

Appendix V

Stage 1 Civil Report



Stage 1 Civil SSSDA Report

Powerhouse Ultimo Renewal

06 May 2022 Rev D

212058 CFAA

Document History

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Abbreviations

| Abbreviation | Meaning |
|-------------------------|---|
| AEP | Annual Exceedance Probability (1% = 1 in 100) |
| AS/NZS | Australian/New Zealand Standards |
| ANZECC | Australian and New Zealand Environment and Conservation Council guidelines |
| Council | City of Sydney Council |
| DP | Deposited Plan |
| EIS | Environmental Impact Statement |
| ESD | Ecologically Sustainable Development |
| FFL | Finished Floor Level |
| FPL | Flood Planning Level |
| LGA | City of Sydney Local Government Area |
| m | metre |
| mm | millimetre |
| MUSIC | Model for Urban Stormwater Improvement Conceptualisation |
| NABERS | National Australian Built Environment Rating System |
| NARCIIM | NSW and ACT Regional Climate Modelling project. |
| OEH | NSW Office of Environment and Heritage |
| OSD | On-Site Detention |
| PMF | Probable Maximum Flood |
| RL | Reduced Level |
| SEARs | Secretary's Environmental Assessment Requirements |
| sqm | Square Metres |
| SSD | State Significant Development |
| SSDA | State Significant Development Application |
| TNSW | Transport for New South Wales |
| WELS | Water Efficiency Labelling and Standards |
| WSUD | Water Sensitive Urban Design |
| Reference Scheme | Test fit as one potential option for what may be developed within the proposed building envelope. The detailed design of any building/s and public domain areas will be confirmed at Stage 2. This assessment addresses the reference scheme to demonstrate that the project is capable of compliance |

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1.0 Introduction

1.1 Introduction

This report has been prepared on behalf of the Department of Enterprise, Investment and Trade (Create NSW) to support a State Significant Development (SSD) Development Application (DA) for alterations and additions to Powerhouse Ultimo at 500 Harris Street, Ultimo.

The Powerhouse Ultimo Renewal is a transformative \$480-\$500 million investment by the NSW Government to establish a world-class museum that will significantly contribute to an important and developing part of Sydney. The renewal will see Powerhouse Ultimo deliver a programming focus on design and fashion, presenting exhibitions that showcase the Powerhouse Collection, international exclusive exhibitions and programs that support the design and fashion industries.

1.2 Process

The Powerhouse Ultimo Renewal project is for the purposes of an 'information and education facility' with a capital investment value of more than \$30 million, and such is classified as State Significant Development (SSD) pursuant to Section 13(1) of Schedule 1 of *State Environmental Planning Policy (Planning Systems) 2021*.

The delivery of the new Creative Industries Precinct for Powerhouse Ultimo will occur in stages, comprising the following:

- **Stage 1** – Concept DA establishing the planning, design, and assessment framework for the Powerhouse Ultimo Renewal Project including the indicative land uses, maximum building envelopes, general parameters for the future layout of the site, and strategies to guide the subsequent detailed design phases of the project including Urban Design Guidelines and Design Excellence Strategy.
- **Architectural Design Competition** – A competitive design process to critically analyse and provide design alternatives for the Powerhouse Ultimo Renewal project in accordance with the planning and development framework established for the site under the Concept DA. A winning design will be selected by a jury of experts and will inform the subsequent detailed design and assessment phase (Stage 2) of the project.
- **Stage 2** – A Detailed DA confirming the ultimate architectural design and operation of Powerhouse Ultimo and assessing any associated planning and environmental impacts. This Detailed DA will seek consent for the detailed design, construction and operation of the proposed development and follows the same planning assessment and determination process as the Concept DA (Stage 1).

1.3 SEARs

The Department of Planning and Environment (DPE) has issued Secretary's Environmental Assessment Requirements (SEARs) to the applicant for the preparation of an Environmental Impact Statement (EIS) for the proposed development. This report has been prepared by TTW to specifically address the civil items shown in Table 1:

Table 1 – SEARs (SSD-32927319)

| SEARs | Report Reference |
|--|--|
| <p>SEARs 14. Ground and Water Conditions</p> <ul style="list-style-type: none"> Where applicable, provide an assessment of the potential operational and construction impacts on soil resources, including related infrastructure and riparian lands on and near the site. Where applicable, provide an assessment of the potential operational and construction impacts on surface and groundwater resources (quality and quantity), including related infrastructure, hydrology, aquatic and groundwater dependent ecosystems, drainage lines, downstream assets, and watercourses. Where applicable, provide an assessment of salinity and acid sulfate soil impacts. | <p>Refer to section 4.3 and 4.4 for construction and operational impacts on surface water (quality and quantity). Refer to section 2.2, 4.2 and 4.3 for impacts on Drainage lines, downstream assets, and watercourses.</p> <p>Refer to Douglas Partners; Report on Preliminary Site Investigation (Contamination), and Report on Geotechnical Investigation, April 2022, for assessment of groundwater and soil conditions.</p> |
| <p>SEARs 15. Stormwater and Wastewater</p> <ul style="list-style-type: none"> Where applicable, provide an Integrated Water Management Plan for the development that: <ul style="list-style-type: none"> is prepared in consultation with council and any other relevant drainage or water authority. details the proposed drainage design for the site including any on-site treatment, reuse and detention facilities, water quality management measures, and the nominated discharge points. demonstrates compliance with council or other drainage or water authority requirements and avoids adverse impacts on any downstream properties, including during construction. Provide a stormwater concept plan prepared in consultation with, and compliant with the relevant standards of, the local council or other drainage or water authority. | <p>Refer to section 4.0 for the Integrated Water Management Plan and stormwater.</p> <p>Refer to Section 4.3 for MUSIC assessment and WSUD measures.</p> <p>Refer to section 4.4 for runoff erosion and sediment control during construction.</p> <p>Refer to section 4.2 for the proposed stormwater concept plan.</p> |
| <p>SEARs 16. Flooding Risk</p> <ul style="list-style-type: none"> Identify any flood risk on-site having regard to adopted flood studies, the potential effects of climate change, and any relevant provisions of the NSW Floodplain Development Manual and City of Sydney Interim Floodplain Management Policy. Where applicable, assess the impacts of the development, including any changes to flood risk on-site or off-site, and detail design solutions and operational procedures to mitigate flood risk where required. | <p>Refer to section 5.0 for flooding assessment.</p> <p>Refer to Section 5.4 for the impact on flooding due to climate change.</p> |
| <p>SEARs 23. Infrastructure Requirements and Utilities</p> <ul style="list-style-type: none"> In consultation with relevant service providers: Assess the impacts of the development on existing utility infrastructure and service provider assets surrounding the site, including the Inner West Light Rail. Assess the impact on and detail any measures to protect Sydney Water stormwater assets which traverse the site. Identify any infrastructure upgrades, including for the Inner West Light Rail, required on-site and off-site to facilitate the development and any arrangements to ensure that the upgrades will be implemented on time and be maintained. Provide an infrastructure delivery and staging plan, including a description of how infrastructure requirements would be co-ordinated, funded and delivered to facilitate the development. | <p>Refer to section 2.2 for existing Utilities and impact on Sydney Water Assets</p> <p>Refer to Steensen Varming; Site Infrastructure Management Strategy Stage 1 SSDA Report for assessment of other infrastructure and utilities.</p> |

1.4 Site Description

Powerhouse Ultimo is situated upon the lands of the Gadigal people of the Eora Nation. It is located within the City of Sydney Local Government Area and its primary address is 500 Harris Street, Ultimo.

The site contains two heritage-listed buildings, being the 'Ultimo Power House' (c.1899-1905) and the 'Former Ultimo Post Office including interior' (c.1901), both of which are listed on the State Heritage Register under the *Heritage Act 1997*.

Other buildings within the site include the former tram shed (Harwood Building) and the 1988 museum building fronting Harris Street (Wran Building). A café building has been constructed immediately to the south of the Power House at the northern end of the Ultimo Goods Line. Located at the corner of Harris Street and Macarthur Street is a forecourt that acts as the main public entrance to the site, but provides limited activation and is disconnected from higher-quality urban spaces including the Ultimo Goods Line.

The primary focus of the Powerhouse Ultimo Renewal project is the museum to the north of Macarthur Street and bounded by Harris Street, Pier Street and the light rail corridor. However, some enabling and minor decoupling works will occur within the broader Powerhouse Ultimo precinct. Table 2 shows a description of the site and related lots.

No substantive works or changes in use are proposed to the Harwood Building located between Macarthur Street and Mary Ann Street.

Table 2 – Site Description

| Lot/DP | Description | Owner |
|-----------------|--|---|
| Lot 1 DP 631345 | Ultimo Power House, Harris Street forecourt, café and southern carpark | The Trustees of the Museum of Applied Arts and Sciences |
| Lot 1 DP 781732 | Wran Building | The Trustees of the Museum of Applied Arts and Sciences |
| Lot 3 DP 631345 | Harris Street forecourt | The Trustees of the Museum of Applied Arts and Sciences |
| Lot 37 DP 82234 | Harris Street forecourt | The Trustees of the Museum of Applied Arts and Sciences |
| Lot 1 DP 770031 | Former Ultimo Post Office | The Trustees of the Museum of Applied Arts and Sciences |
| Lot 3 DP 216854 | Harwood Building | The Trustees of the Museum of Applied Arts and Sciences |

1.5 Site and Surrounding Context

Powerhouse Ultimo is situated upon the lands of the Gadigal people of the Eora Nation. The site is located at the interface between the suburbs of Ultimo, Pyrmont, Haymarket and Darling Harbour. This is reflected in its strategic positioning in relation to the local pedestrian, active transport, public transport, and road network. The site is located at the northern terminus of the Ultimo Goods Line from Central Station and close to the southern end of Tumbalong Boulevard.

Macarthur Street serves as a pedestrian-friendly east-west connection between Ultimo and the southern CBD. The Paddy's Markets and Exhibition Centre Light Rail Stations are both located in close proximity to the site, and bus stops at Harris Street provide access to Central as well as centres including Ryde and Parramatta via Victoria Road.

The urban context of the site is characterised by a wide array of land uses, development typologies and architectural styles. There is no consistent street wall height along Harris Street or intersecting local streets, with 2-storey historic terraces sitting in close proximity to more modern 6-8 storey commercial and mixed-use buildings. The recent urban renewal of Darling Square provides a rapid transition in density and building heights immediately to the east of the site, with a range of 20+ storey buildings within a modern setting. The Site location and surrounding area are shown in Figure 1.

The site is located in the vicinity of a number of locally listed heritage items identified under the Sydney LEP, including the Glasgow Arms Hotel, terrace-house groups along Harris St and Macarthur St, the former Millinery House building, the former National Cash Register building and the former Technological Museum/Sydney Technical College building in Harris Street.

The site contains two heritage-listed buildings, the 'Ultimo Powerhouse' (c.1899-1905) and the 'Former Ultimo Post Office including interior' (c.1901), both of which are listed on the State Heritage Register under the Heritage Act 1997. An existing Conservation Management Plan (Architectural Projects, 2003) is in place

The site is not identified as being located within a Heritage Conservation Area; however, it is adjacent to and in the vicinity of the Harris St Ultimo Conservation Area.

The surrounding context of the site is informed by a wide variety of land uses, building densities and architectural styles as summarised below in regard to the immediate surrounds:

- Harris St (William Henry St – Macarthur St) – Mix of 2-6 storey residential buildings, a pub/hotel and 3-8 storey commercial and educational buildings
- Harris St (Macarthur St – Mary Ann St) – 2-3 storey commercial and residential terraces, with taller 6-8 storey commercial and educational buildings towards the Mary Ann St intersection
- Systrum St – 2-storey historic terraces in the north, modern 3-8 storey residential apartments towards the south
- Darling Square – 20 storey student accommodation buildings directly to the east, beyond which is a dense urban precinct with a range of employment, residential, and tourism uses, with Darling Harbour further north
- Mary Ann St – University of Technology Buildings 8 (Gehry Building) and 15 with a range of educational uses
- Ultimo Goods Line – Completed in 2012, the 'Goods Line' is a unique linear space that provides connection and amenity by reinterpreting the former railway and tram corridor.

