Developer Project Management & Construction Design Lend Lease		Drawn By MV Designed MV Checked TM Approved By Date AUG 16 Scale AS SHOWN
Consultant	30 The Bond 30 Hickson Road Milsons Point NSW 2060 www.lendlease.com		Project No. 161804 Site No. B1B Drawing No. CD2500004 Revision 06



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SCALE 1:50 @B1

STAGE 1B - PUBLIC DOMAIN WORKS
TYPICAL CROSS SECTIONS
SHEET 5

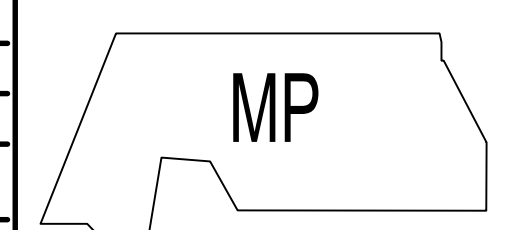
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RT	RT	TM		DEC'12
Scale				
AS SHOWN				
Project No.		Site No.		Revision
161804		B1B CD2500005		04

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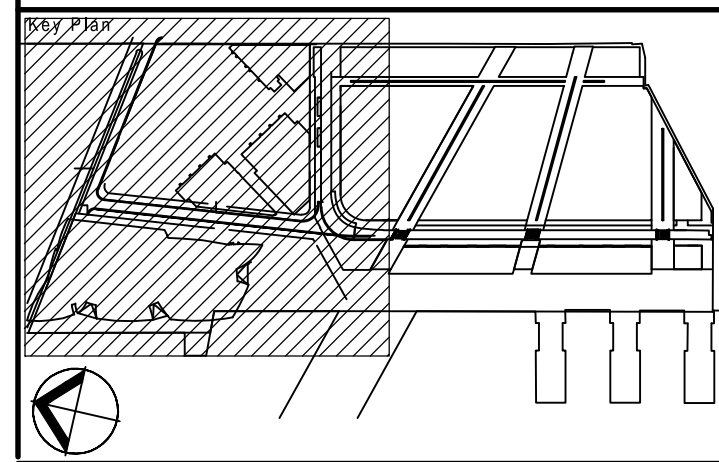
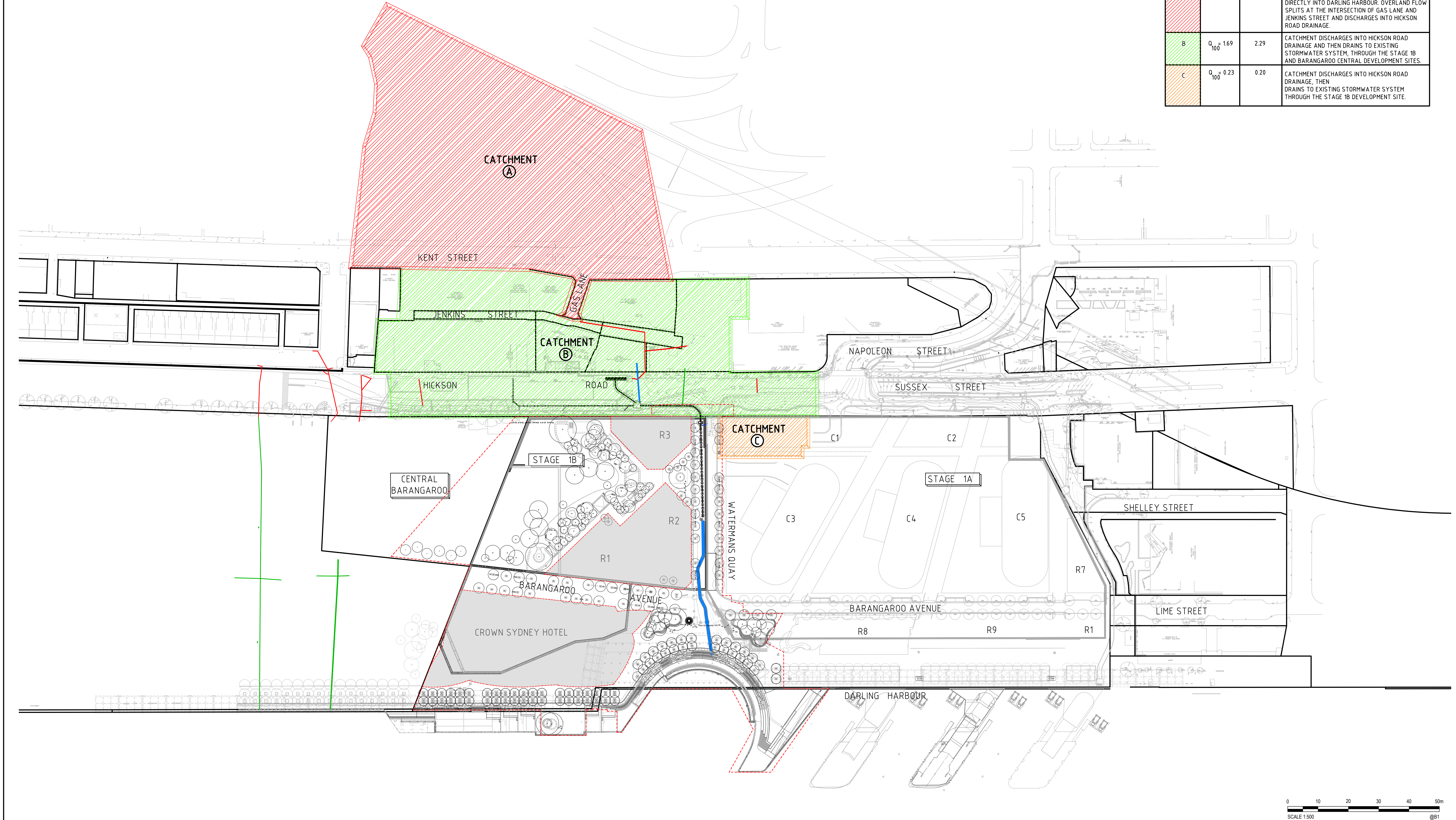
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Lead Architects	RSHP Australia Pty Ltd Ivan Harbour Principal Architect RAIA NSW ARB 8484 Sydney NSW 2000	Principal 
Collaborating Architects	Lend Lease Graham W. Jones Principal Architect FRAIA NSW ARB 4505 ABN 97 00 098 162	Developer Project Management & Construction Design www.lendlease.com.au
Consultant	30 The Bond 30 Hickson Road Sydney NSW 2000	



