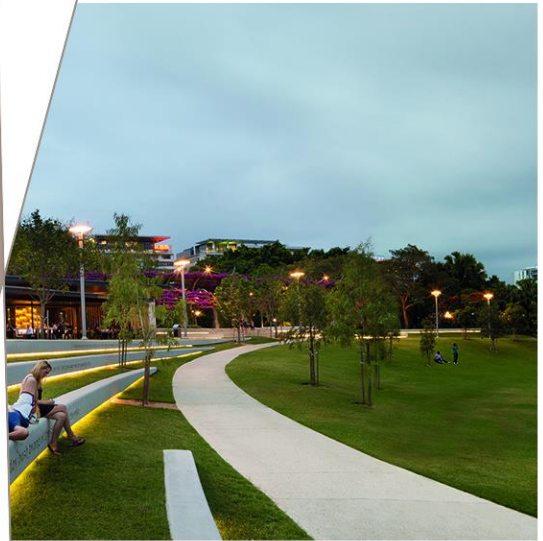


Flooding and Water Quality Assessment Report

New Sydney Fish Market Concept
Design, Stage 1 and Stage 2

59918015



Prepared for
Infrastructure NSW

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Executive Summary

Introduction

Cardno has been commissioned by Infrastructure NSW (INSW) to undertake a flooding and water quality assessment for the proposed new Sydney Fish Market. This assessment forms part of the Environment Impact Statement (EIS), which accompanies a concept development application.

This report addresses the relevant Secretary's Environmental Assessment Requirements (SEARs) for the new Sydney Fish Market for Stage 1 and Concept Design Requirements and Stage 2 Main Works Requirements in relation to flooding and stormwater quality.

Flood Modelling Approach and Scenarios

Using flood models developed for the Blackwattle Bay Catchment Flood Study (WMAwater, 2012) as a base, a 2D hydraulic flood model was assembled to assess the impacts of the proposed development on flooding and provide advice on Flood Planning Levels (FPLs). The following scenarios were investigated for the purpose of this assessment:

Existing Conditions

A number of modifications were made to the Blackwattle Bay Catchment Flood Study:

- Detailed ground survey for the Study Area and Bridge Road was incorporated into the model;
- The pit and pipe network within the study area was updated based on a more recent GIS database;
- Assumptions adopted in modelling the pit and pipe network were refined;
- Building footprints within the study area were refined based on the latest aerial imagery.

Demolition (Stage 1):

The Existing Conditions flood model was revised to represent the demolition works scenario. The existing buildings were removed within the Study Area to establish the interim demolition phase flood behaviour.

Main Works (Stage 2):

The Existing scenario model was revised to represent the proposed new Sydney Fish Market development through applying the following:

- The Existing buildings were removed and replaced with the proposed new Sydney Fish Market building;
- The proposed development design terrain was incorporated into the model. The proposed drainage network for the study area was incorporated into the model.

Flooding Assessment

Flood Impact Assessment

The three scenarios (Existing, Stage 1 and Stage 2) were run for 10% AEP, 1% AEP and PMF events and flood behaviour was assessed for each scenario and event. The results showed that the proposed development has no adverse impact on flooding on adjacent properties and roads.

Flood hazard around the study area generally remains unchanged in all modelled scenarios.

The impacts of development on flooding were found to be consistent with the requirements of the SEARs and the NSW Floodplain Development Manual (2005).

Climate Change Assessment

A sensitivity analysis was undertaken to assess the impacts of climate change on flood behaviour around the study site. The following scenarios were investigated:

- Increased Rainfall Intensity, which was assessed using the 0.5% AEP and 0.2% AEP flood events;
- Sea level Rise: which was assessed through incorporation of 0.4 m and 0.9 m increases in tailwater conditions in the 1% AEP flood event.

The assessment revealed that the impacts of increased rainfall intensity on the study site are not significant. As expected, with the Study Area being located adjacent to Blackwattle Bay, flood levels are predicted to increase with sea level rise.

Emergency Response Management

The rate of rise of flood waters was assessed for the 1% AEP and PMF events. In the PMF event the rate of rise is generally high, which limits opportunities to evacuate visitors and staff in this event. In the 1% AEP event the rate of rise of flood waters is relatively low, however the flood depths along Bridge Road are high which makes evacuation unsafe. Therefore, evacuation is not recommended in the 1% AEP and PMF events and it is recommended that visitors and staff shelter in-place.

Water Quality Assessment

The Sydney Development Control Plan (DCP) 2012 sets targets for stormwater quality for urban developments. The following reductions in post-development baseline annual pollutant loads are required:

- Gross Pollutants (GP) 90%
- Total Suspended Solids (TSS) 85%
- Total Phosphorus (TP) 65%
- Total Nitrogen (TN) 45%

A MUSIC model of the proposed development was assembled using climate data, land use types and rainfall-runoff parameters. A water sensitive urban design strategy (WSUD) strategy was developed and the following treatment devices are proposed:

- Rainwater harvesting and re-use of roof runoff;
- Proprietary devices / Gross Pollutant Traps (GPTs); and
- Bioretention systems.

The results of the MUSIC modelling indicate that the proposed WSUD strategy will achieve the required CoS water quality targets.

Water quality monitoring is proposed to be carried out during the following project stages:

- Pre-construction (baseline monitoring) Weekly
- Demolition Phase Monthly
- Construction Phase Monthly

Water quality monitoring is to be undertaken at all discharge locations into Blackwattle Bay.

Conclusion

This assessment has demonstrated that the impact of the proposed development in relation to flooding is minimal, with decreases in flood levels observed at most locations and no adverse impacts on private property in the 1% AEP event. This report has also considered climate change and Emergency Response Management requirements.

A review of the existing surface water, hydrology and groundwater conditions has been undertaken and suitable water quality objectives have been established. A MUSIC water quality model was assembled to assess the existing hydrology and water quality conditions and the impact of the proposed works. The proposed WSUD strategy has been demonstrated to meet the relevant targets.

Note

UrbanGrowth NSW Development Corporation (UrbanGrowth NSW) was abolished on 1 July 2019 with all functions transferred to Infrastructure NSW. Any reference to UrbanGrowth NSW throughout this report is interchangeable with Infrastructure NSW (INSW).

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1 Introduction

Cardno has been commissioned by Infrastructure NSW (INSW) to undertake a flooding and water quality assessment for the proposed new Sydney Fish Market (nSFM). This assessment forms part of the Environment Impact Statement (EIS), which accompanies a concept development application in accordance with Clause 3 of Schedule 2 of the Environmental Planning and Assessment Regulation 2000. This report addresses the relevant Secretary's Environmental Assessment Requirements (SEARs) for the new Sydney Fish Market for:

- > Stage 1 and Concept Design Requirements; and
- > Stage 2 Main Works Requirements.

This Report summarises the following:

Section 2 – Background

Provides background on the Study Area, the proposed new Sydney Fish Market development, and the environmental assessment requirements;

Section 3 – Flooding Assessment

Summarises the modelling methodology, the outcomes of the flooding assessment, and assesses the flood planning and emergency response implications of the proposed development; and

Section 4 – Water Quality Assessment

Sets water quality objectives and summarises the modelling methodology and outcomes.

2 Background

Sydney Fish Market is the largest of its kind in the Southern Hemisphere and among the three largest seafood markets in terms of variety in the world. The market sources product both nationally and internationally and trades approximately 14,500 tonnes of seafood annually with up to one hundred sustainable seafood species traded every day and approximately 500 species traded annually. The site attracts over 3 million visits each year.

In November 2016 the NSW Premier announced a new fish market would be built at the head of Blackwattle Bay, adjacent to the existing fish market. In June 2017 the Premier of NSW announced the appointment of Danish architects 3XN to lead the design team that includes Sydney firms BVN and Aspect Studios. They have been working with key stakeholders, including INSW and Sydney Fish Market Pty Ltd (SFM) to develop the design for the new fish market.

2.1 Study Site and Context

2.1.1 Location

The site is located at the head of Blackwattle Bay between the Pyrmont Peninsula and the foreshore of Glebe, situated less than 2km west of Sydney's CBD and is partially within the City of Sydney (CoS) Local Government Area.

The land to which the development application relates comprises Lots 3 - 5 in DP 1064339 part of lot 107 in DP 1076596 and part Lot 1 in DP835794. Works to connect to the existing waterfront promenade to the west of the site are located on Lot 3 in DP1018801. The development footprint is irregular in shape and has an area of approximately 36,800 m². The site is partly on land above mean high water mark and partly on water below mean high water mark.

The site has a frontage to Bridge Road to the south and Blackwattle Bay to the north. Pyrmont Bridge Road is an arterial road that links to the Anzac Bridge to the north west of the site. Sydney Secondary College Blackwattle Bay Campus is immediately south west of the site and the existing Fish Market immediately north east. Located directly opposite the site to the south is Wentworth Park, separated by Bridge Road.

Located approximately 400 m walking distance from the site are the existing Fish Market, Wentworth Park and Glebe Light Rail stops which are serviced by the Dulwich Hill Line which is a 23 stop, 12.8-kilometre route running from Dulwich Hill to Central station via Pyrmont.

The site contains one heritage item being the heritage stormwater culvert. The site is also near a number of heritage items.

The site's current uses include a concrete batching plant at the Western end and concrete hardstand and wharf area at the Eastern end, which is currently vacant. The site includes wharves and land-based structures. Part of the site is the water of Blackwattle Bay. Works will be undertaken on Bridge Road and its intersections with Wattle Street and Wentworth Park Road.

The Study Site is shown in **Figure 2-1**.

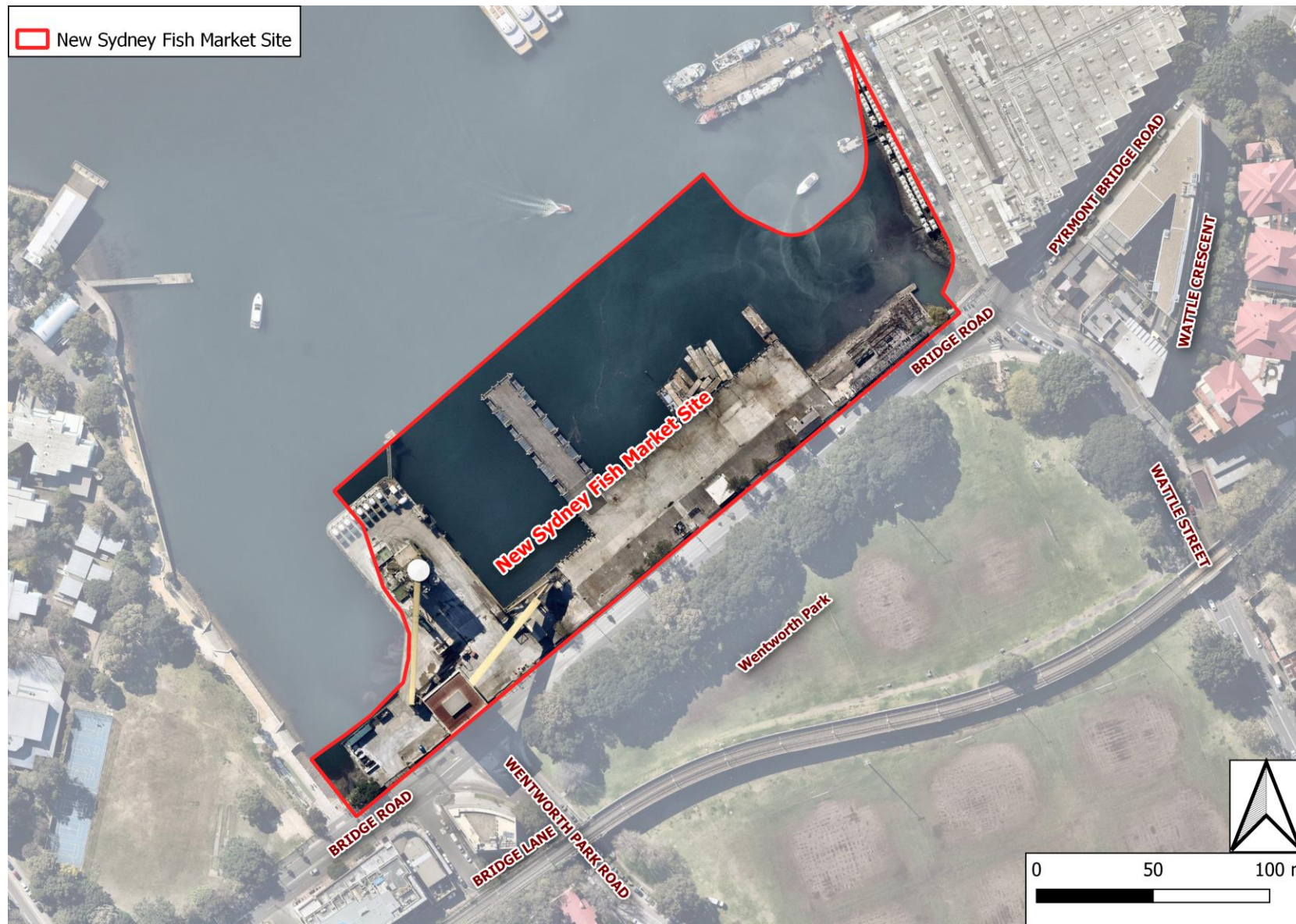


Figure 2-1 Proposed New Sydney Fish Market Site

2.2 Approval Strategy

Pursuant to the provisions of the *Environmental Planning and Assessment Act 1979* and *State Environmental Planning Policy (State and Regional Development) 2011* ("SEPP SRD") the new Sydney Fish Market development is State Significant Development and the Minister for Planning is the consent authority.

To deliver the new Sydney Fish Market, the following applications will be lodged:

1. A concept development application seeking approval for concept proposals for the new fish market. This is to meet the requirements for a master plan contained in clause 40 of SREP26. This concept development application will also set out details of the first stage of the development being the demolition of land and water-based structures on the site including removal of marine piles and any resulting repairs to the existing sea wall; and
2. A development application for the construction of the new fish market.

These applications are lodged concurrently.

2.3 Summary of the Development

The proposal is to build the new Sydney Fish Market (nSFM) with a contemporary urban design, provide unique experiences for visitors and world-class auction and wholesale facilities. The new facility will be set within an improved public domain including the creation of a waterfront promenade with improved access to Blackwattle Bay and linking to surrounding areas and to public transport.