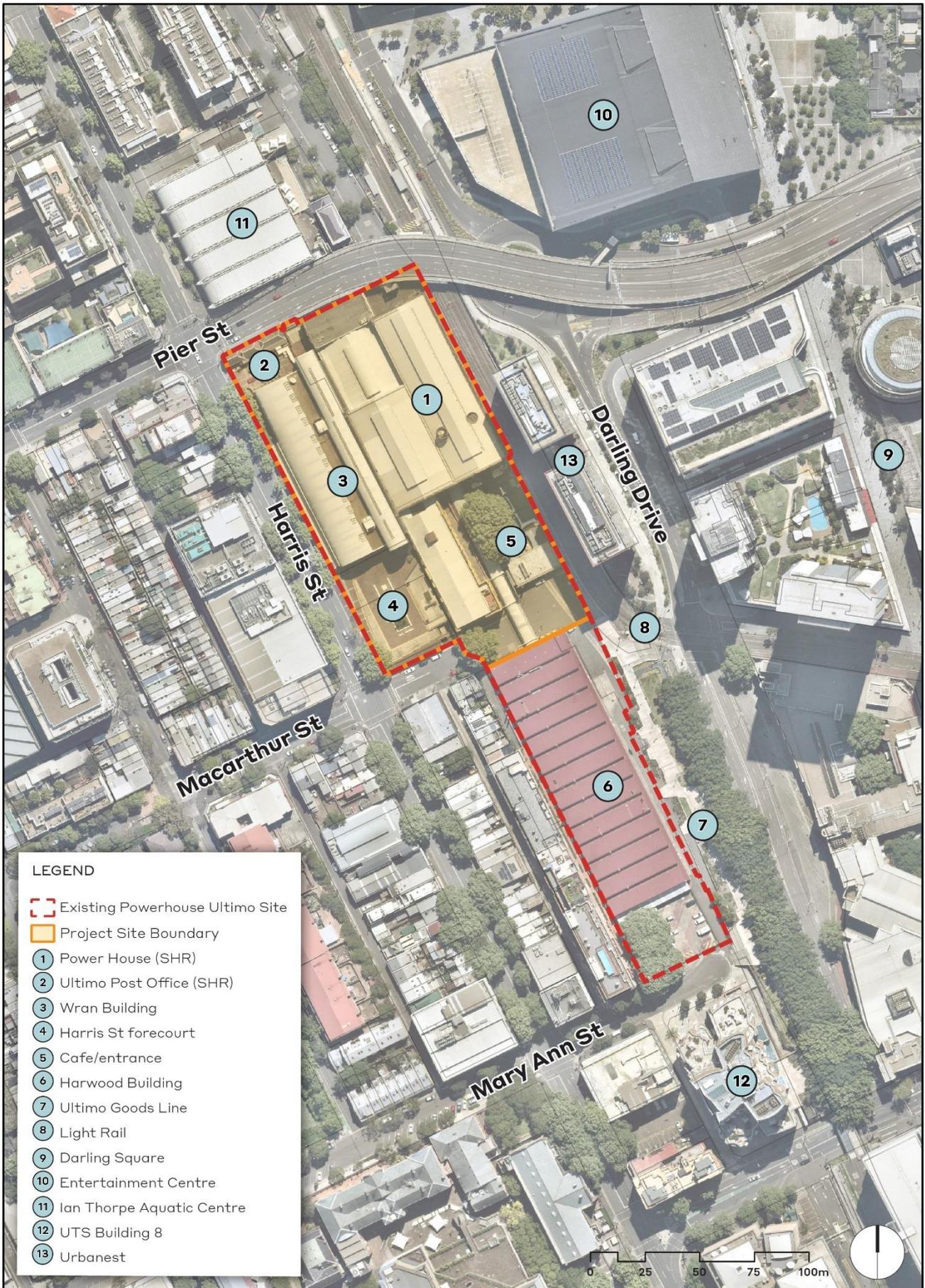


Figure 1 - Site Location and Surroundings

1.6 Overview of Proposed Development

This Concept DA sets the vision for the renewal of Powerhouse Ultimo and the creation of the Powerhouse Creative Industries Precinct, with the detailed design, construction, and operation of the project to be sought at a separate and future stage (Stage 2).

Concept approval is sought for the following:

- A maximum building envelope for any new buildings and alterations and additions to existing buildings retained on the site.
- Use of the new spaces and built form as an 'information and education facility' including exhibition, education, and back of house spaces, and a range of related and ancillary uses to contribute to the operation of Powerhouse Ultimo.
- Endorsement of Urban Design Guidelines and a Design Excellence Strategy to guide the detailed design of the future building, internal spaces, and public domain areas that will be the subject of a competitive design process and a separate and future DA (Stage 2).
- An updated Draft Conservation Management Plan to ensure that future development occurs in a manner that is compatible with, and facilitates the conservation of, the heritage values of the site.
- General functional parameters for the future design, construction, and operation of buildings and uses on the site including the principles and strategies for the management of transport and access, flooding, sustainability, heritage and the like.

2.0 Site Overview

2.1 Site Topography

The Site is located within the northern and lower area of Darling Harbour catchment; refer to Figure 2. The catchment is highly urbanised with a large network of stormwater infrastructure, which includes Council owned pit and pipe systems that discharge into Sydney Water owned trunk drainage. There are no open watercourses within the catchment, and the road networks and open spaces provide the primary overland flow paths following the natural topography of the land. Flows from the catchment discharge north to Darling Harbour. The natural topography of the surrounding area generally falls from the south and east to the north and west.



Figure 2 – Catchment Area Surface Level For Powerhouse Site And Surrounding Area

2.2 Existing Infrastructure

SEARs 23. Infrastructure Requirements and Utilities

In consultation with relevant service providers:

- *Assess the impacts of the development on existing utility infrastructure and service provider assets surrounding the site, including the Inner West Light Rail.*
- *Assess the impact on and detail any measures to protect Sydney Water stormwater assess which traverse the site.*
- *Identify any infrastructure upgrades, including for the Inner West Light Rail, required on-site and off-site to facilitate the development and any arrangements to ensure that the upgrades will be implemented on time and be maintained.*
- *Provide an infrastructure delivery and staging plan, including a description of how infrastructure requirements would be co-ordinated, funded and delivered to facilitate the development.*

Extensive services and existing utilities within the road reserve surrounding the site; figures 3, 4 and 5 show existing utility services around the site. Collation of existing survey and services information will be completed during the Design Competition Stage and Stage 2 DA. Impacts on the existing infrastructure and any augmentation/amendments will be assessed by the relevant service consultant, and it is expected that existing utilities and infrastructure will be used wherever possible, refer to *Site Infrastructure Management Strategy Stage 1 SSDA Report, by Steensen Varming*. The existing and proposed stormwater infrastructure has been assessed in Section 4.0.

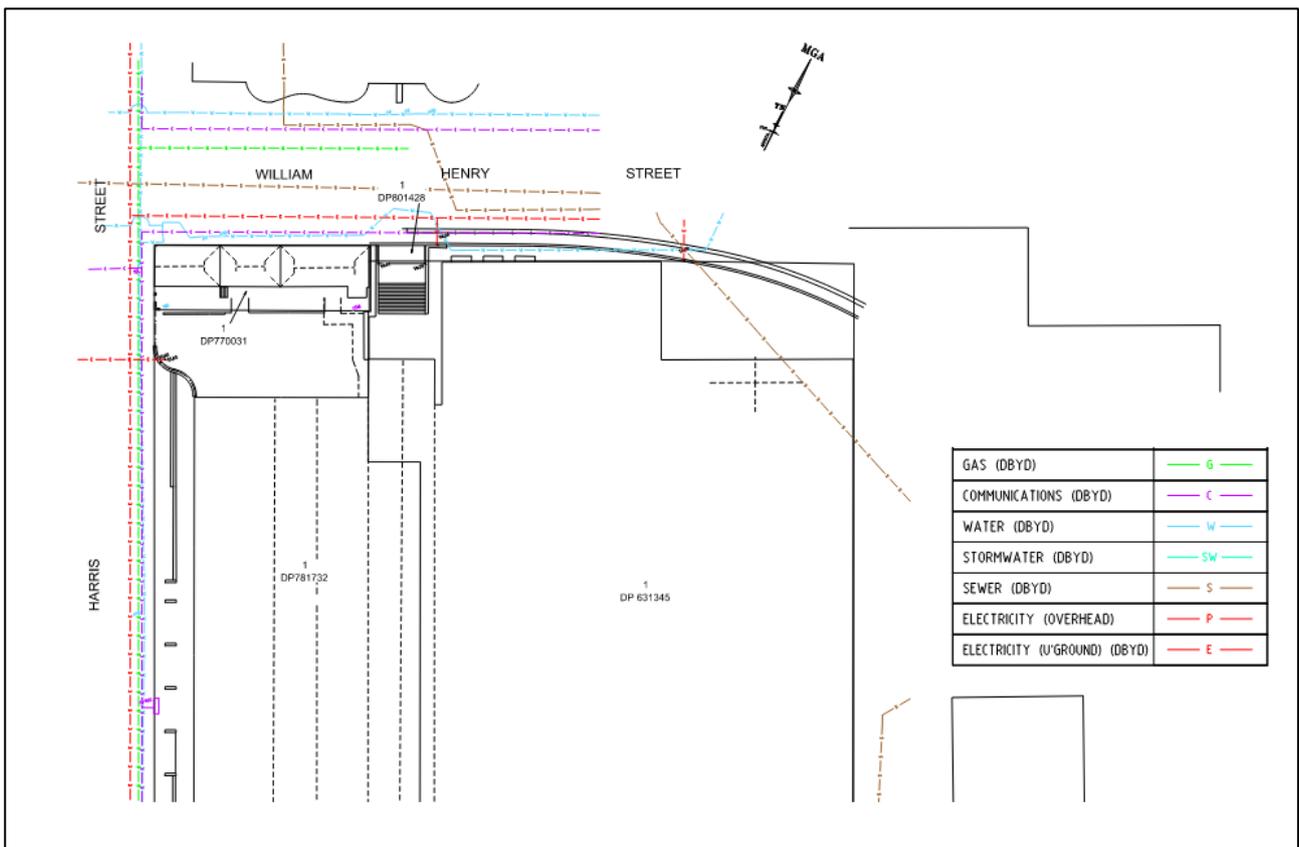


Figure 3 - Existing Services to the north of the site (William Henry Street)