STORMWATER EXTERNAL DRAINAGE SUMMARY STAGE 1B

CATCHMENT No.	FLOW (100yr ARI) (m ³ /s)	AREA (Ha)	DESCRIPTION
A	$Q_{100} = 2.35$	2.83	CATCHMENT DISCHARGES INTO GAS LANE THROUGH A Ø600 PIPE, THEN INTO AN EXISTING Ø1200 PIPE THROUGH THE STAGE 1B DEVELOPMENT SITE DIRECTLY INTO DARLING HARBOUR. OVERLAND FLOW SPLITS AT THE INTERSECTION OF GAS LANE AND JENKINS STREET AND DISCHARGES INTO HICKSON ROAD DRAINAGE.
B	$Q_{100} = 1.69$	2.29	CATCHMENT DISCHARGES INTO HICKSON ROAD DRAINAGE AND THEN DRAINS TO EXISTING STORMWATER SYSTEM, THROUGH THE STAGE 1B AND BARANGAROO CENTRAL DEVELOPMENT SITES.
C	$Q_{100} = 0.23$	0.20	CATCHMENT DISCHARGES INTO HICKSON ROAD DRAINAGE, THEN DRAINS TO EXISTING STORMWATER SYSTEM THROUGH THE STAGE 1B DEVELOPMENT SITE.



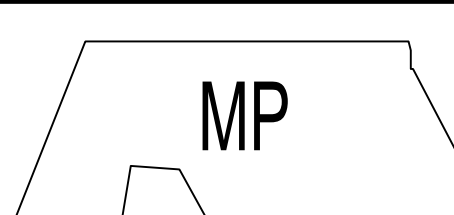
Rev.	Item	Revision Description	Date	Rev.	Item	Revision Description	Date
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11		95% IFT (RE-ISSUED FOR COORDINATION)	15.03.19				
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05		STAGE 4A DRAFT ISSUE	06.04.18				
04		ISSUED FOR DEVELOPMENT APPLICATION	17.03.17				
03		INCORPORATING MINOR AMENDMENTS	20.11.16				
02		INCORPORATING CLIENT REVIEW	15.11.16				
01		ISSUE FOR SSD T944	25.10.16				

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Lead Architects		Principal		Project	
RSHP RSHP Australia Pty Ltd Ruan Harbour Principal Architect RAIA NSW ARB 4004 Sydney NSW 2000				BARANGAROO SOUTH	
Collaborating Architects		Developer			
Lend Lease		Lend Lease			
Graham W Jones Principal Architect FRAIA NSW ARB 4005 ABN 97 000 098 162		Project Management & Construction			
Consultant		Design		Scale 1:500	
		30 The Bond 30 Hickson Road Millers Point NSW 2000 www.lendlease.com		Project No. 161804 Site No. B1B Drawing No. CD2900002 Revision 12	