The development will expand and improve the functions of the existing Fish Market in a new setting designed to achieve design excellence, functional performance and environmental sustainability.

The new Sydney Fish Market will include retail and food and beverage premises, wholesale facilities and auction rooms, offices and commercial space, Sydney Seafood Schools, back-of-house facilities and car, truck and coach parking spaces. The new facility is to include a new foreshore promenade and wharves. The new fish market will be purpose built and will be supported by a state of the art back-of-house plant and recycling/waste management facilities.

The proposed Site Plan is shown in **Appendix A**.

2.3.1 Concept Development Application

The Concept development application seeks approval for:

1. The use of the site for the fish market including waterfront commercial and tourist facilities and ancillary uses and the distribution of uses;
2. A gross floor area of up to 30,000 m² contained within a defined building envelope;
3. Waterfront structures such as wharves;
4. Concepts for improvements to the public domain including promenades, access to Blackwattle Bay and landscaping;
5. Pedestrian cycle and road access and circulation principles;
6. Principles for infrastructure provision and waste management.

This concept development application will also set out details of the first stage of the development being the demolition of land and water-based structures on the site including removal of marine piles and any resulting repairs to the existing sea wall, and related services relocations.

2.3.2 Main Works Development Application

The Main Works development application seeks approval for:

1. The construction of a new fish market including land and water-based structures.
2. The use of the site for a fish market including waterfront commercial and tourist facilities and ancillary uses and the distribution of uses;
3. A gross floor area of approximately 26,000 m² as calculated according to the definition of GFA under SREP 26 (approximately 25,600 m² as calculated according to the definition of GFA under the Standard Instrument).

4. Public domain works including promenades access to Blackwattle Bay and landscaping;
5. Pedestrian, cycle and road access and circulation;
6. Infrastructure provision and waste management;
7. Associated works as required.

The proposed uses comprise:

Below Ground Level

- > Parking for service and delivery, and private vehicles up to approximately 417 vehicles;
- > Plant and storage;
- > Waste Management facilities; and
- > End of journey facilities.

Ground Level - Outside of Building Envelope

- > Up to three operational wharves for fishing fleet servicing and product unloading/loading, multi-purpose wharf space, private-operated ferry stop, recreational vehicles and the like;
- > Vehicular access driveways; and
- > Publicly accessible promenade.

Ground Level - Within Building Envelope

- > Wholesale services space including product storage and processing; and
- > Auction floor and associated refrigeration and handling space.
- > Loading dock including time-limited delivery and service vehicle parking area;
- > Waste management facilities;
- > Office space including buyers room;
- > Staff amenities, plant and storage.

Upper Ground Level (L1)

- > Retail premises including fresh food retail, food and drink premises including harbourside dining;
- > External/shared dining space;
- > Ancillary back of house space and staff amenities; and
- > Circulation areas.

Upper Level 2 (Mezzanine)

- > Catering space;
- > The Sydney Seafood School;
- > Tenant and subtenant office space; and
- > Plant and storage space.

2.4 Purpose of this Report

The purpose of this report is to address the relevant Secretary's Environmental Assessment Requirements (SEARs) for the new Sydney Fish Market (refer **Appendix B**) and specifically the items listed in **Table 2-1** for Stage 1 and Concept Design Requirements and **Table 2-2** for Stage 2 Main Works Requirements. This report forms part of the Environmental Impact Statement (EIS) for the concept and main works development for the proposed new Sydney Fish Market development.

Table 2-1 Flooding and Water Quality SEARs Addressed for Stage 1 and Concept Design

SEARs requirements	Report Reference
Flooding	
<p>The EIS must map the following features relevant to flooding as described in the NSW Floodplain Development Manual 2005 including</p> <ul style="list-style-type: none"> > Flood prone land; > Flood planning area, the area below the flood planning level; and > Hydraulic categorisation (floodways and flood storage areas). 	Section 3 Appendix D
<p>The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 1 in 10 year, 1 in 100 year flood levels and the probable maximum flood, or an equivalent extreme event.</p>	Section 3
<p>The EIS must model the effect of the proposed development (including fill) on the current flood behaviour for a range of design events as identified above. This includes the 1 in 200 and 1 in 500 year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.</p>	Section 3.6 Section 3.7
<p>Modelling in the EIS must consider and document:</p> <ul style="list-style-type: none"> > The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood; > Impacts of the development on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazards and hydraulic categories; and > Relevant provisions of the NSW Floodplain Development Manual 2005. 	Section 3
<p>The EIS must assess the impacts on the proposed development on flood behaviour, including:</p> <ul style="list-style-type: none"> > Whether there will be detrimental increases in the potential flood affectation of other properties, assets and infrastructure; > Consistency with Council floodplain risk management plans; > Compatibility with the flood hazard of the land; > Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land; > Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site; > Any impacts the development may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the SES and Council; > Whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the SES and Council; and > Emergency management, evacuation and access, and contingency measures for the development considering the full range of flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the SES. 	Section 3
<p>Include consideration of The City of Sydney Interim Floodplain Management Policy and The City of Sydney Blackwattle Bay Flood Study and Floodplain Risk Management Study.</p>	Section 3.1.1 Section 3.9

SEARs requirements	Report Reference
Water Quality, Soils and Contamination	
<p>The EIS must describe the background conditions for any water resource likely to be affected by the development, including:</p> <ul style="list-style-type: none"> > Existing surface and groundwater; > Hydrology, including volume, frequency and quality of discharges at proposed intake discharge locations; > Water quality objectives (as endorsed by the NSW Government), including groundwater as appropriate that represent the community's uses and values for the receiving waters; and > Indicators and trigger values/criteria for the environmental values identified above in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Quality and/or local objectives, criteria or targets endorsed by the NSW Government. 	Section 4
<p>The EIS must assess the impacts of the demolition and early works on water quality, including:</p> <ul style="list-style-type: none"> > The nature and degree of impact on receiving waters for both surface and groundwater, demonstrating how the development protects the Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are currently not being achieved. This should include an assessment of the mitigating effects of proposed stormwater and wastewater management during and after demolition and early works; and > Identification of proposed monitoring of quality. 	Section 4
<p>The EIS must assess the impacts of the demolition and early works on hydrology, including:</p> <ul style="list-style-type: none"> > Water balance, including quantity, quality and source; > Mitigating effects of proposed stormwater and wastewater management during and after the works on hydrological attributes such as volumes, flow rates, management methods and re-use options; and > Identification of proposed monitoring of hydrological attributes. 	Section 4.7
Sea Level Rise	
<p>Provide an assessment of the risks associated with sea level rise on the development noting the NSW Government Climate Change Policy Framework and NSW Government's Draft Climate Change Fund Strategic Plan and A Plan to Save NSW Energy and Money.</p>	Section 3.7

Table 2-2 Flooding and Water Quality SEARs Addressed for Stage 2 Main Works

SEARs requirements	Report Reference
Flooding	
<p>Have regard to and demonstrate consistency with the Concept development application (SSD 8924) flood assessment.</p>	Section 3

SEARs requirements	Report Reference
Include consideration of The City of Sydney Interim Floodplain Management Policy and The City of Sydney Blackwattle Bay Flood Study and Floodplain Risk Management Study.	Section 3.1.1 Section 3.9
Water Quality, Soils and Contamination	
<p>The EIS must describe the background conditions for any water resource likely to be affected by the development (construction and operation), including:</p> <ul style="list-style-type: none"> > Existing surface and groundwater; > Hydrology, including volume, frequency and quality of discharges at proposed intake discharge locations; > Water quality objectives (as endorsed by the NSW Government), including groundwater as appropriate that represent the community's uses and values for the receiving waters; and > Indicators and trigger values/criteria for the environmental values identified above in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Quality and/or local objectives, criteria or targets endorsed by the NSW Government. 	Section 4
<p>The EIS must assess the impacts of the development (construction and operation) on water quality, including:</p> <ul style="list-style-type: none"> > The nature and degree of impact on receiving waters for both surface and groundwater, demonstrating how the development protects the Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are currently not being achieved. This should include an assessment of the mitigating effects of proposed stormwater and wastewater management during and after demolition and early works; and > Identification of proposed monitoring of quality. 	Section 4
<p>The EIS must assess the impacts of the development (construction and operation) on hydrology, including:</p> <ul style="list-style-type: none"> > Water balance, including quantity, quality and source; > Mitigating effects of proposed stormwater and wastewater management during and after the works on hydrological attributes such as volumes, flow rates, management methods and re-use options; and > Identification of proposed monitoring of hydrological attributes. 	Section 4
Provide a Stormwater Management Plan outlining the measures for the proposal, particularly WSUD options and including measures for ongoing maintenance including associated funding approaches for ongoing management.	Section 4
Develop an Integrated Water Cycle Management Strategy that considers water, wastewater and stormwater. The Strategy must consider water sensitive urban design and water conservation measures, including water efficiency and reuse, following appropriate best practice and guidelines and prioritise meeting non-potable water demands with recycled water or harvested stormwater.	Section 4
Sea Level Rise	
Provide an assessment of the risks associated with sea level rise on the development noting the NSW Government Climate Change Policy Framework and NSW Government's Draft Climate Change Fund Strategic Plan and A Plan to Save NSW Energy and Money.	Section 3.7

3 Flooding Assessment

3.1 Introduction

3.1.1 Previous Studies

The Study Area is located within the Blackwattle Bay catchment. In 2015 WMAwater undertook the Blackwattle Bay Catchment Flood Study (FS), Floodplain Risk Management Study (FRMS) and Floodplain Risk Management Plan (FRMP) for the CoS as part of the NSW State Government floodplain planning process. These studies and plans provide the basis for the future management of those parts of the Blackwattle Bay catchment which are flood liable and within the CoS local government area.

The flood model developed as part of the flood study has been utilised as a basis for undertaking the flooding assessment for the Study Area.

3.1.2 Drainage Systems

The Study Site is located at the downstream end of the Blackwattle Bay catchment. There are five Sydney Water Corporation (SWC) owned trunk drainage systems that discharge within the Study Site including Wattle Street Branch and the Old Wattle Street Branch. These two branches collect stormwater runoff from a wider upstream catchment and discharge into Blackwattle Bay near the existing Sydney Fish Markets.

3.2 Model set-up

Flood modelling for the Blackwattle Bay catchment has been undertaken using a 2m x 2m grid two-dimensional (2D) TUFLOW hydraulic model. The model files and results for the Blackwattle Bay Catchment FS were made available by the CoS.

The following sections describe the model set-up methodology and updates that have been made based on the data review and discussions with the CoS.

3.2.1 Hydrology

The Blackwattle Bay catchment is divided into 720 sub-catchments. Review of the Blackwattle Bay Flood Study model indicates that the discreet inflow method was adopted for the hydrology calculations within the TUFLOW model. In this method, rainfall is applied to each sub-catchment and the flow generated is applied at a discreet region or “inflow” location within that sub-catchment. This approach is suitable for the purposes of this study.

3.2.2 Terrain

The terrain adopted for the Blackwattle Bay flood model was based on a combination of 2007 and 2008 LIDAR data. Detailed ground survey for the Study Area and Bridge Road was supplied for this study (provided in **Appendix C**). This has been incorporated into the model terrain to provide greater definition of the existing surface profile within the Study Area.

3.2.3 Building Footprints

The existing building footprints in the Blackwattle Bay Catchment FS model were reviewed and it was identified that the building polygons did not match with the latest Nearmap imagery within the Study Area. A number of existing buildings within the Study Area have therefore been refined based on this more recent aerial imagery (Nearmap 2017) to provide a better representation of flood behaviour in the existing scenario.

3.2.4 Downstream Boundary Condition

A water level of 1.38 m AHD has been adopted in the model as the downstream boundary condition. This level is the 5% AEP ocean water level in Sydney Harbour.

3.2.5 Pit and Pipe Network

The pit and pipe network adopted in the model has largely been based on the CoS GIS database dated March 2011. Where the pit and pipe information was not available, estimates were made using engineering judgment, site inspection, and via Street View in Google Maps. A more recent GIS database received from the CoS in September 2017 was used to update the pit and pipe network within the Study Area to allow more accurate representation of the existing flood behaviour.

The Blackwattle Bay Catchment FS model was established as a regional model for the entire catchment. It adopted the following methodology for the pit and pipe network:

- > The hydraulic capacity of inlet pits has not been assessed in the model and unlimited capacity was assumed for all inlet pits;
- > Pipes with a diameter less than 450 mm have been excluded from the model; and
- > A blockage factor of 25% has been applied to all the modelled pipes.

This approach effectively applies blockage to the entire network upstream rather than just the immediate upstream pits. This usually results in the majority of pipes in the network running full in the smaller events and does not provide an accurate representation of the actual capacities of the pipe network.

Inlet capacity is one of the key factors that may constrain flows into the drainage system in urban hydraulic modelling. The capacity of inlets depends on the depth and velocity of approaching run-off and the configuration of the inlets. As observed in the stormwater network assessment undertaken in the flood study (WMAwater 2015), the majority of the pipes in the network are running full in relatively small events.

To address these limitations the model was refined to incorporate additional details within the Bays Market District (BMD) site and Blackwattle Bay which is included the Study Area. The following approach has been adopted for the pit and pipe set-up:

- > The surface inflows were separately defined for different pit types in the model. Pit inflow relationships were defined in terms of flow depths versus pit inflow;
- > The kerb inlet pits in the study area are typically sag or on grade pits and the types are as follow:
 - Lintel and single grate with the inlet lengths of 0.9m, 1.2m, 1.8m, 2.4m, 3.0m, 3.6m and 4.2m;
 - Lintel and double grate with the inlet lengths of 0.9m, 1.2m, 1.8m, 2.4m, 3.0m, 3.6m and 4.2m;
 - Grated pit only; and
 - Kerb inlet pit without grate with various lintel lengths;
- > The following assumptions for the pits within the study area were made to calculate the inlet curves:
 - Road cross fall or side slope is 3%;
 - Gutter cross fall is 8%;
 - Longitudinal grade is 1%;
 - Gutter width is 0.5m;
 - Manning's "n" for streets is 0.014; and
 - Manning's "n" for gutters is 0.013;
- > For large specialised inlet pits (double grate) the length of the grated lid has been doubled;
- > Blockage factors for pits and pipes have been adopted based on Council's stormwater drainage design specification as shown in **Table 3-1** below;
- > The pit inlet rating curves have been adopted for the on-grade and sag pits within the Study Area and its surrounds. **Figure 3-1** shows the area for which pit inlet curves have been adopted in the flood model;
- > Pipes with a diameter less than 450 mm have been included in the model for the Study Area and its surrounds as shown in **Figure 3-1**.