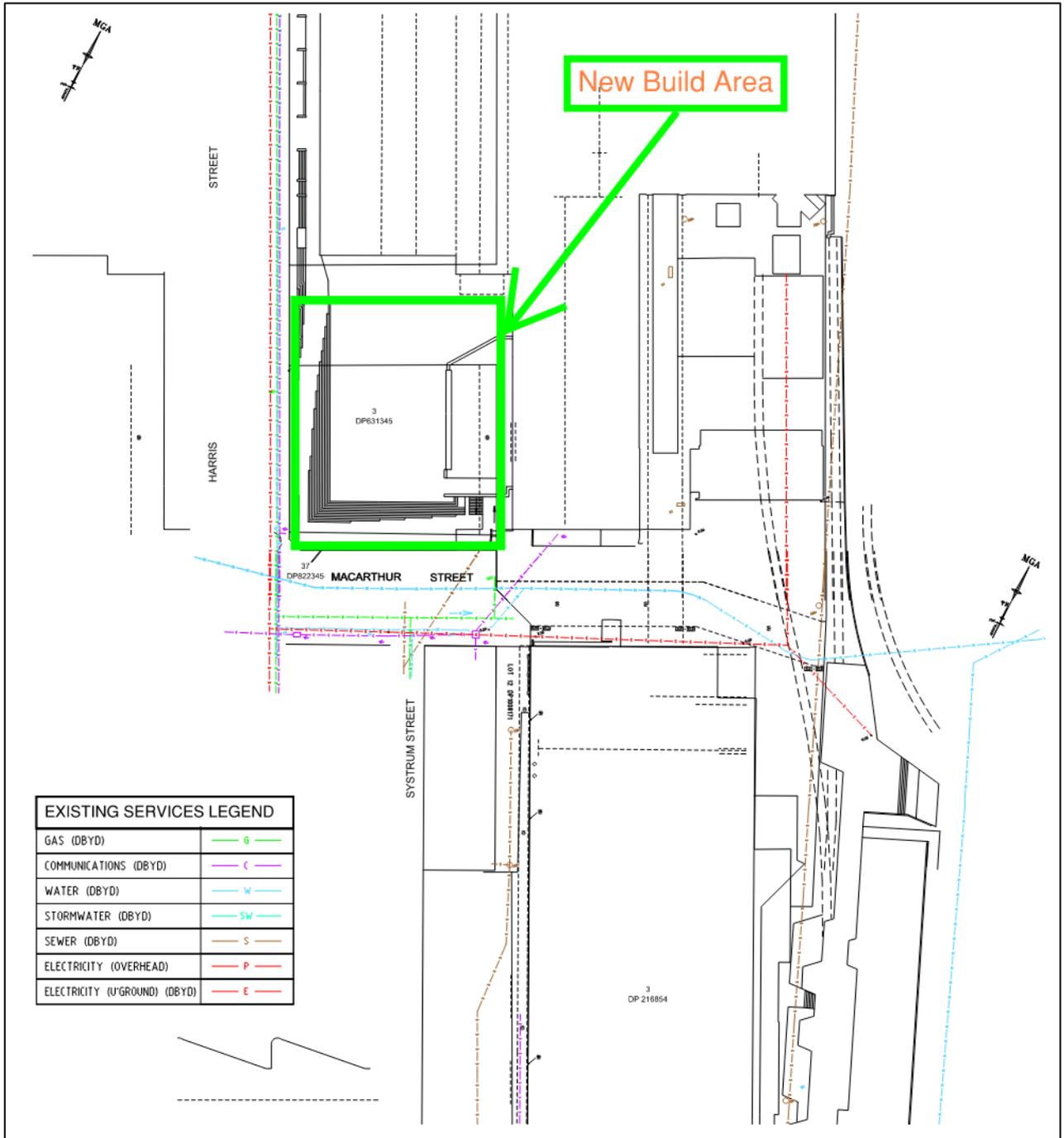


Figure 4 - Existing Services (MacArthur Street)

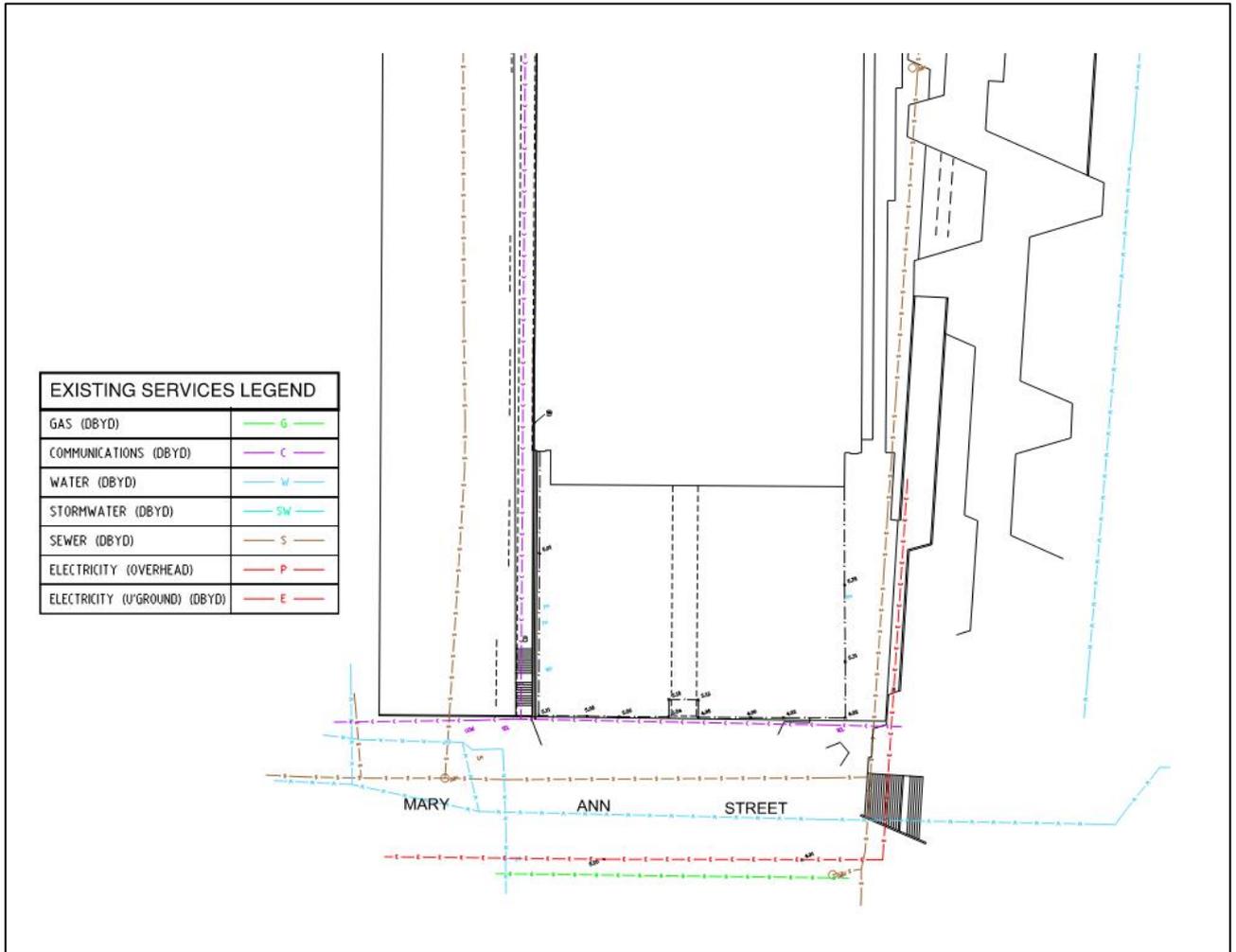


Figure 5 - Existing Services to the south of the site (Mary Ann Street)

Existing 300mm and 600mm Sydney Water stormwater pipes run through Harris Street and MacArthur Street. The stormwater pipes increase to 900mm before discharging to large Sydney Water Trunk Culverts in Darling Drive, as shown in Figure 6.

The proposed reference scheme building will have no impact on the existing capacity of the Sydney Water stormwater asset. The proposed stormwater runoff from the development will not increase as there will be no increase in impermeable area.

Due to the proximity of construction works adjacent to the Sydney Water Assets, any proposed basement, structural works, excavation and retention systems will require Section 73 application and approval by Sydney Water. A detailed assessment will be required by the structural engineer and Water Services Coordinator during the Design Competition Stage and Stage 2 DA.

3.0 Proposed Reference Scheme

This Concept DA sets the vision for the renewal of Powerhouse Ultimo and the creation of the Powerhouse Creative Industries Precinct, with the detailed design, construction, and operation of the project to be sought at a separate and future stage (Stage 2).

This assessment addresses the 'reference scheme' which is a test fit as one potential option for what may be developed within the proposed maximum building envelope. The detailed design of any building/s and public domain areas will be confirmed during the Design Competition and Stage 2 DA. This report demonstrates that the proposed project is capable of compliance. The proposed reference scheme architectural plans and sections are included in figures 7, 8 and 9.

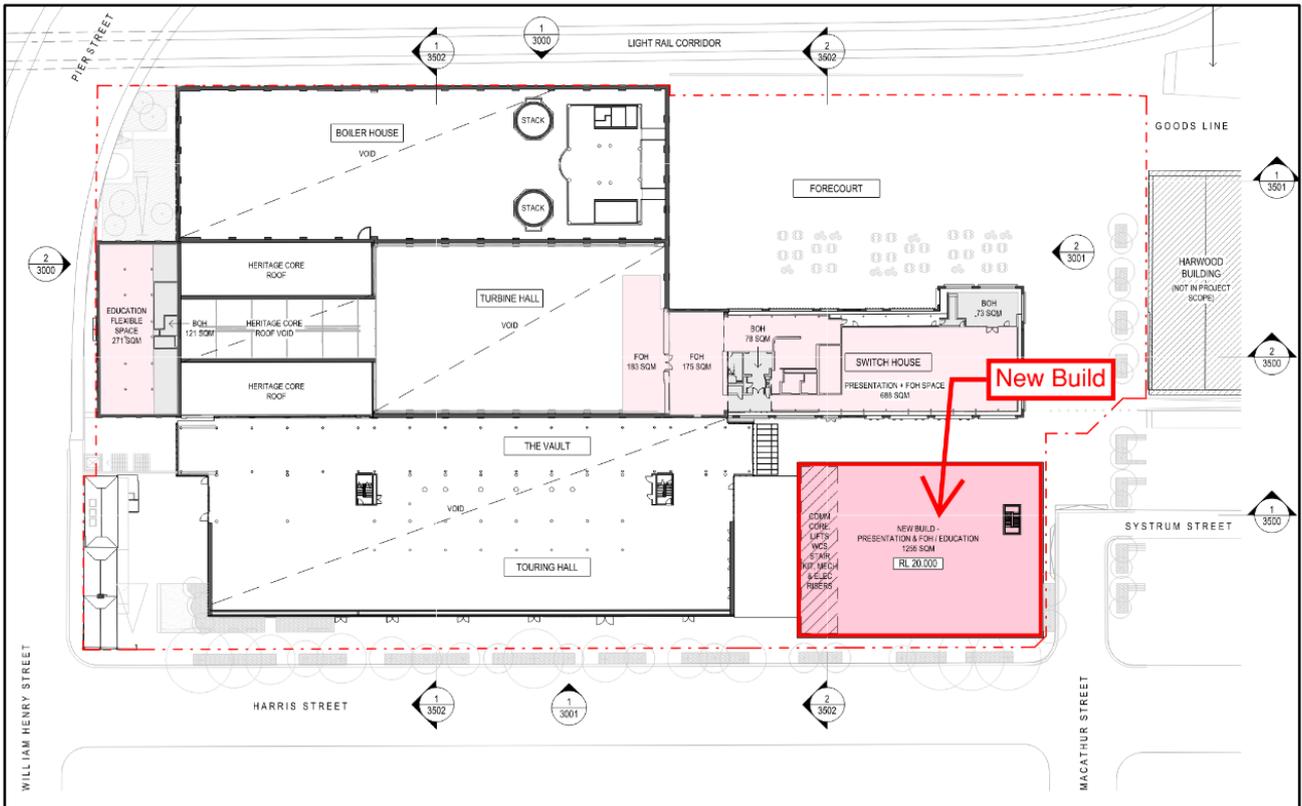


Figure 7 – Reference Scheme Level 03 Floor Plan (Harris Street Level)