Table 3-1 Pit design blockage factors

Pit type	On Grade Blockage factor	Sag blockage factor
Kerb inlet <= 1.0m	50%	70%
Kerb inlet >1.0m	20%	50%
V grate or Grate only	90%	90%
Strip drain or other	95%	90%

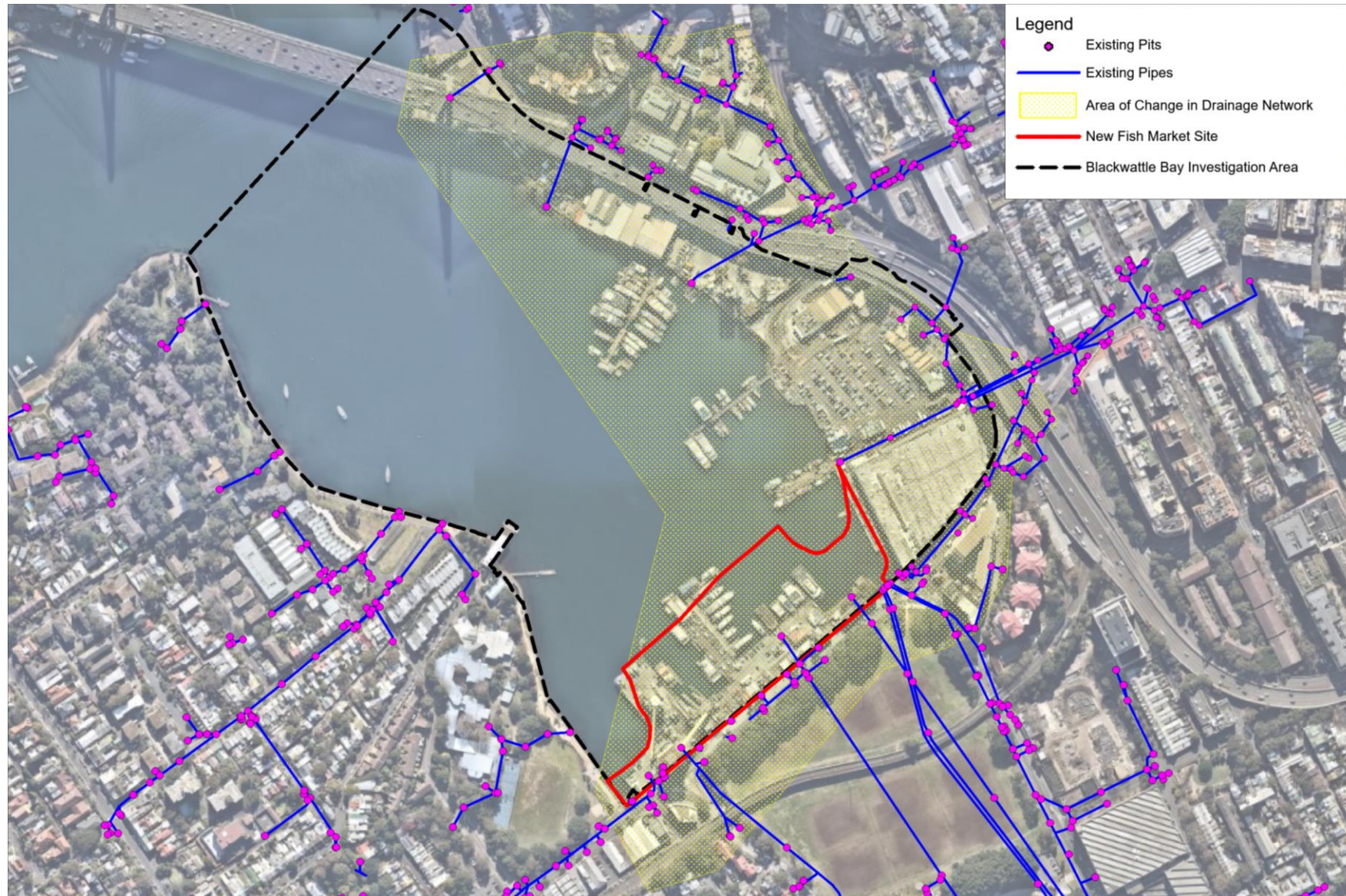


Figure 3-1 Area of change in drainage network

3.3 Critical Duration

Based on the Blackwattle Bay Catchment Flood Study (WMAwater 2015), the 2 hour duration was used to determine the peak flood levels for all events excluding the PMF. For the PMF, the 1 hour duration was determined to be the critical duration and was thus used to determine the peak flood levels.

3.4 Existing Scenario Flood Behaviour

The hydraulic model was run for the 10%, 1% AEP and PMF events. Peak levels, depths, hazard and hydraulic categories were established for the existing scenario. These have been provided in **Appendix D**.

A summary of the results provided is as follows:

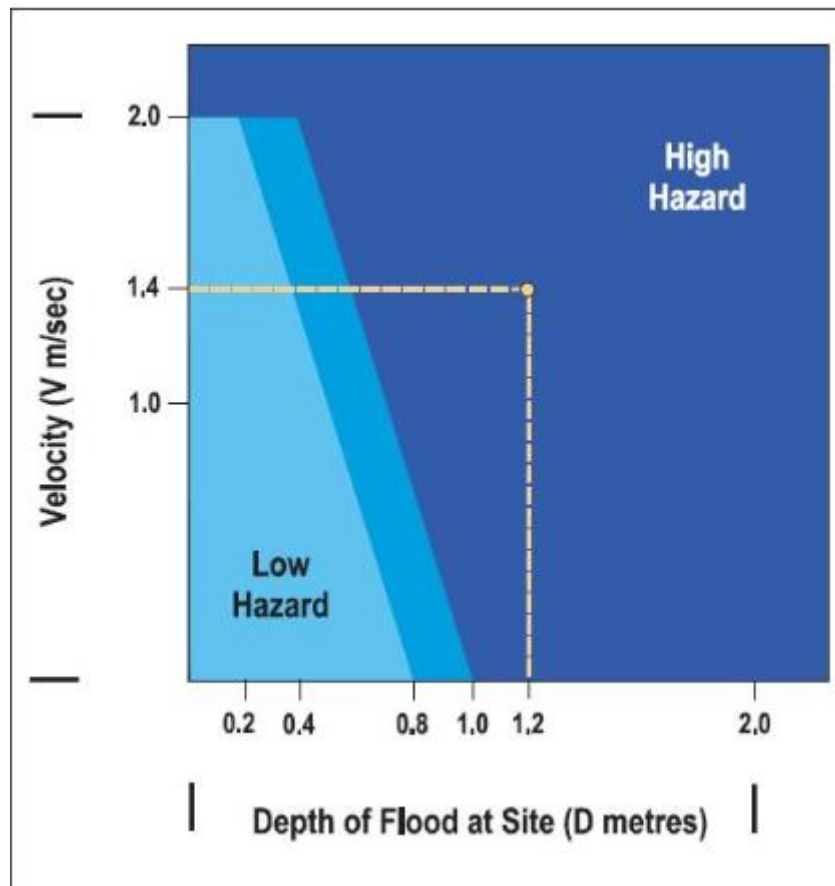
- > Figure E1 – 10% AEP Peak Depths;
- > Figure E2 – 10% AEP Peak Water Level;
- > Figure E3 – 10% AEP Peak Provisional Hazard;
- > Figure E4 – 10% AEP Hydraulic Categorisation;
- > Figure E5 – 1% AEP Peak Depths;
- > Figure E6 – 1% AEP Peak Water Level;
- > Figure E7 – 1% AEP Peak Provisional Hazard;
- > Figure E8 – 1% AEP Hydraulic Categorisation;
- > Figure E9 – PMF Peak Depths;
- > Figure E10 – PMF AEP Peak Water Level;
- > Figure E11 – PMF Peak Provisional Hazard; and
- > Figure E12 – PMF Hydraulic Categorisation.

The Study Area, which lies within the lower reaches of the catchment, is subject to overland flooding. It includes outlets for several significant stormwater culverts and overland flowpaths conveying runoff from the broader catchment.

Bridge Road acts as a major overland flow path for upstream runoff to reach the outlet. The majority of the Blackwattle Bay catchment runoff flows around Wentworth Park along Wattle Street and Wentworth Park Road, which then crosses Bridge Road. Bridge Road is inundated by up to 700mm flood depth for the smallest event assessed (10% AEP).

Provisional flood hazard was determined based on the definition of the NSW Floodplain Development Manual (2005) through a relation between the depth and velocity of floodwaters (**Figure 3-2**). This definition considers three categories for provisional hazard; High, Medium (Transition Zone) and Low.

For Existing conditions, in all events up to the 1% AEP event, the Study Area and adjoining roads are predominantly defined as low hazard, with the exception being the intersection of Bridge Road and Wentworth Park Road where there are areas of medium and high hazard. In the PMF event, all the adjoining roads (Bridge Road, Wattle Street and Wentworth Park Road) are predominantly high hazard.



Source: NSW Floodplain development Manual (2005)

Figure 3-2 Provisional Flood Hazard Categories

3.5 Stage 1 Demolition Works Flood Behaviour

The existing scenario flood model was revised to represent the demolition works scenario. The existing buildings were removed within the Study Area to establish the interim demolition phase flood behaviour. The model was run for 10% AEP, 1% AEP and PMF events.

The results have been provided in **Appendix D**.

A summary of the results provided is as follows:

- > Figure DM1 – 10% AEP Peak Depths;
- > Figure DM2 – 10% AEP Peak Water Level;
- > Figure DM3 – 10% AEP Peak Provisional Hazard;
- > Figure DM4 – 10% AEP Hydraulic Categorisation;
- > Figure DM5 – 1% AEP Peak Depths;
- > Figure DM6 – 1% AEP Peak Water Level;
- > Figure DM7 – 1% AEP Peak Provisional Hazard;
- > Figure DM8 – 1% AEP Hydraulic Categorisation;
- > Figure DM9 – PMF Peak Depths;
- > Figure DM10 – PMF AEP Peak Water Level;
- > Figure DM11 – PMF Peak Provisional Hazard;
- > Figure DM12 – PMF Hydraulic Categorisation; and
- > Figure DM13 – 1% AEP Water Level Difference – Demolition Scenario Less Existing Scenario.

Removing the existing buildings generally has no negative impact on flood behaviour outside the Study Area for all the design events modelled.

3.6 Concept Design and Stage 2 Main Works Flood Behaviour

The existing scenario flood model was revised to represent the proposed new Sydney Fish Market development. The proposed development design terrain is shown in **Appendix E**. This has been based on the design provided to Cardno by Mott McDonald (dated 24/09/2019).

The existing drainage network was modified by Mott McDonald (09/10/2018) for the study area to represent the proposed case drainage network. The proposed drainage network includes adding new pits and pipes and also some modification to the existing drainage network (**Appendix F**). The proposed drainage network for the design case was included in the TUFLOW model.

The additional design features that were incorporated in the flood model included:

1. Extending the model to include the Study Area and proposed buildings extents;
2. Proposed Sydney Fish Market building;
3. Finished surface levels of the public domain;
4. New finished surface levels for Bridge Road;
5. Inclusion of proposed drainage networks for the Eastern Plaza and western Plaza (refer below for details); and
6. Modifications to the outlet structures discharging into the bay (refer to *SFM Structures, Civil and Maritime DA Design Report*, Mott Macdonald, 26 September 2019). Further details of the proposed outlet structures are provided in **Appendix G**.

Eastern/Civic Plaza Drainage Network

A series of slots and grates and a 10 m wide overland flow path are provided to collect and convey flows in the Eastern Plaza. The slots and grates discharge directly into the bay below. The overland flow path conveys flows in excess of the capacity of the slots and grates through to the edge of the bay. In the 1% AEP event, the slots and grates capture approximately 5 m³/s of flow. In addition, a series of 0.9m x 0.9m raised grates are also included in the bioretention area adjacent to Bridge Rd to capture and convey a portion of the flow (approximately 0.4 m³/s). **Figure 3-3** shows the Eastern Plaza drainage network setup in the TUFLOW model.

Western Plaza Drainage Network

In the Western Plaza, four 0.9 m x 0.9 m raised grates and a 900 mm diameter pipe are included in the bioretention area adjacent to Bridge Road. A continuous slot has also been included at the northern edge of the sunken wetland to allow flows to discharge directly to the bay under the raised promenade. In the 1% AEP event, the raised grates capture approximately 0.5 m³/s and the slot conveys approximately 12.3 m³/s. **Figure 3-4** shows the Western Plaza drainage network setup in the TUFLOW model.

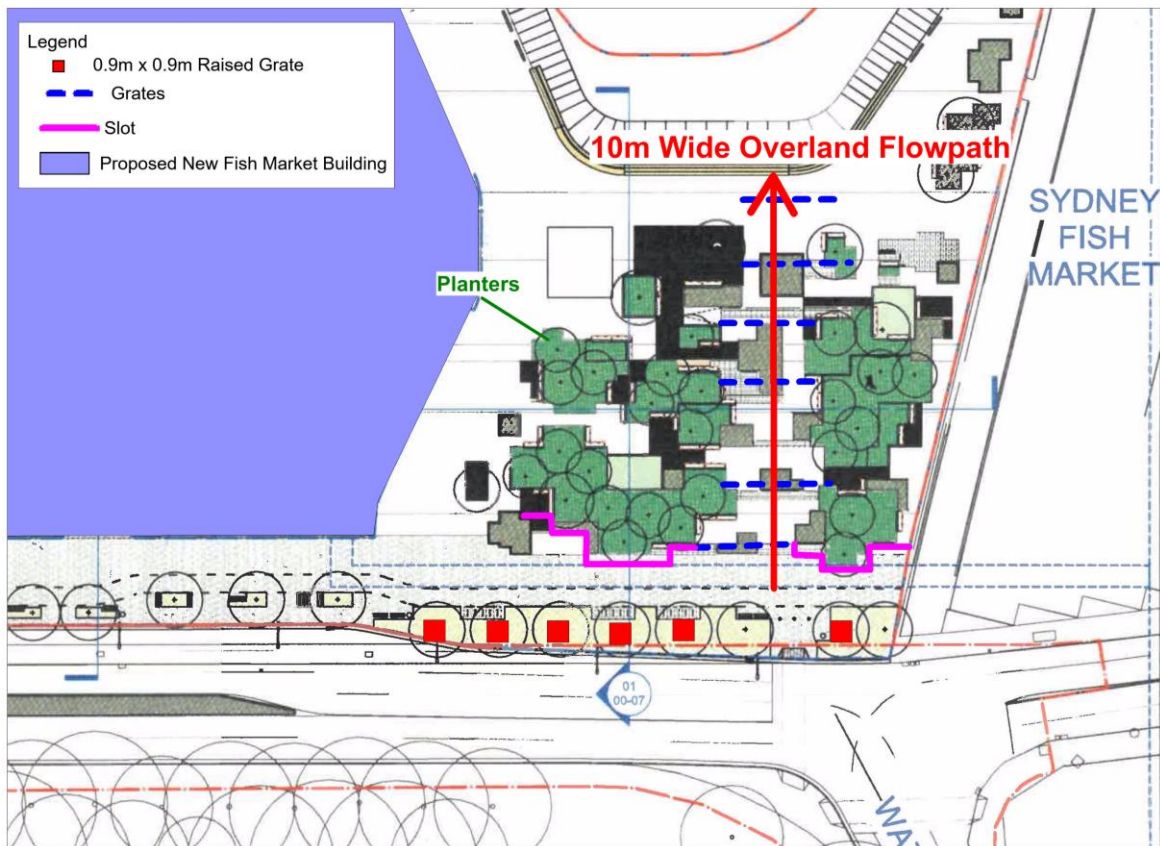


Figure 3-3 Eastern/Civic Plaza Drainage Network Setup in the TUFLOW Model

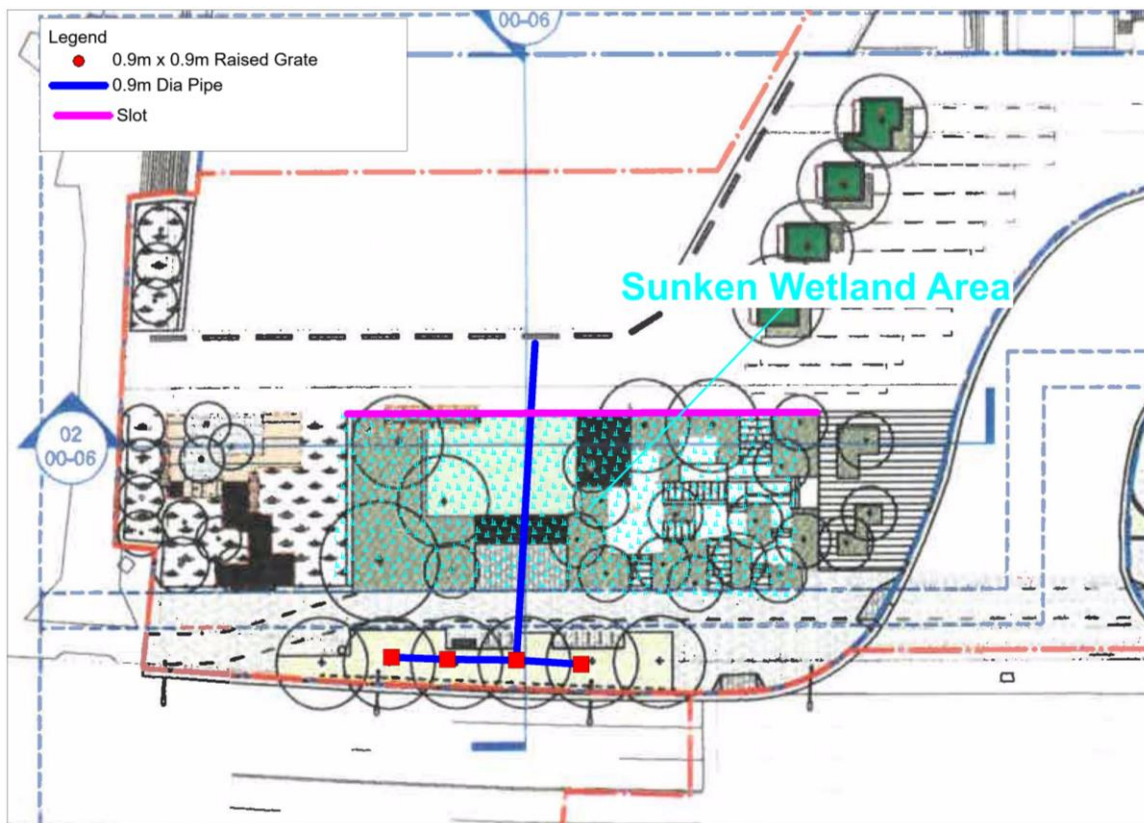


Figure 3-4 Western Plaza Drainage Network Setup in the TUFLOW Model

The results have been provided in **Appendix D**. A summary of the results provided is as follows:

- > Figure P1 – 10% AEP Peak Depths;
- > Figure P2 – 10% AEP Peak Water Level;
- > Figure P3 – 10% AEP Hazard;
- > Figure P4 – 10% AEP Hydraulic Categorisation;
- > Figure P5 – 1% AEP Peak Depths;
- > Figure P6 – 1% AEP Peak Water Level;
- > Figure P7 – 1% AEP Hazard;
- > Figure P8 – 1% AEP Hydraulic Categorisation;
- > Figure P9 – PMF Peak Depths;
- > Figure P10 – PMF Peak Water Level;
- > Figure P11 – PMF Hazard;
- > Figure P12 – PMF Hydraulic Categorisation;
- > Figure P13 – 1% AEP Water Level Difference – Proposed Scenario Less Existing Scenario

The flood behaviour for 10% AEP, 1% AEP and PMF events shows that the proposed changes in Bridge Road surface levels has resulted in minor changes in the flood behaviour within and surrounding the Study Site. The impacts of development on the flood behaviour were found to be consistent with the requirements of SEARs and NSW Floodplain Development Manual (2005).

3.6.2 Flood Impact Assessment

Figure 3-5 shows the difference in 1% AEP flood levels between the Existing and Proposed Scenarios. This shows flooding conditions have generally improved along Bridge Road with flood levels decreasing up to 0.22 m at the intersection with Wentworth Park Road. Flood levels along Wattle St and Wattle Crescent generally decrease by up to 0.035 m. Minor increases in water levels observed on the western foreshore promenade are localised and, being at the boundary of the model, are considered most likely due to a minor model instability rather than representing a real increase in flood levels. A minor, localised impact is also observed in Wentworth Park (largely < 0.05 m) due to the raising of Bridge Road. No adverse impacts on flooding are observed on adjoining private properties as a result of the proposed development.

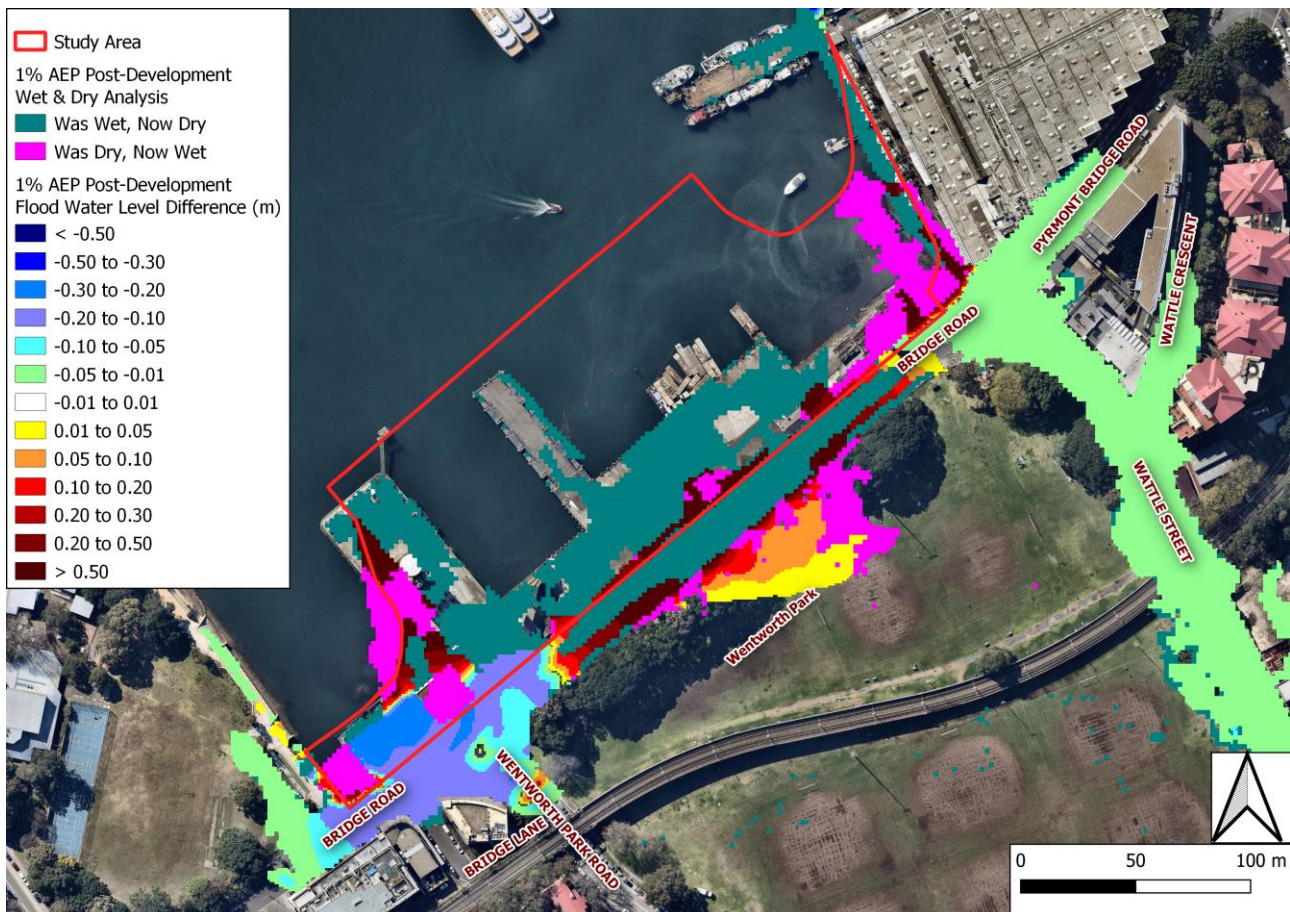


Figure 3-5 1% AEP Water Level Difference (Proposed Scenario Less Existing Scenario)

3.6.3 Flood Hazard

In relation to hazard, there is minimal difference in hazard between the existing and proposed scenarios. The key exception being along areas of Bridge Road that have been raised in the proposed scenario and are flood free up to the 1% AEP event. They therefore also have no categorised hazard in events up to the 1% AEP event. In the PMF event, similarly to existing conditions, all the adjoining roads (Bridge Road, Wattle Street and Wentworth Park Road) are predominantly high hazard. The exception also being the raised areas of Bridge Road, which are fully inundated, but have reduced hazard relative to existing conditions due to shallower depths.

3.7 Climate Change Assessment

Climate change is expected to cause increased rainfall intensities and sea level rise. The NSW Government's Floodplain Risk Management Guideline Practical Consideration of Climate Change (2007) provides recommendations on assessing the impact of climate change on flood behaviour.

3.7.1 Increases in Rainfall Intensity

A sensitivity analysis has been undertaken by assessing the 0.5% and 0.2% AEP flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.

The peak flood depth results for the 0.5% and 0.2% AEP are provided in **Appendix H**. A summary of the results provided is as follows:

- > Figure R1 – 0.5% AEP Peaks Depths;
- > Figure R2 – 0.5% AEP Water Level Difference – 0.5% AEP Proposed Scenario Less 1% AEP Proposed Scenario;
- > Figure R3 – 0.2% AEP Peaks Depths; and
- > Figure R4 – 0.2% AEP Water Level Difference – 0.2% AEP Proposed Scenario Less 1% AEP Proposed Scenario.

For the 0.5% AEP event, increase in flood levels of less than 0.02 m are observed at the Eastern Plaza. Flood level increases of less than 0.04 m are observed at the Western Plaza. Increased water levels of less than 0.04 m are observed outside the study site, along Wattle Street and Wentworth Park Road. Increased water levels of up to 0.10 m are observed at Wentworth Park.

For the 0.2% AEP event, increases in flood levels of less than 0.07 m are observed at the Eastern Plaza. Flood level increases of less than 0.14 m are observed at the Western Plaza. In this event, impacts on flood levels outside the study site are also generally less than 0.22 m along Bridge Rd, Wattle Street and Wentworth Park Road. Increased water levels of up to 0.45 m are observed at the Wentworth Park. Flood extents within Wentworth Park significantly increase.

In summary, the impacts of increased rainfall intensity on flood levels within the study site are not significant. However, the surrounding roads and lands are potentially impacted by increased rainfall intensity, most significantly in the 0.2% AEP event.

3.7.2 Sea level rise

Climate change scenarios incorporating a 0.4 m and a 0.9 m rise in sea levels were modelled for the 1% AEP event, representing 2050 and 2100 climatic conditions in accordance with the *NSW Sea Level Rise Policy Statement* (NSW Government, 2009).

The peak flood depth results for the 1% AEP flood event with 0.4 m and 0.9 m rise in sea levels are provided in **Appendix H**. A summary of the results provided is as follows:

- > Figure S1 – 1% AEP with 0.4m Sea Level Rise Peaks Depths;
- > Figure S2 – 1% AEP Water Level Difference – 1% AEP Proposed Scenario with 0.4 m Sea Level Rise Less 1% AEP Proposed Scenario;
- > Figure S3 – 1% AEP with 0.9m Sea Level Rise Peaks Depths; and
- > Figure S4 – 1% AEP Water Level Difference with 0.9m rise in Sea – 1% AEP Proposed Scenario with 0.9 m Sea Rise Less 1% AEP Proposed Scenario.