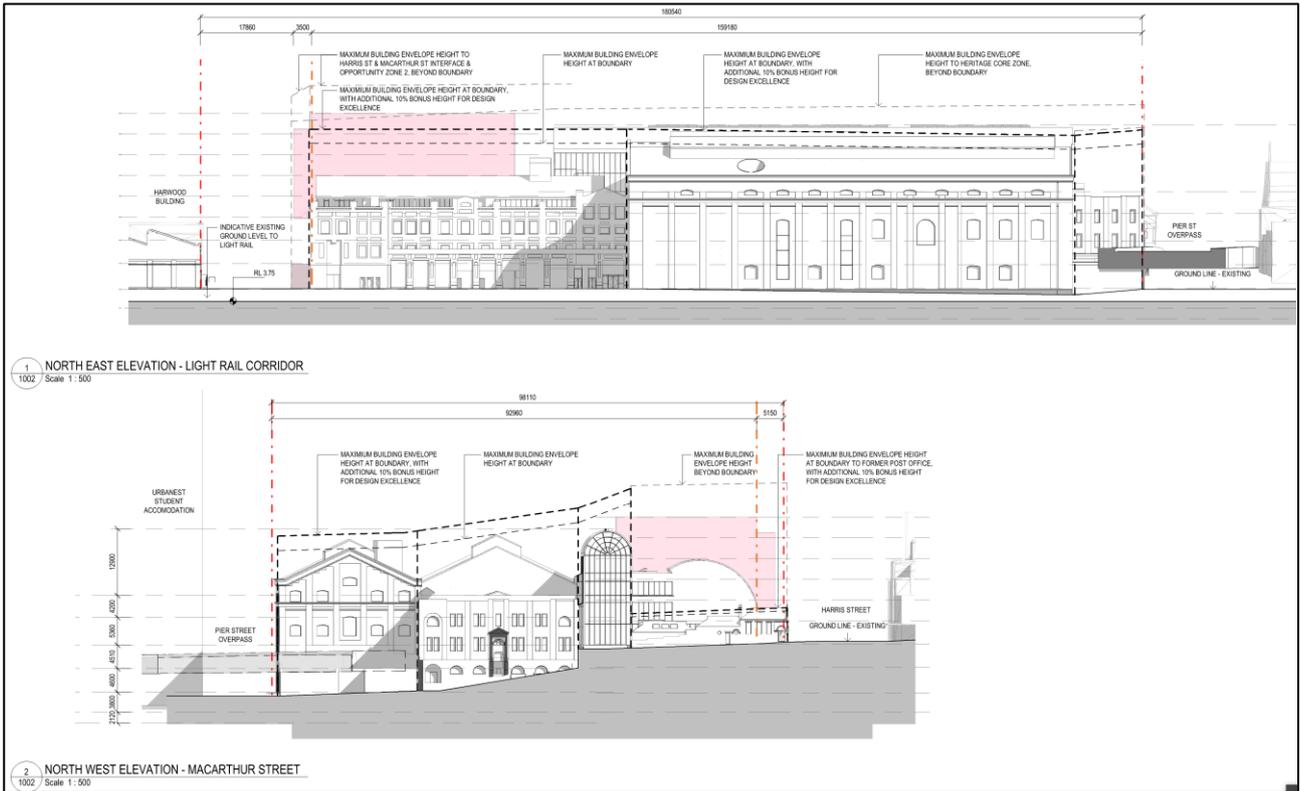


Figure 8 – Reference Scheme Section Views of the New Building (Coloured in red)

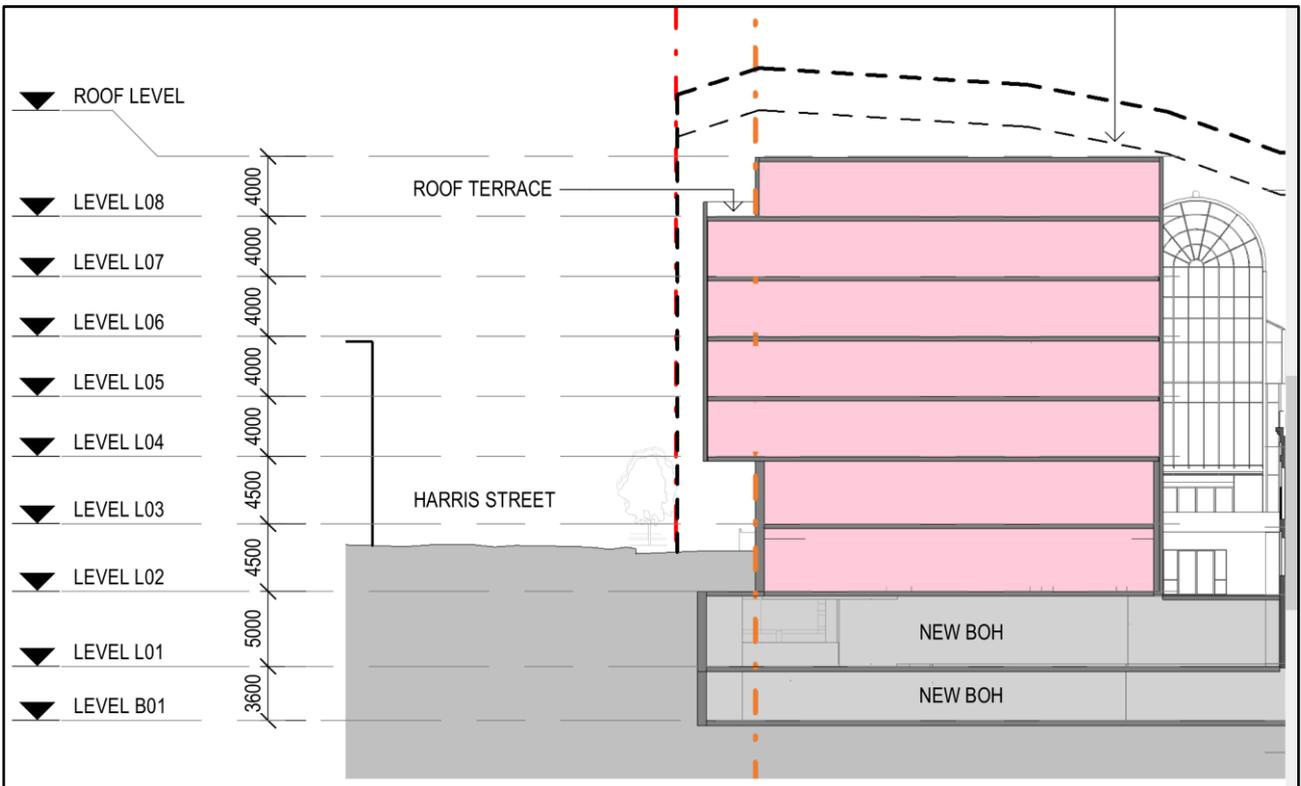


Figure 9 – Reference Scheme Section View of the New Building

4.0 Integrated Water Management Plan and Stormwater

SEARs 15. Stormwater and Wastewater

- Where applicable, provide an Integrated Water Management Plan for the development that:
 - is prepared in consultation with council and any other relevant drainage or water authority.
 - details the proposed drainage design for the site including any on-site treatment, reuse and detention facilities, water quality management measures, and the nominated discharge points.
 - demonstrates compliance with council or other drainage or water authority requirements and avoids adverse impacts on any downstream properties, including during construction.
- Provide a stormwater concept plan prepared in consultation with, and compliant with the relevant standards of, the local council or other drainage or water authority.

Water NSW requires a water management plan for commercial developments to include stormwater quality modelling, an erosion and sediment control plan, and an assessment of post development pollutants. The following section provide the Water Management Plan and addresses the Water NSW and SEARS requirements. The proposed stormwater concept plan is included in Section 4.2 and is in accordance with City of Sydney design requirements and has no adverse downstream impacts.

4.1 Existing Stormwater Catchments

Further investigation and survey are required to fully understand the existing stormwater system within the development site, existing catchments, stormwater controls (if any) and existing discharge points off-site. This investigation will be required to develop the stormwater concept design during the Design Competition stage and Stage 2 DA.

The existing site stormwater catchments are shown in Figure 10. The total area is divided into three sub-catchments based on existing site levels and assumed gravity drainage system as follows:

- Stormwater from Area 1 (approx. 16685 sq.m) drains by gravity to the existing Council stormwater pipe located in Macarthur Street.
- Area 2 (approx. 8133 sq.m) drains by gravity to the south of the site into an existing Council Stormwater pipe located in Mary Ann Street.
- A Bypass area (approx. 1200 sq.m) that is unlikely to drain towards the main discharge points from the site and instead drains by gravity towards William Henry Street

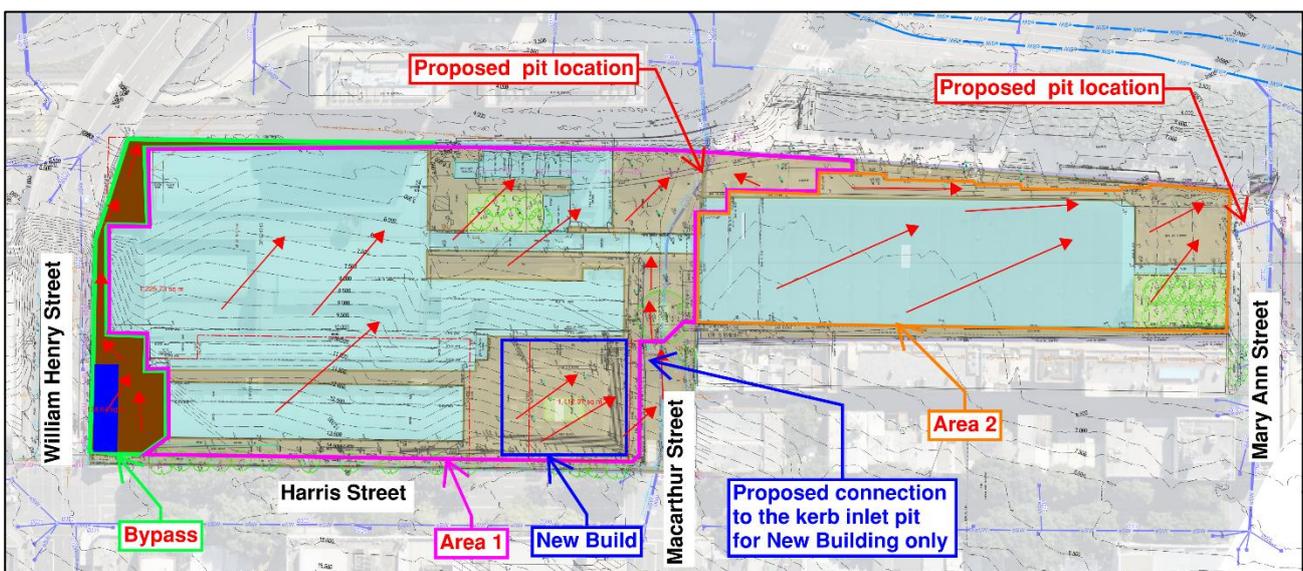


Figure 10 – Existing Stormwater Catchments and New Building

4.2 Proposed Stormwater Concept Plan

Sydney Water has confirmed that there is no on-site detention (OSD) required or any restriction on stormwater discharge required for the development site; refer to Appendix A. There is no net change in peak flows following development as the site is fully developed and there is not expected to be any increase in impermeable area following development. A detailed site catchment assessment will be required during the Stage 2 DA phase and will be informed by the proposed landscape, civil and architectural design.

The proposed stormwater concept allows for the reuse of the existing stormwater infrastructure across the development site, with a new stormwater connection for the reference building to an existing Council stormwater pit on Macarthur Street. Water Quality treatment (WSUD) will be required for this new building and will be located within the development site area upstream of the Council connection pit. An extract of the Proposed Stormwater Concept is shown in Figure 12 and also included in Appendix B.

The proposed stormwater minor system will be designed to convey the 5% AEP (1 in 20 years) flows, and the major system will be designed to convey the 1% AEP (1 in 100 years) flows in accordance with the City of Sydney Stormwater design requirements.

As there is no effective change in impermeable areas from the site, there will be no change in stormwater flows and no downstream impact associated with the development. The proposed site catchment flows are shown in Table 3.