As expected, with the Study Area being located adjacent to Blackwattle Bay, flood levels are predicted to increase with sea level rise.

With 0.4 m sea level rise, **Figure S2** shows that within the study area flood level increases of less than 0.02m are observed at the Western Plaza. Outside the Study Area along Wattle Street, Wentworth Park Road, Bridge Road and in Wentworth Park, flood level increases are generally less than 0.05 m.

With 0.9 m sea level rise, **Figure S4** shows increases in flood levels of up to 0.50 m in the Western Plaza. In the Eastern Plaza, flood level increases are less than 0.30 m. Outside the Study Area, along Wattle Street, Wentworth Park Road and in Wentworth Park, flood level increases are generally between 0.02m to 0.14m.

3.8 Emergency Response Management

3.8.1 Background

When determining the risk to life from flooding, the flood hazard for an area does not directly imply the danger posed to people in the floodplain. This is due to the capacity for people to respond and react to flooding, ensuring they do not enter floodwaters. This concept is referred to as flood emergency response.

To help minimise the flood risk to occupants of the floodplain, it is important that there are provisions for flood emergency response. There are two main forms of flood emergency response that may be adopted:

- > Evacuation: The movement of occupants out of the floodplain before the property becomes flooded;
- > Shelter-in-place: The movement of occupants to a building that provides vertical refuge on the site or near the site before their property becomes flood affected.

The emergency response provisions for a local area are outlined in documentation provided by the relevant emergency authority for New South Wales, the State Emergency Service (SES). The NSW SES typically prepare two documents relevant to flood emergency response:

- > Emergency Management Plan (EMPLAN); and
- > Flood Plan, which is a sub-plan of the EMPLAN.

These documents are intended to provide information to SES coordinators and other authorities relating to identified responsible personnel and agencies, as well as evacuation centres, evacuation procedures and actions in the event of flooding.

3.8.2 Flood Emergency Response Management Documentation

The Blackwattle Bay catchment is located within the Sydney West Emergency Management District. Flood emergency management for this district is organised under the NSW Disaster Plan (2010). No district DISPLAN has been prepared for the district within which the Blackwattle Bay catchment and new Sydney Fish Market Study Area lies.

The Blackwattle Bay Floodplain Risk Management Study and Plan (WMAwater 2015) recommends that a DISPLAN be prepared for the Sydney West Emergency Management District.

In addition, a local flood plan has not been prepared for the local area containing the Blackwattle Bay catchment.

3.8.3 Emergency Service Operators

The Blackwattle Bay Floodplain Risk Management Study and Plan (WMAwater 2015) identifies that emergency response to any flooding within the Blackwattle Bay catchment will be coordinated by the lead combat agency, the SES, from their Local Command Centre located at Erskineville.

3.8.4 Flood Warning

The Blackwattle Bay catchment is affected by flash flooding (i.e. floods where the warning time is less than 6 hours) and as such it is difficult to provide any warning in advance of floods. However, for flash flood catchments the BoM provides general warning services, including:

- > Flood Watches – early appreciation of a developing weather system that could lead to flooding;
- > Flood Warnings – water level readings from gauges;
- > Severe Weather Warnings; and
- > Severe Thunderstorm Warnings. As such, it is difficult to provide any flood warning in advance of floods.

3.8.5 Access and Movement During Flood Events

Any flood response must take into account the availability of flood free access, and the ease with which movement can be accomplished. Movement includes evacuation of people from flood affected areas, medical personnel attempting to provide aid and/or SES personnel installing flood defences.

3.8.5.1 Access Road Flooding

Excessive flooding on roads inhibit traffic and result in significant impacts on traffic flows throughout the region. Bridge Road is the major road servicing the Study Area. A summary of the flood depth and rate of rise at suitable location along this road is provided in **Figure 3-6** and **Table 3-2**.



Figure 3-6 Rate of Rise Reference Points

Table 3-2 Flood Behaviour at Bridge Rd for Various Events and Location

ID Point	Parameter	1% AEP	PMF
BR1	Peak Flood depth (m)	0.40	0.98
	Rate of Rise (m/hour)	0.41	1.60
BR2	Peak Flood depth (m)	0.41	1.25
	Rate of Rise (m/hour)	0.62	2.03
BR3	Peak Flood depth (m)	NA	0.26
	Rate of Rise (m/hour)	NA	0.03
BR4	Peak Flood depth (m)	0.31	1.13
	Rate of Rise (m/hour)	0.28	1.58

N/A - no flooding is observed at this location for this event

The rate of rise of flood waters in the PMF event is generally high, which would limit the opportunity to evacuate visitors and staff in this event. There are also areas of high hazard at the south eastern and south western corners of the development in the PMF event.

The rate of rise of flood waters in the 1% AEP event at all points is relatively low. However, the peak 1% AEP flood depth at some locations along Bridge Road, specifically at the south-eastern corner of the Study Area, are high. Therefore, evacuation via Bridge Road in the 1% AEP event is not recommended.

3.8.6 Shelter-in-Place Potential

The advantage of shelter-in-place is that people do not require as long to respond for this type of emergency response to be appropriate. As opposed to evacuation, where people are likely to have to travel a significant distance to reach flood free land, for shelter-in-place people are likely only going to need to access a mezzanine level or first floor within the same building. Therefore, this type of response is far more appropriate for flash flooding environments, in particular where the duration of flooding is expected to be relatively short and high hazard conditions are expected in surrounding access routes.

Therefore, a shelter-in-place approach is recommended for the nSFM due to the short duration of flooding and limited ability to provide safe evacuation offsite.

3.9 Flood Planning Assessment

As stated within Appendix K of the Floodplain Development Manual (NSW Government, 2005):

Flood Planning Levels (FPL's) are an important tool in the management of flood risk. They are derived from a combination of a flood event, and a freeboard.

CoS has an Interim Floodplain Management Policy (2014) that provides direction with respect to how floodplains are managed within the LGA of the CoS. This document provides general requirements for proposed development on flood prone land, FPL requirements for different development types and guidelines on flood compatible materials. **Table 3-3** lists the FPL requirements applicable for proposed Sydney Fish market.

Table 3-3 City of Sydney Flood Planning level requirements

Development		Type of Flooding	Flood Planning 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.
	Retail Floor Levels	Mainstream or local drainage flooding	Merits approach presented by the applicant with a minimum of the 1% AEP flood level. The proposal must demonstrate a reasonable balance between flood protection and urban design outcomes for street level activation.
Below ground/garage car park*	All other below-ground car parks	Mainstream or local drainage flooding	1% AEP flood level + 0.5m or the PMF (whichever is the higher)
	Below-ground car park outside floodplain	Outside floodplain	0.3m above the surrounding surface

* The below ground garage/car park level applies to all possible ingress points to the car park such as vehicle entrances and exits, ventilation ducts, windows, light wells, lift shaft openings, risers and stairwells.

It is noted that a property is considered to be outside the floodplain where it is above the mainstream and local drainage flood planning levels including freeboard.

Figure 3-7 shows the PMF water levels adjoining the proposed nSFM building and the reference locations for the various entrances into the building.

Based on the CoS FPL requirements, the required floor levels for the various entrances to the nSFM building are summarised in **Table 3-4**.

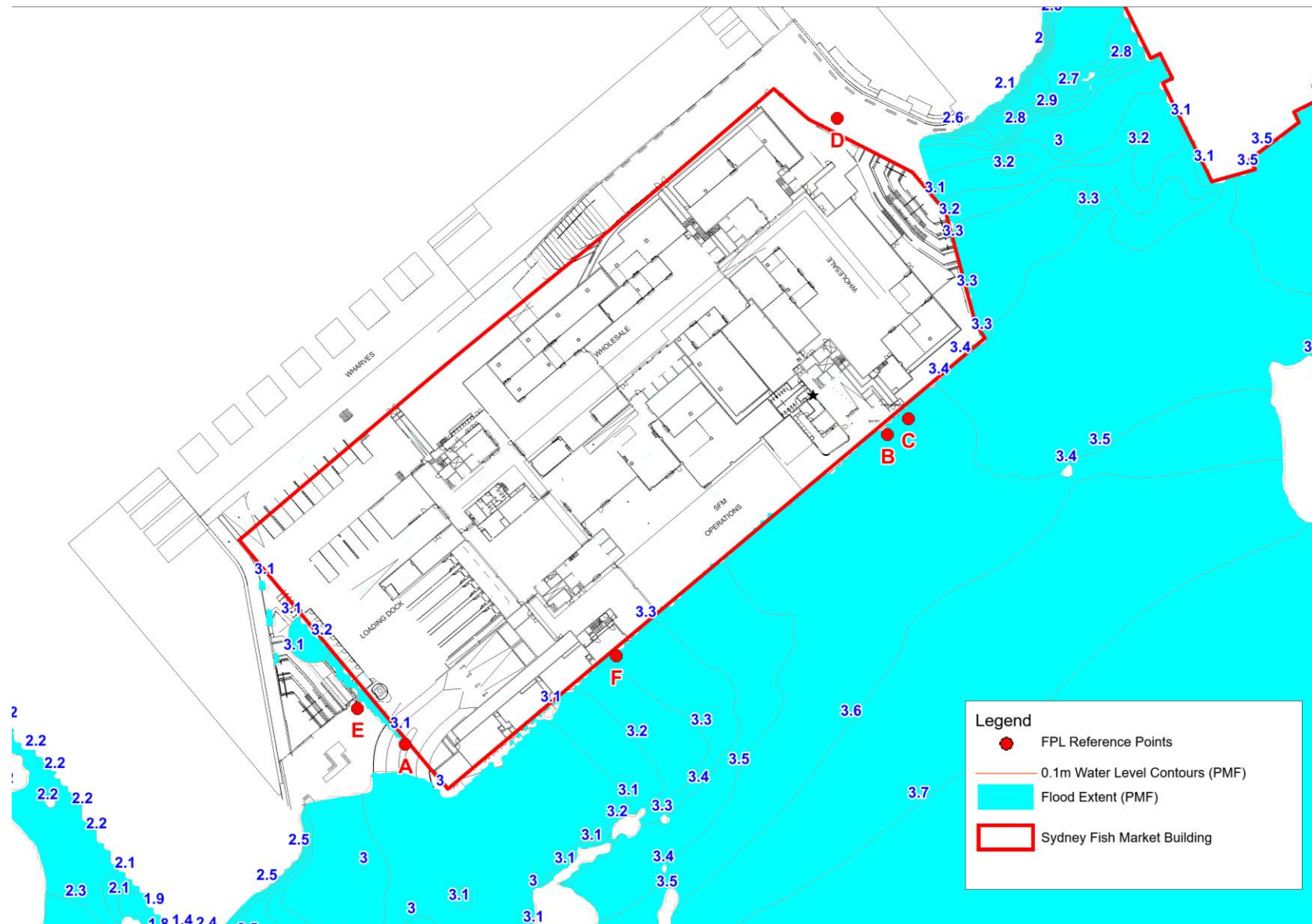


Figure 3-7 New Sydney Fish Market Building Entrance Reference Locations

Table 3-4 Flood Planning Level Assessment

Location	Proposed Development Flood levels (mAHD)		Flood Planning Level (FPL) Requirement		Proposed Levels (mAHD)
	1% AEP	PMF	CoS Requirement	mAHD	
A – Carpark Entrance	N/A	3.10	1% AEP Flood Level + 0.5m or the PMF (whichever is higher)	3.10	3.10
B – Lift Access	N/A	3.54	1% AEP Flood Level + 0.5m or the PMF (whichever is higher)	3.54	4.25
C – Fire Egress	N/A	3.53	1% AEP Flood Level + 0.5m or the PMF (whichever is higher)	3.53	3.29 / 3.53*
D – Lift Access	N/A	N/A	0.3m above the Surrounding Surface	N/A	3.10
E – Basement Access	N/A	3.15	1% AEP Flood Level + 0.5m or the PMF (whichever is higher)	3.15	3.15
F – Basement Access	N/A	3.31	1% AEP Flood Level + 0.5m or the PMF (whichever is higher)	3.31	3.10 / 3.31*

* The proposed level at the entry is below the FPL requirement, however the minimum level is proposed to be achieved at these locations by incorporating steps within the egress.

From a comparison of the FPL and proposed levels in **Table 3-4** it is concluded that all locations are in accordance with Council's flood planning requirements.

4 Water Quality Assessment

Water quality and water balance modelling of the proposed development has been undertaken using Model for Urban Stormwater Improvement Conceptualisation (MUSIC) software.

4.1 Water Quality Objectives

The Study Area drains directly into Blackwattle Bay. The Baseline Assessment of Ecological Structure and Environmental conditions at The Bays Precinct (University of NSW, 2017) provides information on the environmental condition of sediments. Grab samples were collected at various sites adjacent to natural or artificial habitats to measure nutrients and metals. Sediments found were predominantly silty with the highest concentration of metal at Blackwattle Bay. The sediment concentration of around 2000mg/kg of total nitrogen and 1000mg/kg of phosphorous were found. The metal and nutrient levels were found to be above the recommended values.

No additional water quality information was available to establish baseline water quality for Blackwattle Bay. In addition, no information was available on any known existing Water Sensitive Urban Design (WSUD) features within the Study Area.

The Sydney Development Control Plan (DCP) 2012 sets targets for stormwater quality for urban developments. All developments greater than 1,000m² are required to achieve the following reductions in post-development baseline (ie. proposed development without any water quality treatment) annual pollutant loads:

- > Gross Pollutants (GP) (litter and vegetation >5 mm) 90%
- > Total Suspended Solids (TSS) 85%
- > Total Phosphorus (TP) 65%
- > Total Nitrogen (TN) 45%

4.1.1 Groundwater

The Revised Geotechnical Report to UrbanGrowth NSW on Geotechnical Investigation for Proposed Bays Market District at Blackwattle Bay, Pyrmont, NSW (J&K Geotechnics, 2017) provides background information on the geology at the site. The site is underlain by the Hawkesbury Sandstone of the Wianamatta Group, consisting of medium to coarse grained quartz sandstone with very minor shale and laminate lenses. At least two dolerite dykes are believed to extend through the site in a rough north-west alignment.

Groundwater is expected to be present within the Hawkesbury Sandstone at the site.

4.2 Model Set-Up

The City of Sydney WSUD Technical Guidelines (Alluvium, 2014) were used as a basis to set-up a MUSIC model for the proposed development.

4.2.1 Climate Data

Pluviograph rainfall data was obtained from City of Sydney's MUSIC-link data. Details are summarized in **Table 4-1**.

Table 4-1 Rainfall Gauge Details

Bureau of Meteorology Station No.	066062
Location	Sydney Observatory Hill
Data Period	1/01/1982
Data Period Used	31/12/1986
Data Type	Pluviograph (6-minute)
Number of Years	5
Average Annual Rainfall (mm)	1290

Potential Evapo-transpiration (PET) data was also obtained from CoS MUSIC-link. Average monthly PET is summarised in **Table 4-2**.

Table 4-2 Average Monthly Potential Evapo-transpiration (PET) (mm)

Mon	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
PET	180	135	128	85	58	43	43	58	88	127	152	163

4.2.2 Land Use

The existing land use types within the Study Area were identified based on aerial imagery. The land uses, area breakdown and adopted impervious percentages for each land use category for the purposes of the MUSIC model are provided in **Table 4-3**.

Table 4-3 Existing Land Use and Catchment Characteristics

Land Use	Surface Type	Area (ha)	% Impervious
Roof	Roof	0.15	100%
Paved (including wharf)	Mixed	1.32	100%
Pervious	Mixed	0.07	0%
TOTAL		1.54	

The proposed land use types within the Study Area were identified based on the concept designs. The land uses, representative surface types, areas and adopted impervious percentages for the purposes of the MUSIC model are provided in **Table 4-4**. Areas of Bridge Road which are external to the site, but drain to the proposed treatment measures have also been included.

Table 4-4 Proposed Land Use and Catchment Characteristics

Land Use	Surface Type	Area (ha)	% Impervious
Roof	Roof	1.71	100%
Public Domain	Mixed	1.86	90%
Paved / Vehicle Ramp	Sealed Road	0.05	100%
Wharf/Dock	Mixed	0.30	100%
Total Site		3.62	
Bridge Rd (external to site)	Sealed Road	0.32	100%
Total Including External		3.94	

The total Study Area has increased in the proposed development scenario as it extends over Blackwattle Bay.

4.2.3 Rainfall Runoff Parameters

The adopted rainfall-runoff parameters are listed in **Table 4-5**. This has been based on sandy loam soil characteristics.

Table 4-5 Rainfall Runoff Parameters

Parameter	Roof	Mixed	Sealed Road
Impervious Area Properties			
Rainfall Threshold (mm/day)	0.3	1.5	1.5
Pervious Area Properties			
Soil Storage Capacity (mm)	-	195	-
Soil Initial Storage (% of Capacity)	-	30	-
Field Capacity (mm)	-	135	-
Infiltration Capacity Coefficient –a	-	250	-
Infiltration Capacity Exponent –b	-	1.3	-
Groundwater Properties			
Initial Depth (mm)	-	10	-
Daily Recharge Rate (%)	-	60	-
Daily Baseflow Rate (%)	-	45	-
Daily Deep Seepage Rate (%)	-	0	-

4.2.4 Pollutant Generation

In MUSIC stormwater quality is characterised by event mean concentrations (EMC) for storm flow and base flow conditions. Base flow parameters are summarised in Table 4-6 and storm flow parameters are summarised in **Table 4-7**.

Table 4-6 Base Flow Pollutant Concentration Parameters by Land Use

Surface Type	Concentration (mg/L-log ₁₀)					
	TSS		TP		TN	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Roof	-	-	-	-	-	-
Mixed	1.20	0.17	-0.85	0.19	0.11	0.12
Sealed Road	-	-	-	-	-	-

Table 4-7 Storm Flow Pollutant Concentration Parameters by Land Use

Land Use	Concentration (mg/L-log ₁₀)					
	TSS		TP		TN	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Roof	1.30	0.32	-0.89	0.25	0.30	0.19
Mixed	2.15	0.32	-0.60	0.25	0.30	0.19
Sealed Road	2.43	0.32	-0.30	0.25	0.34	0.19

4.3 Water Sensitive Urban Design

A key component of urban water management is Water Sensitive Urban Design (WSUD). WSUD manages the impacts of stormwater from development with the aim of protecting and improving waterway health by mimicking the natural water cycle as closely as possible.

Some of the commonly used WSUD structures are listed in **Table 4-8**.

Table 4-8 Typical WSUD Devices

Device	Description
Gross Pollutant Traps (GPTs)	GPTs are structures that trap litter and coarse sediment.
Grass Swales	Grass swales are a method of replicating a more natural water cycle, whereby nutrients, sediments and other pollutants with potential to cause water quality issues are captured or absorbed by the vegetation as the stormwater runoff flows through the swale.
Infiltration trenches	Infiltration trenches collect and hold water below ground for disposal to the groundwater table. The trench is an excavation filled with porous material. Stormwater infiltrates from the walls and base of the trench while sediments and some dissolved pollutants are retained in the porous material.

Device	Description
Bioretention systems	Bioretention basins, also known as raingardens, filter stormwater runoff through densely planted surface vegetation and an engineered filter media such as sand. Bioretention basins can have the added benefit of providing detention to alleviate flooding issues as well as treating stormwater runoff.
Constructed wetlands	Constructed wetlands provide a natural way to treat stormwater before it enters the local waterways. They allow sediments to settle and remove a significant amount of pollutants by adhesion to vegetation and aerobic decomposition.
Porous paving	Porous paving allows water to pass through and captures suspended solids and pollutants, before discharging into the drainage network or to the groundwater table.
Rainwater/ Stormwater tanks	Rainwater and stormwater tanks allow capture and storage of runoff from roofs and paved surfaces. This water can then be reused as substitute for mains water supply, for toilet flushing, laundry and garden watering/irrigation. These tanks can either be above ground or underground.
Green roofs/walls	A green roof is a roof surface that is partially or completely planted with vegetation over a waterproof membrane. A green wall is an external wall that is partially or completely covered with vegetation on specially designed supporting structures. They help slowing stormwater runoff, and assist with water reuse.

4.4 Proposed Strategy

The proposed Stormwater Management Plan for the site is included in **Appendix I**. This plan includes the water quality treatment devices proposed for the Study Area including:

- > Rainwater harvesting and re-use of roof runoff;
- > Proprietary filters; and
- > Bioretention systems (including tree pits).

4.4.1 Rainwater harvesting

Rainwater harvesting was modelled for the Study Area based on the following design assumptions:

- > Minimum connected roof area – It has been assumed that low flows from the entire upper roof area (1.61 ha) will drain directly connected to the rainwater tank.
- > A 100 kL rainwater tank was adopted.
- > The average daily reuse volume adopted was 100 kL/day, predominantly for the cooling tower. This demand was scaled PET to represent the higher demand in summer relative to winter.

4.4.2 Proprietary Filters

Two types of proprietary filters are proposed to be used:

1. Pit Basket Inserts (eg; OceanGuard)

Pit baskets typically consist of a wire basket with a filtration bag liner. They predominantly remove sediment, litter and debris. Low flows are captured and filtered through the filtration bag and provision is made for flows in excess of the treatment capacity to bypass and enter straight into the stormwater network.

2. Jellyfish Filter

A Jellyfish Filter uses gravity and filtration cartridges containing membranes to remove litter, oil, solids and particulate bound pollutants (including nutrients, metals and hydrocarbons). They typically have a smaller footprint than other treatment devices.

Through the detailed design process, it is expected that these proprietary devices could be substituted for other devices, provided it can be demonstrated that the stormwater quality targets are still able to be met.

The pollutant removal rates for the proprietary filters adopted within the MUSIC model are provided **Table 4-9**.

Table 4-9 Proprietary Filters Input Parameters

Pit Basket			Jellyfish Filter	
Pollutant	Input	Output	Input	Output
TSS (mg/L)	0	0	0	0
	100	46	200	22
TP (mg/L)	0	0	0	0
	10	7	0.4	0.14
TN (mg/L)	0	0	0	0
	10	7.9	7	3.2
GP (mg/L)	0	0	0	0
	10	0.5	100	1

4.4.3 Bioretention System

The design parameters adopted for the bioretention basin are shown in **Table 4-10**.

Table 4-10 Bioretention Basin Input Parameters

Parameters	Values
Saturated Hydraulic Conductivity (mm/hr)	100
Filter Depth (m)	0.6
Extended Detention Depth (m)	0.1
TN Content (mg/kg)	600
Orthophosphate Content (mg/kg)	40
Exfiltration Rate (mm/hr)	0.0
Base Lined	Yes
Submerged Zone	No

4.5 Model Setup

The MUSIC model set-ups for existing, demolition and proposed development with WSUD scenario are shown in **Figure 4-1**, **Figure 4-2**, and **Figure 4-3**.

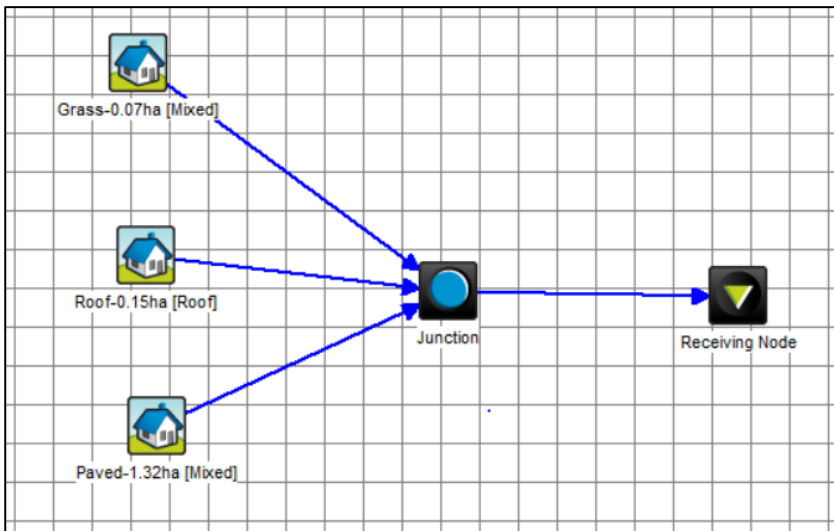


Figure 4-1 MUSIC Model Set-up – Existing Scenario

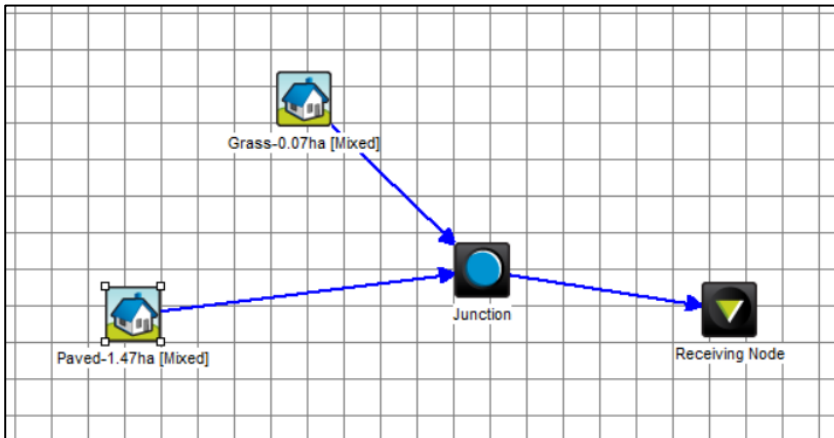


Figure 4-2 MUSIC Model Set-up – Demolition Scenario



Table 4-11 shows the water balance results for the Study Area for the existing, demolition and proposed development scenarios.

Table 4-11 Water Balance (excluding external areas)

Parameter	Existing (ML/year)	Demolition (ML/year)	Developed - no WSUD (ML/year)	Developed - with WSUD (ML/yr)
Rainfall	19.8	19.8	47.9	47.9
Evapotranspiration	2.2	2.3	4.1	6.5
Groundwater Flows	0.2	0.2	0.5	0.5
Stormwater Runoff	17.4	17.3	42.6	32.8
Rainwater Reuse	0	0	0	7.5

Table 4-12 shows the pollutants generated from the Study Area for existing and developed (no WSUD) scenarios.

Table 4-12 Water Quality Results

Parameter	Developed without WSUD (kg/year)	Reduction Achieved* (kg/year)	% Reduction Achieved*	% Reduction Target
Gross Pollutants (GP)	1,100	1,099	99%	90%
Total Suspended Solids (TSS)	4,660	4,430	95%	85%
Total Phosphorus (TP)	10.2	7.6	74%	65%
Total Nitrogen (TN)	97	57	59%	45%

* 'Reduction Achieved' includes pollutants removed from external areas (Bridge Road catchments)

For the developed scenario, increases in the catchment size from 1.54 ha to 3.6 ha due to the proposed structures over Blackwattle Bay and the changes in land uses has resulted in an increase in the annual pollutant loads produced by the Study Area.

The results of the MUSIC modelling indicate that the proposed WSUD measures have increased the evapotranspiration rate and reduced the stormwater runoff from the Study Area in comparison to the existing scenario. The WSUD measures also achieve the required CoS water quality targets.

4.7 Demolition and Construction Water Quality Monitoring

For the purpose of managing any impacts from the Study Area during the demolition stage, monitoring of water quality parameters is required to be established. The objective of the monitoring is to establish the systems and processes that would be required to identify any deviations from the baseline existing water quality conditions for the Study Area (refer **Section 4.3**).

Water quality monitoring would be carried out during the following project stages:

- > Pre-construction (baseline monitoring);
- > Demolition Phase; and
- > Construction Phase.

Water quality monitoring is to be undertaken at all discharge locations into the Bay.

4.7.1 Monitoring Frequency

Indicative minimum monitoring frequencies are presented in **Table 4-13**.

Table 4-13 Monitoring Frequency

Project Stages	Monitoring Frequency
Pre-Construction	Weekly
Demolition	Monthly
Construction	Monthly

4.7.2 Types of Water Quality Monitoring

The indicative key types of monitoring to be undertaken are:

- > Blackwattle Bay; and
- > Water Quality Treatment Device.