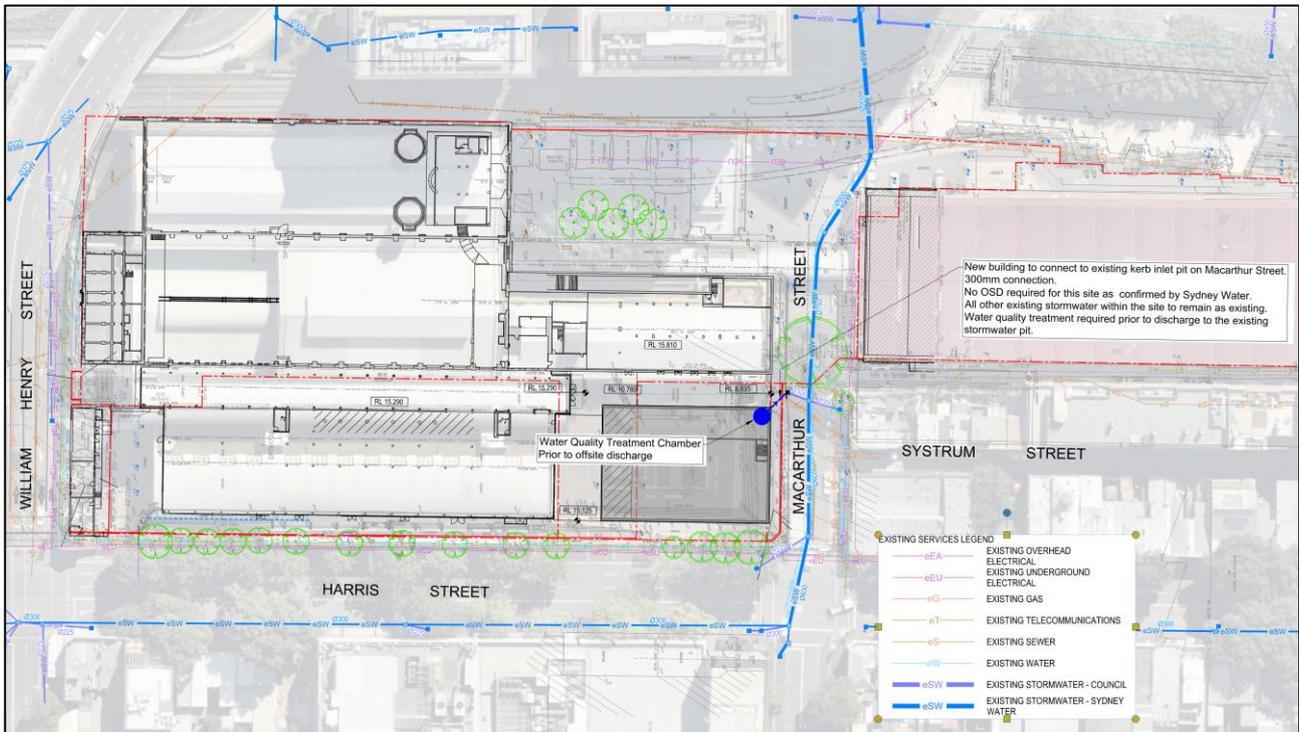


Figure 11 – Extract of Proposed Stormwater Concept (included in Appendix B)

Table 3. Peak Stormwater Flows for Each Catchment For 5% AEP and 1% AEP Storm Events

| | 5% AEP Flow | 1% AEP Flow |
|---|-----------------|-----------------|
| Area 1 (16,685 Sq.m) including New Build | 886 l/s | 1150 l/s |
| Reference Scheme Building Only (1255 Sq.m) | 70 l/s | 90 l/s |
| Area 2 (8,133 Sq.m) | 424 l/s | 554 l/s |
| Bypass (1200 Sq.m) | 64 l/s | 83 l/s |
| Total Site | 1374 l/s | 1787 l/s |

4.3 Stormwater Quality Assessment

In accordance with City of Sydney Water Quality requirements, any development larger than 1000 sq.m is required to meet pollutant reduction targets set by Sydney Water, as shown in Table 4. MUSIC modelling has been completed to demonstrate how the stormwater quality targets will be achieved.

The proposed stormwater quality measures will need to be integrated with the landscaping, irrigation, water use/reuse and reticulation; this will be further detailed in the Integrated Water Management Plan to be produced by the Hydraulic Engineer.

At this stage, it is unclear if water quality targets are required to be met for the full development site or just for the new building reference scheme area. Further discussion is required with Council and Sydney Water to confirm this during the Stage 2 DA. Water Quality compliance has been assessed for both the whole site (Section 4.3.1) and the reference scheme building only (Section 4.3.2). Both assessments meet the required Water Quality objectives.

Table 4 - Council Stormwater Quality Targets

| Pollutant | Average annual pollutant load reduction objective (%) ¹ |
|--------------------------|--|
| Gross pollutants (>5 mm) | 90 |
| Total suspended solids | 85 |
| Total phosphorous | 60 |
| Total nitrogen | 45 |

4.3.1 Water Quality Requirements - Full Site

A preliminary MUSIC model has been completed for the full site, which confirms that the following water quality treatment devices would be installed that meet the Sydney Water pollution load reduction targets. This is a conservative model that assumes that there are no existing water quality treatment devices currently installed on-site that can be reused. Further stormwater investigation and confirmation with Sydney Water and Council will be completed during the Stage 2 DA.

- One OceanGuard gross pollutant trap is required per 2000m² of impermeable area. This equates to;
 - 7 OceanGuards for Area-1,
 - 3 x OceanGuards as a minimum for area 2
 - 1x OceanGuard for the Bypass area.
- For Area 1, dual DN3250 manholes, each containing 17 x StormFilters.
- For Area 2, a single DN3250 manhole containing 16 x StormFilters.

These devices meet the required water quality targets, as shown in Figure 12 and table 5. Further assessment will be required as part of the design development during the Stage 2 DA.

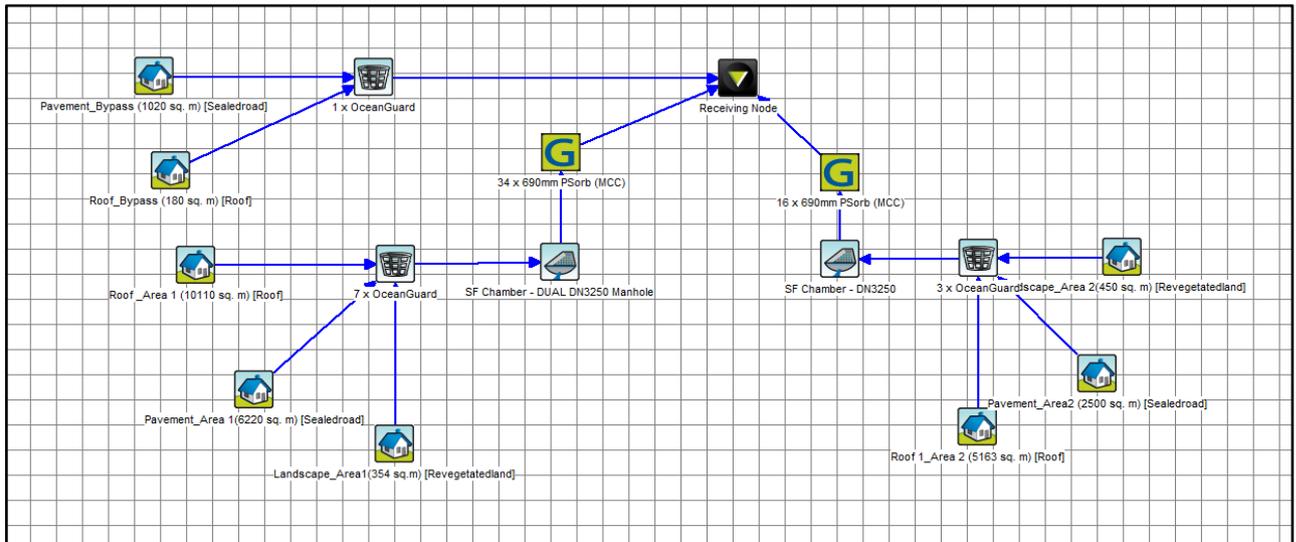


Figure 12 - Preliminary Music Model for the Full Site

Table 5 – Proposed WSUD Results For Pollutant Reduction – Full Site

| | Sources | Residual Load | % Reduction |
|---------------------------------------|---------|---------------|-------------|
| Flow (ML/yr) | 30.3 | 30.3 | 0 |
| Total Suspended Solids (kg/yr) | 4280 | 538 | 87.4 |
| Total Phosphorus (kg/yr) | 9.4 | 2.96 | 68.6 |
| Total Nitrogen (kg/yr) | 68.3 | 33.7 | 50.7 |
| Gross Pollutants (kg/yr) | 727 | 0.078 | 100 |

4.3.2 Water Quality Requirements – Reference Scheme Building Only

If water quality measures are only required for the Reference Scheme Building only, subject to confirmation with Council and Sydney Water during Stage 2 DA, the following water quality measures would be required and meet the required targets as shown in figure 14 and Table 6:

- 1x OceanGuard gross pollutant trap
- 1x DN1200 manhole containing 3 x StormFilters

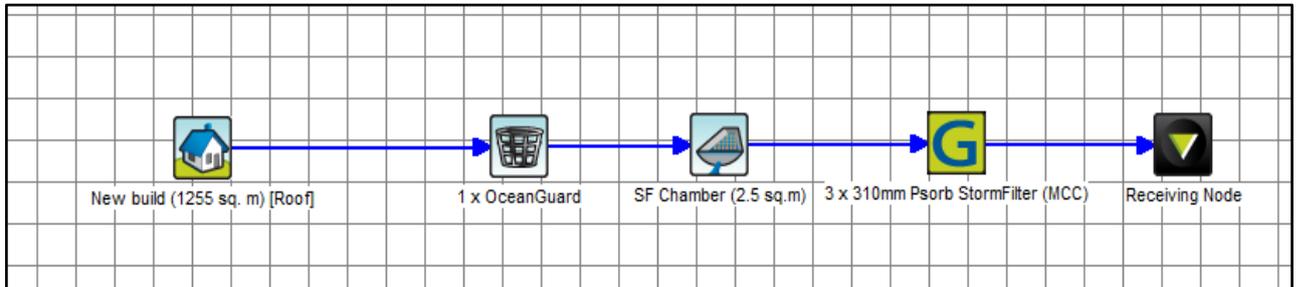


Figure 14 - Preliminary Music Model for New Building Only

Table 6 – Proposed WSUD results for pollutant reduction for new build area

| | Sources | Residual Load | % Reduction |
|---------------------------------------|---------|---------------|-------------|
| Flow (ML/yr) | 1.55 | 1.55 | 0 |
| Total Suspended Solids (kg/yr) | 39.6 | 5.67 | 85.7 |
| Total Phosphorus (kg/yr) | 0.234 | 0.0721 | 69.2 |
| Total Nitrogen (kg/yr) | 3.41 | 1.73 | 49.1 |
| Gross Pollutants (kg/yr) | 38.3 | 0 | 100 |

4.4 Erosion and Sediment Control

A detailed erosion and sediment control plan will be implemented during the construction stage and will be in accordance with Council’s requirements and Landcom NSW’s Managing Urban Stormwater, Soils and Construction (“Blue Book”). Typical measures to be implemented would include:

- Provision of sediment and erosion controls at locations downstream of construction areas (e.g. sediment fences, sediment basins, others as required).
- Provision of stormwater diversions around the construction site for run-off from upstream undisturbed areas.
- Identification of stockpile locations.
- Identification and locations of sediment control barriers
- Protection of existing stormwater using geotextile filters, sandbags or similar.
- Identification of work staging to limit the area and duration of soils exposure
- Identify suitable locations for construction vehicle access and wheel wash facilities

An indicative erosion and sediment control plan has been produced based on the location of works for the reference scheme, refer to Figure 15 and Appendix B. This plan will need to be updated to reflect the site development proposal for the Design Competition stage and Stage 2 DA.