Water samples for analysis are to be collected from the treated water on site prior to discharge into the Bay, and in the receiving environment immediately adjacent to the discharge outlet in the Bay. A suite of monitoring parameters has been established for the program, which include commonly encountered surface water pollutants typically associated with the construction and post construction phases of land development projects. This is presented in **Table 4-14** and represents the minimum suite of parameters, and the suite may be expanded as required where other potential pollutants are identified. The trigger values shown have been based on the ANZECC guidelines.

Table 4-14 Monitoring Parameters and Trigger Values

Parameters	Units	Trigger Value
<i>Physio-chemical</i>		
pH	pH units	8 – 8.5
Turbidity	NTU	0.5 - 10
Suspended Solids	mg/L	
Salinity	µScm ⁻¹	20 – 30
Dissolved Oxygen	% saturation	90 - 110
Total Phosphorus (TP)	µg P L ⁻¹	25
Total Nitrogen (TN)	µg P L ⁻¹	120
<i>Metals</i>		
Cadmium	µg L ⁻¹	0.7
Copper	µg L ⁻¹	1.3
Lead	µg L ⁻¹	2.2
Mercury	µg L ⁻¹	0.1
Zinc	µg L ⁻¹	15
Chromium (Cr III)	µg L ⁻¹	7.7
Chromium (CrVI)	µg L ⁻¹	0.14

Parameters	Units	Trigger Value
Nickel	µg/L ⁻¹	7

4.7.3 Erosion and Sediment Control

The Managing Urban Stormwater – Soils & Construction (Landcom, 2004) guideline states that:

- > *Erosion and Sediment Control Plans should be prepared on smaller sites, such as, where more than 250 but less than 2,500m² of land will be disturbed; and*
- > *Soil and Water Management Plans generally should be prepared for all development works where more than 2,500 m² of land will be disturbed and/or where development consent is required"*

The Sydney Fish Market project will involve disturbance of more than 2,500m² hence a soil and water management plan will be required for all the proposed works.

Stormwater runoff from the Study Area would require measures such as turbidity curtains, silt fences, filter socks and sedimentation basins.

The potential impacts from the management of soil from demolition and earthworks are:

- > Sediment migration into the stormwater system and harbour; and
- > Mixing of contaminated and non-contaminated materials.

5 Conclusion

This flooding and water quality assessment has been undertaken as part of the new Sydney Fish Market Environment Impact Statement (EIS), which accompanies a concept development application in accordance with Clause 3 of Schedule 2 of the Environmental Planning and Assessment Regulation 2000. The report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) for the new Sydney Fish Market in relation to flooding and stormwater quality.

This assessment has demonstrated that flooding and stormwater quality can be appropriately managed within the Study Area and the relevant SEARs addressed.

Flooding

This report presents the outcomes of flood modelling undertaken to establish the existing flood behaviour at the proposed new Sydney Fish Market location, the changes in flood behaviour during demolition of the site and the proposed flood behaviour with the new Sydney Fish Market development.

As demonstrated in **Section 3.6** of this report, the impact of the proposed development is minimal with decreases in flood levels observed at most locations.

This report has also addressed climate change and emergency response management requirements.

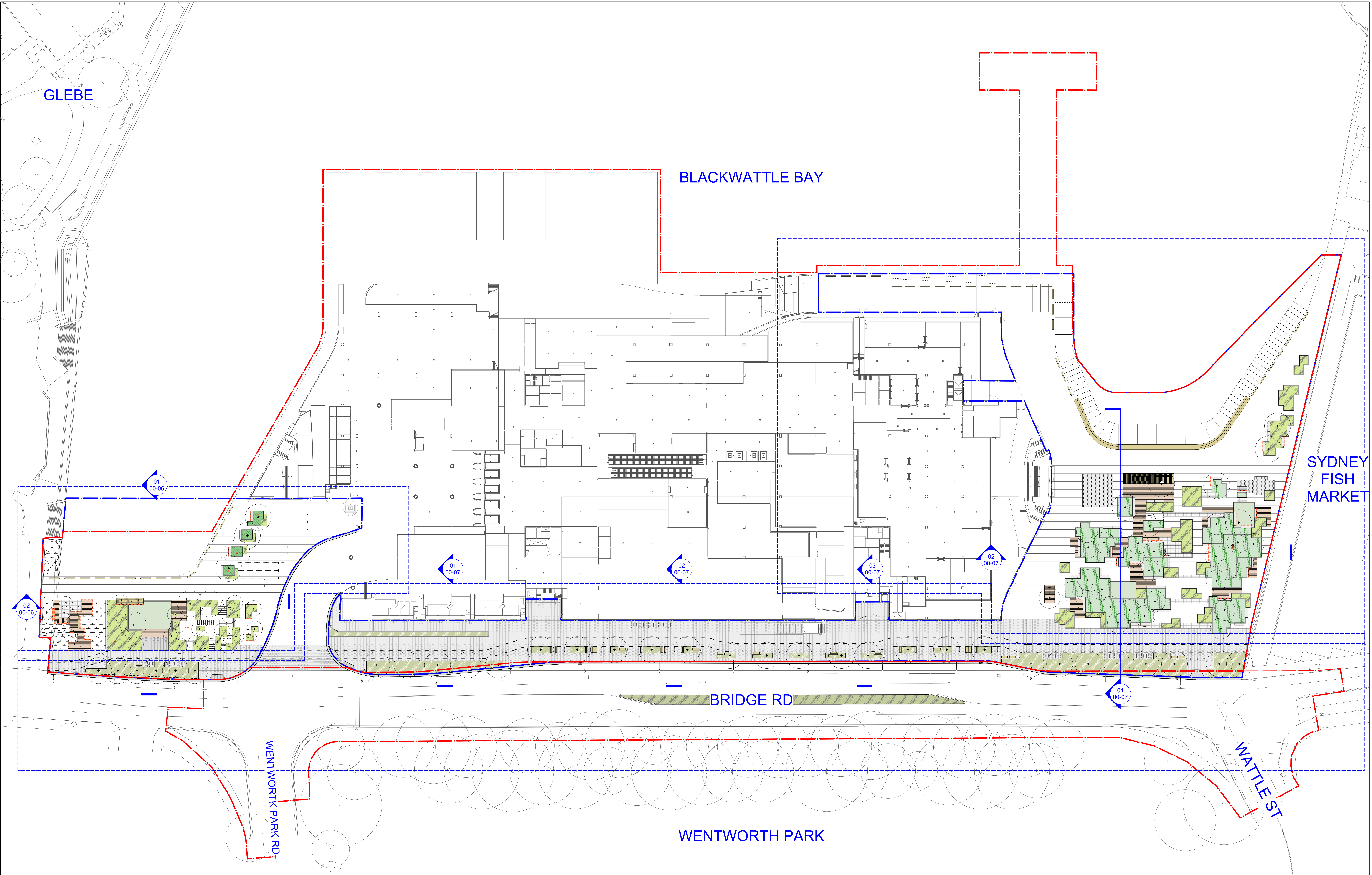
Water Quality

A review of the existing surface water, hydrology and groundwater conditions has been undertaken and suitable water quality objectives have been established. A MUSIC water quality model was assembled to assess the existing hydrology and water quality conditions and the impact of the proposed works. MUSIC has also been used to demonstrate that the proposed WSUD strategy is able to meet the relevant targets.

APPENDIX

A

SITE PLAN



WARNING Services shown on this drawing are approximate only. The exact location is to be confirmed on site by contractor prior to commencement of work. These coloured drawings shall be read in digital format or colour hardcopy. Those drawings shall be read in conjunction with any Engineers, Architects or other consultant information (not limited to drawings, legends, schedules, specifications). Check all dimensions and site conditions prior to commencement of any work or procurement of any services, materials, fittings or equipment. Not be reproduced or distributed without prior permission of the Landscape Architect.	NOTES / KEY PLAN - All services should be referred to on the qualified engineers drawings. Landscape drawings do not include service information. Provision has been made for in landscape systems and build up for services to the installed once finalised. - Final coordination with structural engineering has not been included in this set of drawings. Please refer structural engineers drawings for all detailed structural information. - Levels and grading plans require final coordination with civil and hydraulic engineers. Final levels and drainage will depend on final flood modelling, sign-off by M&S for bridge flood design and responses to NSWCA comments and conditions. - Section Plans are subject to finalisation of structural and civil engineers drawings and have not been included in this documentation. - Detail of infiltration planters subject to future approvals and direction from NSW. - Final Planting Plan including plant layout and species will be provided based on the finalisation of the above.	DATE 28/19 REV A AMENDMENTS ISSUE FOR COSTING

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PROJECT
NEW SYDNEY FISH MARKET
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CLIENT
inSW Infrastructure
New South Wales

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APPENDIX

B

SEARS

Secretary's Environmental Assessment Requirements

Section 78A(8) of the *Environmental Planning and Assessment Act 1979*
Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*

Application Number	SSD 8924
Proposal Name	Sydney Fish Markets – Concept development application and Stage 1 works comprising demolition and early works
Location	1A, 1B & 1C Bridge Road, Glebe, Sydney
Applicant	UrbanGrowth NSW Development Corporation
Date of Issue	22 December 2017
General Requirements	<p>The Environmental Impact Statement (EIS) must address the <i>Environmental Planning and Assessment Act 1979</i> and meet the minimum form and content requirements in clauses 6 and 7 of Schedule 2 of the <i>Environmental Planning and Assessment Regulation 2000</i>.</p> <p>Notwithstanding the key issues specified below, the EIS must include an environmental risk assessment to identify the potential environmental impacts associated with the development.</p> <p>Where relevant, the assessment of the key issues as listed below, and any other significant issues identified in the risk assessment, must include:</p> <ul style="list-style-type: none"> • adequate baseline data • justification of impacts • consideration of potential cumulative impacts due to other development in the vicinity • measures to avoid, minimise and if necessary, offset the predicted impacts, including detailed contingency plans for managing any significant risks to the environment. <p>The EIS must also be accompanied by a report from a qualified quantity surveyor providing:</p> <ul style="list-style-type: none"> • a detailed calculation of the capital investment value (CIV) of the development (as defined in clause 3 of the <i>Environmental Planning and Assessment Regulation 2000</i>), including details of all assumptions and components from which the CIV calculation is derived • an estimate of the jobs that will be created by the development during construction and operation • verification that the CIV was accurate on the date that it was prepared.
Key issues	<p>The EIS must address the following specific matters:</p> <ol style="list-style-type: none"> 1. Environmental Planning Instruments (EPIs), policies and guidelines <ul style="list-style-type: none"> • The relevant statutory provisions contained within the applicable EPIs and Development Control Plans including: <ul style="list-style-type: none"> ○ State Environmental Planning Policy (State & Regional Development) 2011 ○ State Environmental Planning Policy (State Significant Precincts) 2005 ○ State Environmental Planning Policy No. 26 – City West ○ State Environmental Planning Policy (Infrastructure) 2007 ○ State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55) ○ Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005