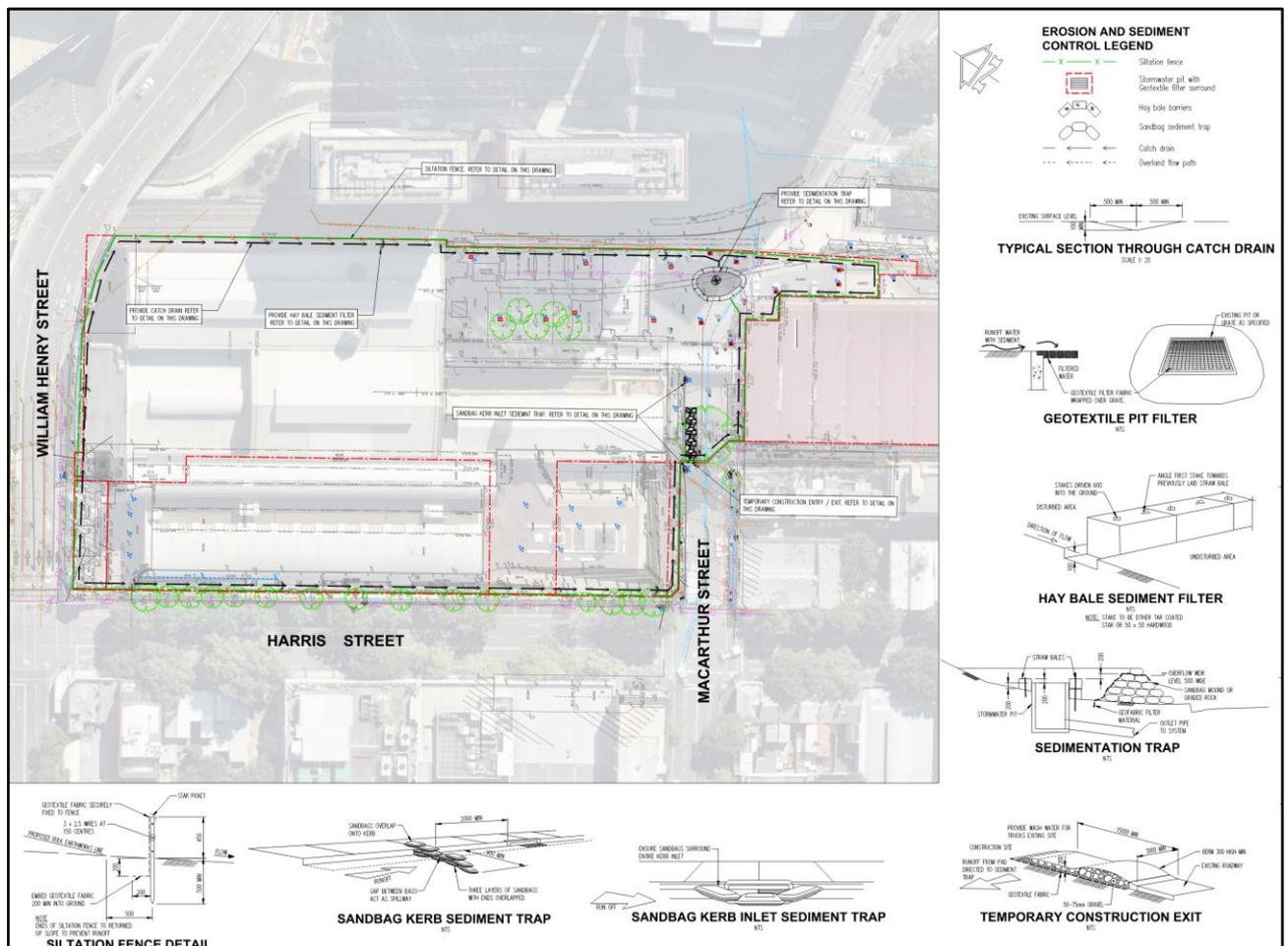


Figure 15 - Preliminary Erosion and Sediment Control Plan, refer to Appendix B.

4.5 Water Supply and Reuse

The proposed water supply requirements and design approach is detailed by the Hydraulic Engineer, refer to the *Ecologically Sustainable Development (ESD), Steensen Varming, April 2022*.

This report confirms that there will be a future opportunity to connect to the planned City of Sydney recycled water network that would enable all water consumption for toilet flushing and irrigation to come from non-potable sources. Further design consideration of this future connection to the Recycled Water Network will be made during the later design stages of the development.

Figure 16 below is an extract from the ESD report showing the hierarchy of water initiatives proposed for the development, with further detail to be provided during later design stages.

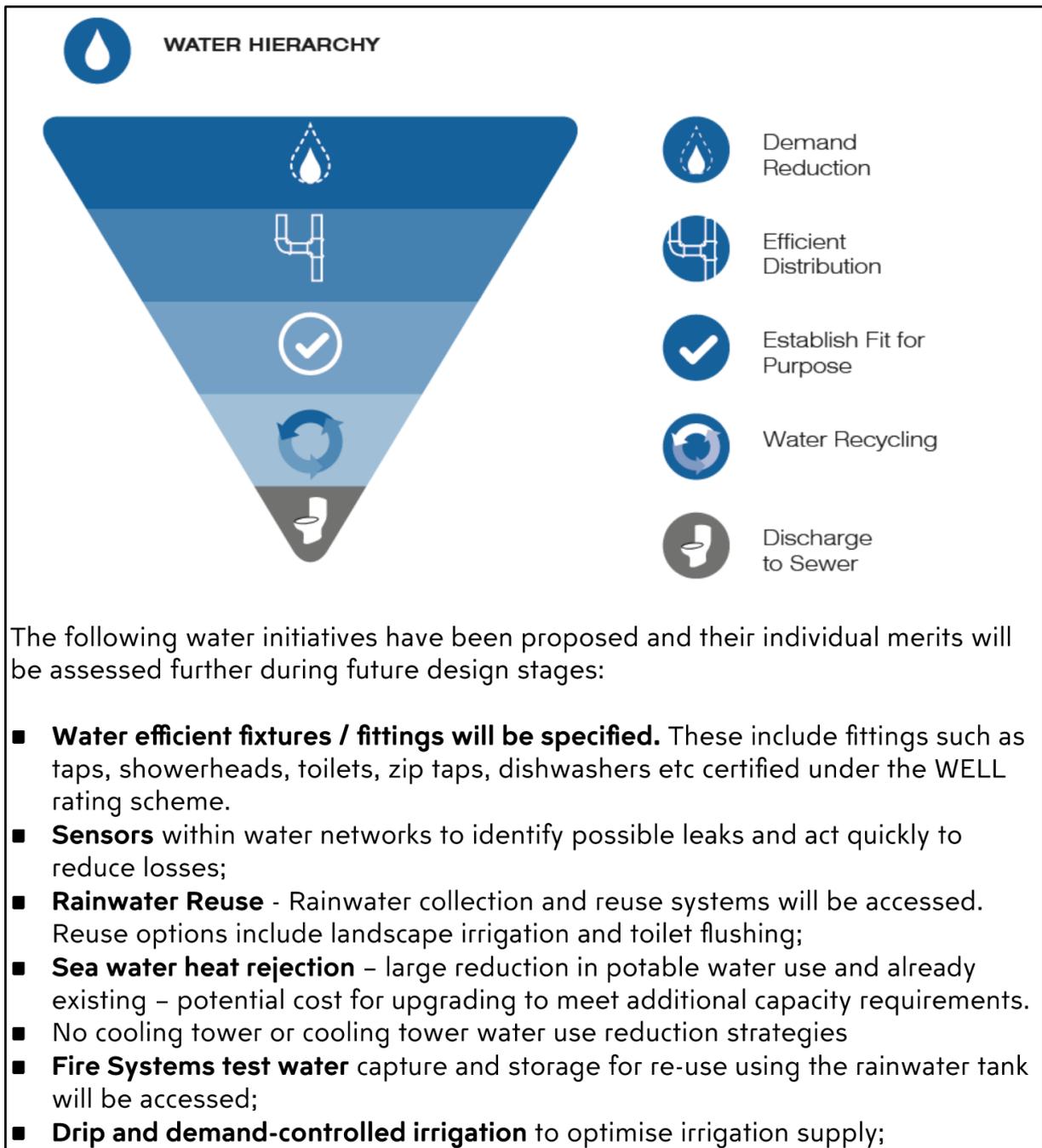


Figure 16 - Preliminary Erosion and Sediment Control Plan, refer to Appendix B.

5.0 Flooding

SEARs 16. Flooding Risk

The EIS Shall:

- *Identify any flood risk on-site having regard to adopted flood studies, the potential effects of climate change, and any relevant provisions of the NSW Floodplain Development Manual and City of Sydney Interim Floodplain Management Policy.*
- *Where applicable, assess the impacts of the development, including any changes to flood risk on-site or off-site, and detail design solutions and operational procedures to mitigate flood risk where required.*

The following sections detail the existing flood risk to the development site and flood impact associated with the development. These sections confirm that the site is generally flood free with low flood risk around the development site with Low flood hazard and shallow flood depths experienced in the external road system. The proposed development will not change the existing flood behaviour, will have no adverse impact on existing properties, and will meet City of Sydney Flood Planning requirements. Discussion with Council is required during the Design Competition Stage and Stage 2 DA to confirm the treatment of Flood Planning Levels to the Loading Dock/basement and the existing Switch House/Café building.

5.1 Existing Flooding

Assessment of flood risk for the development is in accordance with the NSW Floodplain Development Manual 2005, and Council's interim Floodplain Management Policy. The council have completed the Darling Harbour catchment flood study (Oct 2014) and Darling Harbour floodplain risk management plan (Sep 2016). This flood study forms the basis for the site-specific flood impact assessment.

The existing Darling Harbour flood model has been obtained from Council to confirm existing flood behaviour and flood levels at the site location. The flood study identifies that the site is generally flood-free, with only a localised area at the low end of Macarthur Street experiencing shallow flooding-typically less than 200mm deep in the 1% AEP and approximately 250mm deep in the PMF. More significant flooding is experienced downstream of the site within the railway corridor; however, this is significantly lower (approximately 3m) than the development site.

Existing Flood extent, depths and levels for the 1% AEP and PMF are shown in figures 17 and 18 respectively.

Flood Hazard is generally low across the development site in the 1% AEP, with localised steeper road areas experiencing High Flood Hazard in the PMF at the junction of Macarthur Street and Harris Street. Refer to figures 19 and 20, respectively for the 1% AEP and PMF Flood Hazard across the site.

Overland flow along Harris Street adjacent to the reference scheme new building site is less than 100mm in the 1% AEP flood and less than 150mm in the PMF. Overland flow along Macarthur Street is typically less than 30mm in both the 1% AEP and PMF.

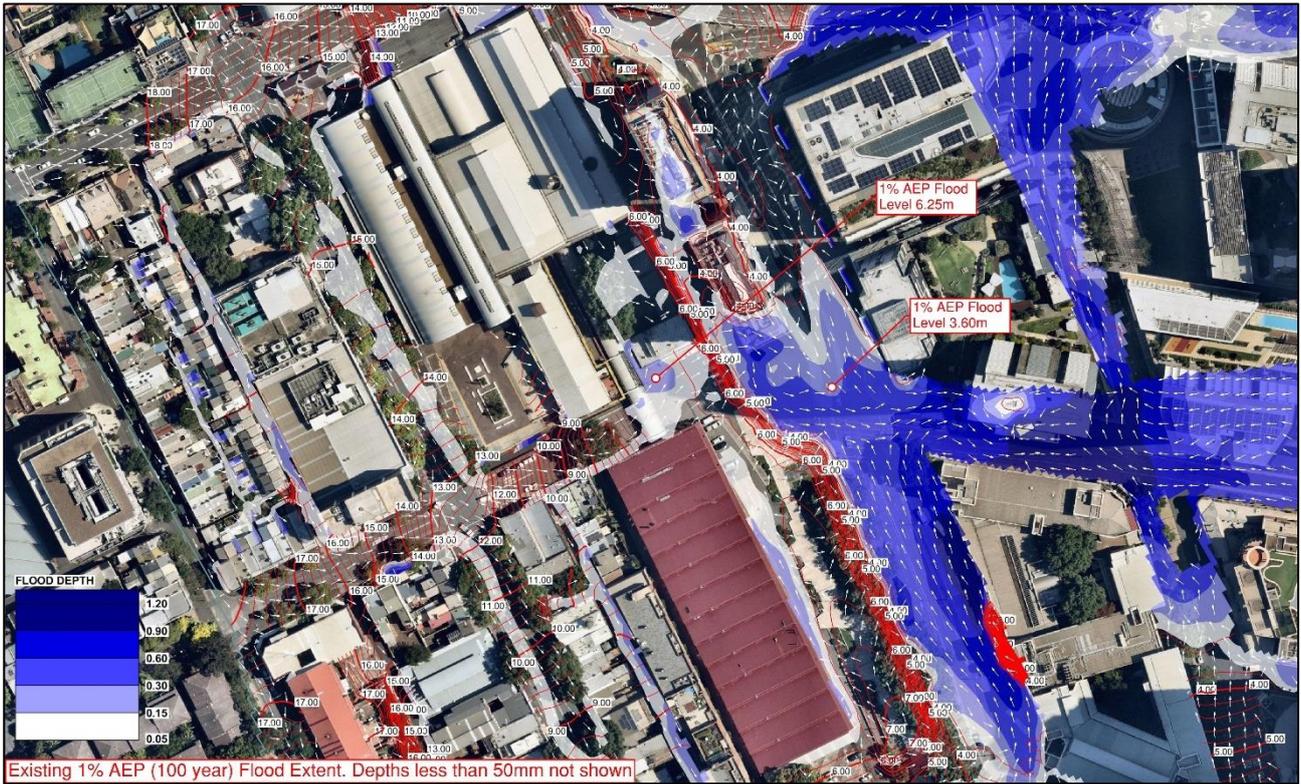


Figure 17 - Darling Harbour Flood Study – Existing 1% AEP Flood Depths and Levels

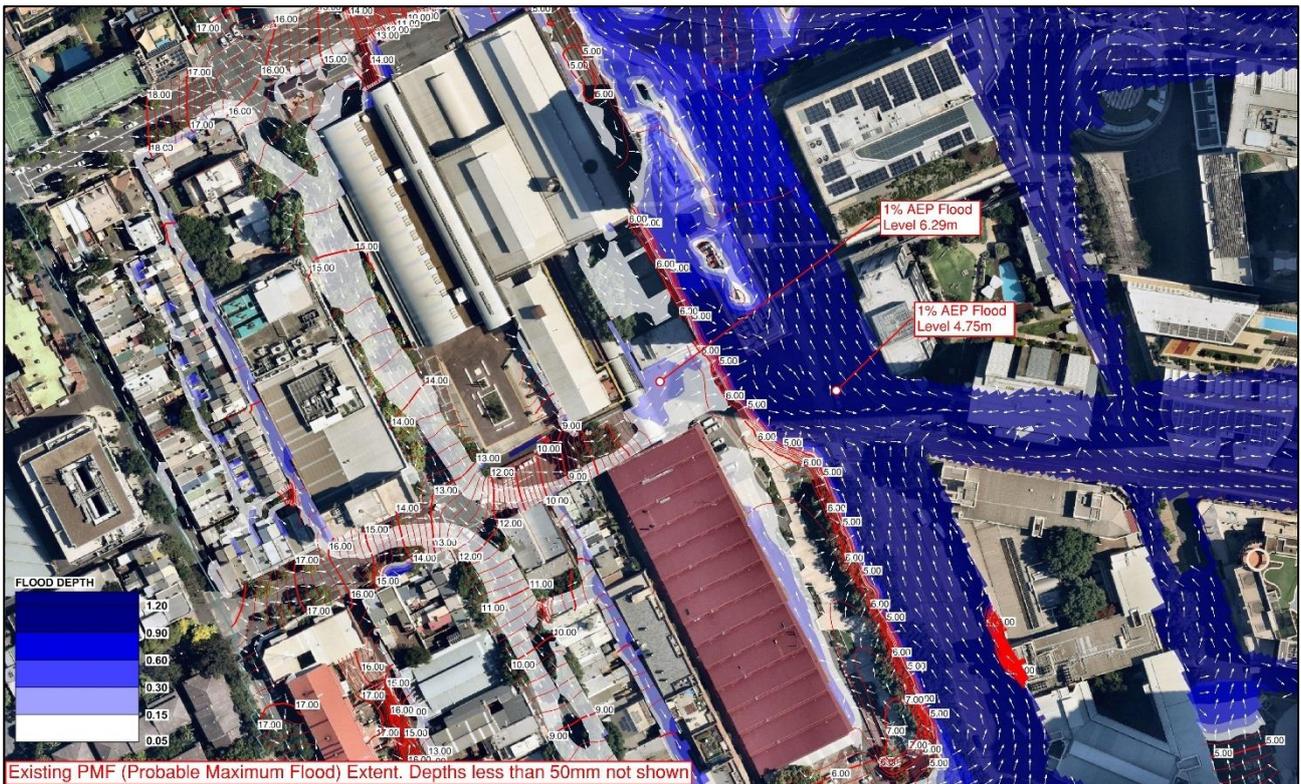


Figure 18 - Darling Harbour Flood Study – Existing PMF Flood Depths and Levels



Figure 19 – Existing 1% AEP Flood Hazard in accordance with NSW Floodplain Management Manual



Figure 20 - Existing PMF Flood Hazard in accordance with NSW Floodplain Management Manual

5.2 Proposed Flooding

There is not expected to be any change to the existing flood behaviour, overland flow paths, flood levels, flood depths or flood hazard following development as the only change to the existing building footprint is outside and above the existing flood extent.

The new reference building will therefore have no adverse impact on flooding and meets the City of Sydney Interim Floodplain Management Policy and the NSW Floodplain Development Manual. Further flood assessment of the development proposals will be required during the Design Competition Stage and Stage 2 DA.

5.3 Flooding Planning Levels

Proposed development impacted by flooding must comply with the Flood Planning Levels requirements from the City of Sydney's Interim Floodplain Management Policy outlined in Table 7, with sections highlighted that are relevant for this development. The Flood Planning Level for commercial floor levels is the 1% AEP and the higher of the PMF or the 1% +500mm for basements.

There is no proposed change to the existing floor levels of the heritage listed buildings. However, the 1% AEP flood level at the bottom of Macarthur Street (RL 6.29m) is currently higher than the floor level of the adjacent Switch Room Building (RL 6.18) and Café (RL 6.19m) and does not meet the flood planning requirements. Further work will be required during the Design competition Stage and Stage 2 DA to either remove or reduce the flooding in this area (through stormwater modification, increased inlet capacity and/or site grading) or through the possible use of flood barriers which will need to be discussed and approved with Council.

The new reference building is proposed to have a ground floor level (RL 15.50m) well above the adjacent 1% AEP flood level on Harris Street (RL 14.00m). The proposed loading dock access and entrance to the basement on Macarthur Street has a flood depth of less than 20mm on the north side of Macarthur Street in both the PMF and 1% AEP flood. This is not considered to be significant flooding, and this entrance should not have to achieve the CoS Flood Planning Levels however, application of the flood planning levels will need to be confirmed with Council during the Design Competition Stage and Stage 2 DA.

If Council confirm during the Design Competition Stage or the Stage 2 DA that Flood Planning Levels are required to be met for the basement ramp, then the ramp will require a crest level above the adjacent 1% AEP +500mm. An approximate crest level of 10.20m would be required at the reference scheme ramp location before ramping down to the basement. Any vents and egress points from the new basement must also be set above the adjacent 1% AEP +500mm level.

Table 7 - Flood Planning Level Requirements (extract of Council's Interim Floodplain Management Policy)

| Development | | Type of flooding | Flood Planning Level |
|-------------------------------|--|---|---|
| Residential | Habitable rooms | Mainstream flooding | 1% AEP flood level + 0.5 m |
| | | Local drainage flooding (Refer to Note 2) | 1% AEP flood level + 0.5 m or Two times the depth of flow with a minimum of 0.3 m above the surrounding surface if the depth of flow in the 1% AEP flood is less than 0.25 m |
| | Outside floodplain | 0.3 m above surrounding ground | |
| | Non-habitable rooms such as a laundry or garage (excluding below-ground car parks) | Mainstream or local drainage flooding | 1% AEP flood level |
| Industrial or Commercial | Business | Mainstream or local drainage flooding | Merits approach presented by the applicant with a minimum of the 1% AEP flood level |
| | Schools and child care facilities | Mainstream or local drainage flooding | Merits approach presented by the applicant with a minimum of the 1% AEP flood level + 0.5m |
| | Residential floors within tourist establishments | Mainstream or local drainage flooding | 1% AEP flood level + 0.5 m |
| | Housing for older people or people with disabilities | Mainstream or local drainage flooding | 1% AEP flood level + 0.5 m or a the PMF, whichever is the higher |
| | On-site sewer management (sewer mining) | Mainstream or local drainage flooding | 1% AEP flood level |
| | Retail Floor Levels | Mainstream or local drainage flooding | Merits approach presented by the applicant with a minimum of the 1% AEP flood. The proposal must demonstrate a reasonable balance between flood protection and urban design outcomes for street level activation. |
| Below-ground garage/ car park | Single property owner with not more than 2 car spaces. | Mainstream or local drainage flooding | 1% AEP flood level + 0.5 m |
| | All other below-ground car parks | Mainstream or local drainage flooding | 1% AEP flood level + 0.5 m or the PMF (whichever is the higher) See Note 1 |
| | Below-ground car park outside floodplain | Outside floodplain | 0.3 m above the surrounding surface |
| Above ground car park | Enclosed car parks | Mainstream or local drainage flooding | 1% AEP flood level |
| | Open car parks | Mainstream or local drainage | 5% AEP flood level |
| Critical Facilities | Floor level | Mainstream or local drainage flooding | 1% AEP flood level + 0.5m or the PMF (whichever is higher) |
| | Access to and from critical facility within | Mainstream or local drainage flooding | 1% AEP flood level |

5.4 Flooding Impact Due to Climate Change

Climate change is expected to have an adverse impact on sea levels and rainfall intensities, both of which have the potential to have significant impact on flood behaviour at specific locations. Climate change projections in NSW are generated from the NSW and ACT Regional Climate Modelling (NARClIM) project. The NARClIM projections for total rainfall for the Sydney Metropolitan Region will decrease in spring and winter, and increase in autumn and summer. The NARClIM projections for extreme rainfall are that both rainfall intensities and the frequency of extreme events will increase.

The current flood policy adopted by City of Sydney, and used in the Darling Harbour Flood Study, allows for a 90cm increase in sea level rise by 2100 from the 2009 Mean Sea Level. This is also in accordance with the projections of the 'very high greenhouse gas scenario' (RCP8.5)

Current predictions for extreme rainfall are that peak rainfall intensity is likely to increase by up to 10%, however sensitivity analysis using an increase in peak rainfall of up to 30% has been adopted in accordance with Council's Darling Harbour Flood Study.

Flood modelling has been completed to allow for possible impacts of climate change for the proposed development, with the combined impact of increased sea levels of 90cm, and increased rainfall of up to 30%. These combined impacts of climate change do not have a significant increase in flooding within or adjacent to the Site refer to figures 21 and 22.

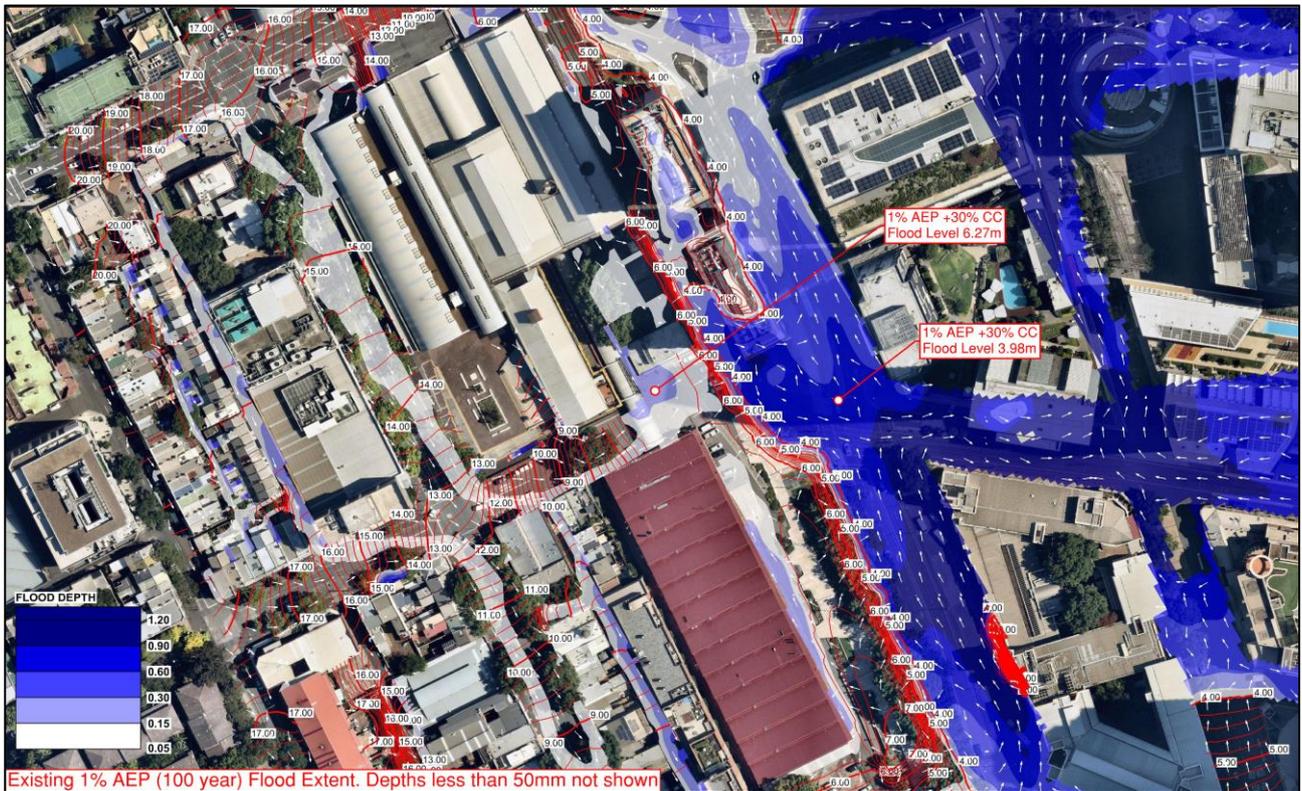


Figure 21 – Existing 1% AEP Flood Depths and Levels with allowance for Climate Change

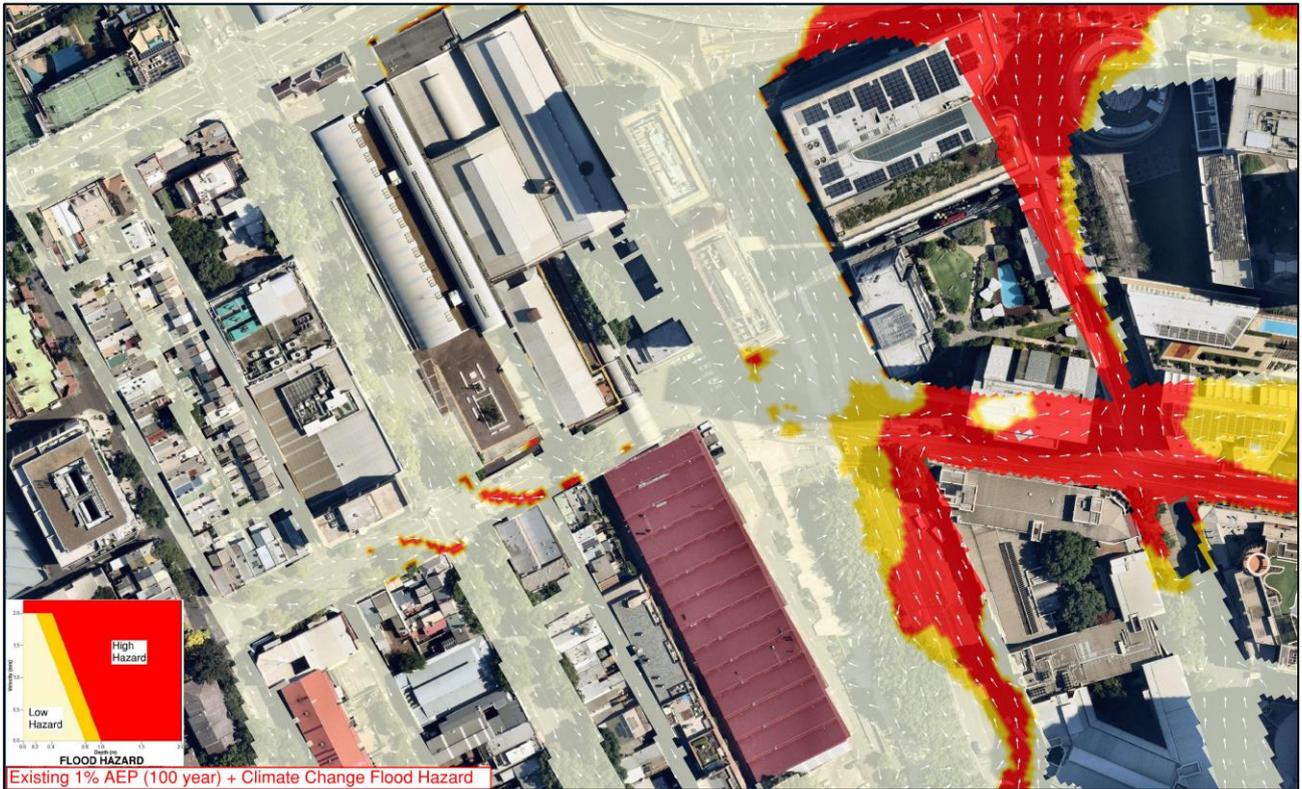


Figure 22 – Existing 1% AEP Flood Hazard with allowance for Climate Change

Appendix A

Sydney Water Confirmation of no OSD Required

From: Stormwater <Stormwater@sydneywater.com.au>
Sent: Wednesday, 16 March 2022 12:30 PM
To: Amir Zalnezhad <amir.zalnezhad@ttw.com.au>
Cc: Ali Attar <ali.attar@ttw.com.au>; Eirian Crabbe <Eirian.Crabbe@ttw.com.au>
Subject: RE: [External] RE: OSD requirements for the powerhouse Museum

[External Email]: Do not click links or open attachments unless you recognize the sender and know the content is safe.

Amir,

On Site Detention is not required for any development at Power House Museum, Harris Street, Ultimo.

Best Regards

Jeya Jeyadevan
Senior Capability Assessor
Business Development

Mobile 0409 318 827
jeya.jeyadevan@sydneywater.com.au

Level 13, 1 Smith Street
Parramatta NSW 2150



We're working on something big

Every drop brings us one step closer to transforming our customers' online experience with Sydney Water



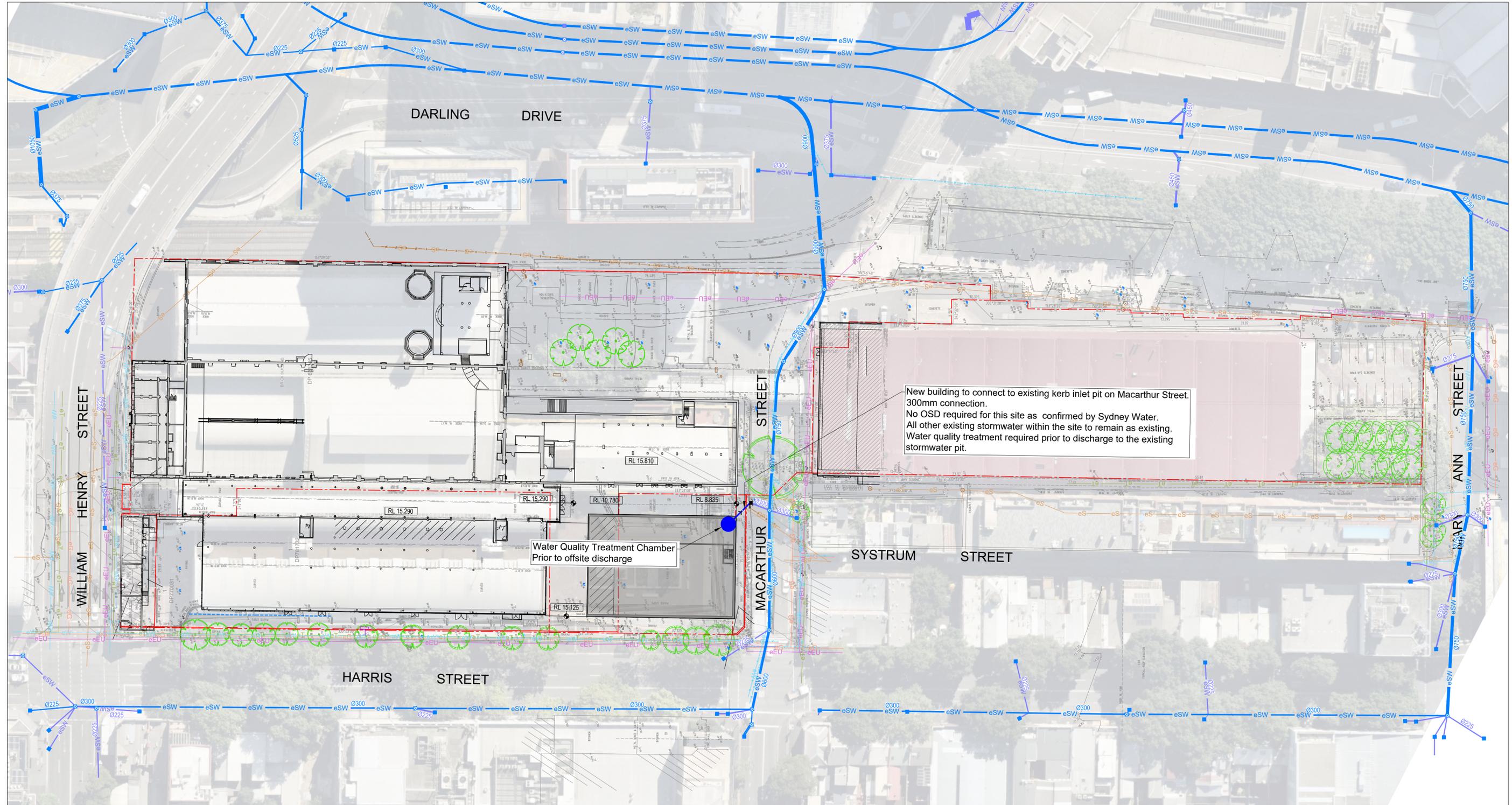
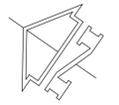
Sydney Water respectfully acknowledges the traditional custodians of the land and waters on which we work, live and learn. We pay respect to Elders past and present.

[Read more](#) about our commitment to reconciliation.



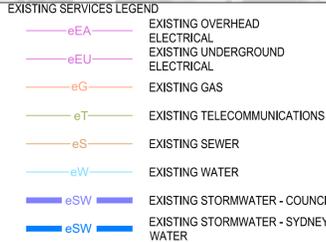
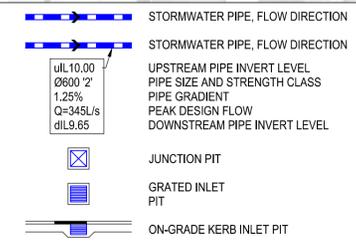
Appendix B

Proposed Stormwater Concept Plan



New building to connect to existing kerb inlet pit on Macarthur Street. 300mm connection. No OSD required for this site as confirmed by Sydney Water. All other existing stormwater within the site to remain as existing. Water quality treatment required prior to discharge to the existing stormwater pit.

Water Quality Treatment Chamber Prior to offsite discharge



Filename: C:\03\03 - USER\gphh - Pwr Fldr Created: Apr 26, 2022 - 4:41pm

| Rev | Description | Eng | Draft | Date | Rev | Description | Eng | Draft | Date | Rev | Description | Eng | Draft | Date |
|-----|-----------------------|-----|-------|----------|-----|-------------|-----|-------|------|-----|-------------|-----|-------|------|
| P1 | ISSUE FOR INFORMATION | EC | LW | 12/04/22 | | | | | | | | | | |

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Sheet Subject
STORMWATER PLAN

Job No: **212058**
Drawing No: **C10**
Revision: **P1**
Plot File Created: Apr 26, 2022 - 4:41pm

Appendix C

Indicative Erosion and Sediment Control Plan