	<ul style="list-style-type: none"> ○ Draft State Environmental Planning Policy – Environment ○ Draft State Environmental Planning Policy – Infrastructure ○ Sydney Local Environmental Plan 2012 ○ Sydney Harbour Foreshores and Waterways Area DCP 2005 <ul style="list-style-type: none"> ● The relevant provisions, goals and objectives in the following: <ul style="list-style-type: none"> ○ <i>NSW State Priorities</i> ○ <i>NSW Planning Guidelines for Walking and Cycling</i> ○ <i>Better Placed – An integrated design policy for the built environment of New South Wales</i> ○ <i>A Plan for Growing Sydney</i> ○ <i>Towards our Greater Sydney 2056</i> ○ <i>Draft Eastern City District Plan</i> ○ <i>Sustainable Sydney 2030</i> ○ <i>Future Transport Strategy 2056</i> ○ <i>Sydney City Centre Access Policy</i> ○ <i>NSW Freight and Ports Plan 2013</i> ○ <i>Sydney's Light Rail Future</i> ○ <i>Sydney's Ferry Future</i> ○ <i>The Bays Precinct Sydney: Transformation Plan</i> ○ <i>NSW Aquifer Interference Policy.</i> <p>2. Strategic context and staging</p> <ul style="list-style-type: none"> ● Consider the proposal in the context of the work being undertaken for the Bays Market District (BMD) nominated as a State Significant Precinct, having regard to the relevant State Significant Precinct Study Requirements for the BMD. ● Consider the proposal in the context of the proposed changes to the State Environmental Planning Policy (State & Regional Development) 2011, State Environmental Planning Policy No.26 – City West and Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 and Draft State Environmental Planning Policy – Environment. ● Outline the proposed stages and works of the development during the Stage 1 proposal and Stage 2 proposal. <p>3. Design excellence</p> <ul style="list-style-type: none"> ● A design excellence strategy is to be provided which has been prepared in consultation with the NSW Government Architect and the City of Sydney, demonstrating how the Stage 2 proposal will achieve design excellence. <p>4. Built form and urban design</p> <ul style="list-style-type: none"> ● Provide an outline of the design process leading to the proposal, including justification of the suitability of the site for the proposed building envelope. ● Provide an urban design analysis of the proposed development with reference to the building envelope, height, setbacks, bulk and scale in the context of the immediate locality, the wider area, and the desired future character, including development options for the remainder of the BMD. ● Include justification for the height, bulk and scale of the proposed building envelope within the context of the locality, its impacts on amenity, views and vistas, and how it would successfully relate to the existing and future character of the surrounding area, including development options for the remainder of the BMD. ● Identify the proposed land uses, including a schedule of gross floor area calculations. <p>5. Scenic quality and visual impacts</p> <ul style="list-style-type: none"> ● Provide a detailed justification for the proposed building location in Sydney Harbour (Blackwattle Bay). ● Provide an outline of what alternative location options were investigated.
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	<ul style="list-style-type: none"> • Provide a detailed Visual Impact Assessment in accordance with the Plans & Documents section. The Visual Impact Assessment must provide a detailed analysis of the proposal's impacts on the scenic quality of the foreshore and justification for these impacts having regard to the unique qualities and natural assets of Sydney Harbour. • The Visual Impact Assessment must also identify the following: <ul style="list-style-type: none"> ○ important sight lines and visual connectivity to and through the site ○ visual changes and view impacts of the proposal to/from key vantage points including, but not limited to, Wentworth Park, Anzac Bridge, Bank Street, Blackwattle Bay Park and various locations along the existing and future Sydney Harbour foreshore. <p>6. Public domain and public access</p> <ul style="list-style-type: none"> • Demonstrate how the proposed development will achieve enhanced public access to the site during operation. • Identify the proposed public domain areas and linkages, including key vehicular, bicycle and pedestrian access points and links to other public domain spaces, including integration with Wentworth Park, Sydney CBD and the existing and future harbour foreshore. <p>7. Amenity</p> <ul style="list-style-type: none"> • Provide a solar access analysis and shadow diagrams outlining impacts on adjoining developments and spaces (including Wentworth Park). • Identify and assess potential overshadowing, privacy and view impacts. • Provide a wind impact report that includes the following detail: <ul style="list-style-type: none"> ○ demonstrate existing wind characteristics of the precinct ○ advice on measures to ensure the suitability of areas for their intended use with regard to the impact of wind on comfort and safety, in particular this is to focus on outdoor public space areas ○ advise on placement, orientation, shape and external design of the building envelope and future wind mitigation devices ○ identify areas surrounding the development that will be wind affected because of the development. <p>8. Transport, traffic, parking and access</p> <ul style="list-style-type: none"> • Prepare a detailed Transport, Traffic and Accessibility Impact Assessment that provides, but is not limited to the following: <p><u>Operation</u></p> <ul style="list-style-type: none"> ○ definition of study area (agreed by TfNSW and RMS) ○ the adequacy of the existing and future public transport network (including Sydney Metro West and ferry services) to meet the demand of the proposed development, including access and connections to these and proposals for modifications to maintain an acceptable level of access and performance of these networks ○ the current daily and peak hour traffic generation, point-to-point transport, public transport, walking and cycling movements and existing traffic and transport facilities located within the vicinity of the proposed development ○ the estimated traffic generation by heavy vehicles during operation, including forecast movement of heavy vehicles across a 24-hour period (early morning, AM peak, interpeak, PM peak, night) and details of proposed vehicle types ○ the estimated daily and peak hour traffic generation, public transport, walking and cycling trip generation during operation. Trip generation rates are to be agreed by RMS ○ undertake a trip generation survey of the Fish Markets, which is used as one of the tools to forecast the future trip generation of the site ○ develop a traffic model to determine improvements to the road network required to support the proposal (scope, parameters and methodology)
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	<p>to be agreed with RMS and to be carried out in accordance with <i>RMS Traffic Modelling Guidelines 2013</i>)</p> <ul style="list-style-type: none"> ○ develop an appropriate framework, including potential inputs from strategic modelling to identify and validate required improvements to support the uplift in demand and target behaviours ○ detail the transport infrastructure and servicing improvements including identification of both the land (corridor preservation) and capital components to support the proposal, including staging, costings and delivery and funding responsibilities ○ the existing and future performance of key intersections providing access to the site, and any required upgrades (roads/intersections) ○ an assessment of predicted impacts on road, pedestrians and cyclists and mitigation measures for any safety issues ○ proposed car parking ○ the proposed pedestrian and bicycle routes, including end-of-trip facilities for workers and visitors, as well as measures to maintain road and personal safety in accordance with CPTED principles ○ estimate seasonal peak trip generation, including Christmas, Easter and any other potential events. Outline how these seasonal peaks and potential events will be managed from a transport perspective, including parking management ○ any proposed physical, access, maintenance, operational, urban design and heritage (if applicable) impacts on RMS assets that form part of the proposal must involve consultation with RMS ○ access to and from the site from the road network including intersection locations, design and sight distance (i.e. turning lanes, swept paths, sight distance requirements) ○ proposed access arrangements, including service vehicles, emergency vehicles and loading areas for the development, including management of queueing of service vehicles at peak delivery times. <p><u>Stage 1 Demolition and Early Works</u></p> <ul style="list-style-type: none"> ○ details of construction vehicle routes, truck numbers, peak hour and daily movements, hours of operation, site compound locations, access arrangements and traffic control measures ○ an assessment of demolition impacts on road safety at key intersections and locations for potential pedestrian, vehicle and bicycle conflicts ○ temporary cycling and pedestrian access during demolition/construction ○ detailed plans of the proposed site demolition layout, including access to and from the site from the road network, the internal road network, truck marshalling, turning path diagrams depicting vehicles entering, exiting and manoeuvring through the site, staging, driver facility areas and parking provision on-site ○ preparation of a Construction Pedestrian Traffic Management Plan that includes an assessment of traffic and transport impacts during demolition and early works and how these impacts will be mitigated. <p>9. Maritime navigation</p> <p><u>Operation</u></p> <ul style="list-style-type: none"> ● Provide a Navigation Impact Assessment (NIA) prepared in consultation with the Harbour Master of the Port Authority of NSW to address the impacts of the proposal on maritime safety, including the navigation of bulk carriers, cruise ships, ferries and commercial/recreational and other maritime vessels, and the implementation of mitigation measures for any safety issues. ● The NIA is to consider the proposed developments at Glebe Island at berths 1 and 2 (SSD 8544 and SSD 6708) and cumulative impacts to all maritime users.
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	<p><u>Stage 1 Demolition and Early Works</u></p> <ul style="list-style-type: none"> • Provide a Navigation Impact Assessment (NIA) to address the impacts of demolition and early works on the navigation of bulk carriers, cruise ships, ferries and commercial/recreational and other maritime vessels, including the implementation of mitigation measures. • The NIA is to consider the proposed developments at Glebe Island at berths 1 and 2 (SSD 8544 and SSD 6708) and cumulative impacts to all maritime users. <p>10. Biodiversity</p> <ul style="list-style-type: none"> • Provide a Marine Ecology Report to identify and determine the impacts to aquatic ecology, including from vessel use during demolition and early works, pile removal, hydrodynamic changes to water circulation and sediment movement, reduced water quality and dredging. • Outline the mitigation measures to avoid, reduce, mitigate and offset these impacts, and provide recommendations to increase the aquatic biodiversity value of the urban waterway. • Provide a Biodiversity Development Assessment Report (BDAR) prepared in accordance with the Biodiversity Assessment Method to assess the impacts of the proposed development on biodiversity. • Include consideration of the relevant policies and guidelines, including the <i>Policy and Guidelines for Fish Habitat Conservation and Management (2013)</i>, <i>DPI Fisheries Threatened Species Assessment Guidelines</i>, <i>NSW Biodiversity Offsets Policy for Major Projects – Aquatic Biodiversity Factsheet</i> and <i>About Fish Friendly Marine Infrastructure</i>. <p>11. Heritage and archaeology</p> <ul style="list-style-type: none"> • Identify if there are any listed or potential heritage items within or near the proposed project area. If any listed or potential heritage items are likely to be affected, a Heritage Impact Statement (HIS) must be prepared in accordance with the guidelines in the NSW Heritage Manual and the following requirements; <ul style="list-style-type: none"> ○ assess how the development would impact on any places of heritage significance in or surrounding the SSD site and include strategies to minimise or mitigate any impacts on heritage significance. ○ include a visual impact assessment that identifies significant views to and from various vantage points including any SHR item, assess the impact of the proposal on these views and provide recommendations to mitigate these impacts. The assessment should also include photomontages of the site. • A historical archaeological assessment should be prepared by a suitably qualified historical archaeologist in accordance with the Heritage Division, Office of Environment and Heritage Guidelines <i>'Archaeological Assessments' 1996</i> and <i>'Assessing Significance for Historical Archaeological Sites and Relics' 2009</i>. This assessment should identify what relics, if any, are likely to be present, assess their significance and consider the impacts from the proposal on this potential resource. Where harm is likely to occur, it is recommended that the significance of the relics be considered in determining an appropriate mitigation strategy. In the event that harm cannot be avoided in whole or part, an appropriate Research Design and Excavation Methodology should also be prepared to guide any proposed excavations. • A detailed maritime archaeological assessment should be undertaken by a suitably qualified and experienced maritime archaeologist. This assessment should identify the archaeological potential and significance of maritime heritage sites including shipwrecks, maritime infrastructure, archaeological items and/or relics (both above and below water) that may be impacted by the proposal. The assessment should also include procedures and management strategies for the unexpected discovery of heritage items
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	<p>and/or relics. Underwater surveys may also need to be undertaken and may require remote sensing and/or diver based investigations.</p> <ul style="list-style-type: none"> • Identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the development. This may include the need for surface survey and test excavation. The identification of cultural heritage values should be guided by the <i>Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW</i> (DECCW, 2011) and consultation with OEH regional officers. • Where Aboriginal cultural heritage values are identified, consultation with Aboriginal people must be undertaken and documented in accordance with the <i>Aboriginal cultural heritage consultation requirements for proponents 2010</i> (DECCW). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the EIS. • Assess and document the impacts on Aboriginal cultural heritage values and demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, outline the proposed measures to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to OEH. <p>12. Flooding</p> <ul style="list-style-type: none"> • The EIS must map the following features relevant to flooding as described in the <i>NSW Floodplain Development Manual 2005</i> including <ul style="list-style-type: none"> ○ flood prone land ○ flood planning area, the area below the flood planning level ○ hydraulic categorisation (floodways and flood storage areas). • The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 1 in 10 year, 1 in 100 year flood levels and the probable maximum flood, or an equivalent extreme event. • The EIS must model the effect of the proposed development (including fill) on the current flood behaviour for a range of design events as identified above. This includes the 1 in 200 and 1 in 500 year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change. • Modelling in the EIS must consider and document: <ul style="list-style-type: none"> ○ the impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood ○ impacts of the development on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazards and hydraulic categories ○ relevant provisions of the <i>NSW Floodplain Development Manual 2005</i>. • The EIS must assess the impacts on the proposed development on flood behaviour, including: <ul style="list-style-type: none"> ○ whether there will be detrimental increases in the potential flood affection of other properties, assets and infrastructure ○ consistency with Council floodplain risk management plans ○ compatibility with the flood hazard of the land ○ compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land ○ whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site ○ whether there will be direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses ○ any impacts the development may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the SES and Council
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	<ul style="list-style-type: none"> ○ whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the SES and Council ○ emergency management, evacuation and access, and contingency measures for the development considering the full range of flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the SES ○ any impacts the development may have on the social and economic costs to the community as consequence of flooding. • Include consideration of <i>The City of Sydney Interim Floodplain Management Policy</i> and <i>The City of Sydney Blackwattle Bay Flood Study and Floodplain Risk Management Study</i>. <p>13. Water quality, soils and contamination</p> <ul style="list-style-type: none"> • The EIS must describe the background conditions for any water resource likely to be affected by the development, including: <ul style="list-style-type: none"> ○ existing surface and groundwater ○ hydrology, including volume, frequency and quality of discharges at proposed intake/discharge locations ○ water quality objectives (as endorsed by the NSW Government), including groundwater as appropriate that represent the community's uses and values for the receiving waters ○ indicators and trigger values/criteria for the environmental values identified above in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Quality and/or local objectives, criteria or targets endorsed by the NSW Government. • The EIS must assess the impacts of the demolition and early works on water quality, including: <ul style="list-style-type: none"> ○ the nature and degree of impact on receiving waters for both surface and groundwater, demonstrating how the development protects the Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are currently not being achieved. This should include an assessment of the mitigating effects of proposed stormwater and wastewater management during and after demolition and early works ○ identification of proposed monitoring of quality • The EIS must assess the impacts of the demolition and early works on hydrology, including: <ul style="list-style-type: none"> ○ water balance, including quantity, quality and source ○ effects to marine waters ○ effects to water-dependent fauna and flora ○ impacts to natural processes and functions ○ mitigating effects of proposed stormwater and wastewater management during and after the works on hydrological attributes such as volumes, flow rates, management methods and re-use options ○ identification of proposed monitoring of hydrological attributes. • Map the following water and soil features: <ul style="list-style-type: none"> ○ acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map) ○ rivers, streams, wetlands, estuaries (as described in Appendix 2 of the Framework for Biodiversity Assessment - NSW Biodiversity Offsets Policy for Major Projects, OEH 2014) ○ groundwater ○ groundwater dependent ecosystems ○ proposed intake and discharge locations. • Provide detail on how the existing structures will be decommissioned and any hazardous materials likely to be encountered during demolition and
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	<p>site preparation. Further, how any de-contaminating processes are to be managed during this process.</p> <ul style="list-style-type: none"> • Undertake an assessment of contamination of shore-side areas of the site and marine sediments. • Demonstrate compliance with the requirements of State Environmental Planning Policy 55 – Remediation of Land. <p>14. Noise and vibration</p> <ul style="list-style-type: none"> • Provide a noise and vibration assessment in accordance with the relevant EPA guidelines that addresses the following: <ul style="list-style-type: none"> ○ the impact of noise and vibration associated with demolition and early works on noise sensitive receivers such as surrounding residences, Sydney Secondary College, Ultimo Public School (temporary relocation site in Wentworth Park) and nearby public reserves ○ the cumulative noise and vibration impacts from concurrent surrounding activities during demolition and early works ○ the cumulative noise and vibration impacts from activities associated with the Stage 2 Main works (SSD 8925) ○ mitigation measures to minimise potential noise and vibration impacts during demolition and early works including recommended standard construction hours and intra-day respite periods for highly intrusive noise generating work) ○ the proposed noise monitoring procedures. <p>15. Air quality and odour</p> <ul style="list-style-type: none"> • Provide an air quality impact assessment to address the impacts of demolition and early works on air quality in accordance with the relevant EPA guidelines. • Identify the key air emission generating sources and activities from the proposed demolition and early works. • Identify measures to minimise and mitigate potential air quality, including dust control, and odour impacts on surrounding development. <p>16. Sediment, erosion and dust controls</p> <ul style="list-style-type: none"> • Provide details on the sediment and erosion control and dust control measures during demolition and early works. • Provide details on the measures and procedures to minimise and manage the generation and off-site transmission of sediment, dust and particles. <p>17. Waste</p> <ul style="list-style-type: none"> • Provide an assessment of the demolition and early works waste impacts and their management, including waste classification in accordance with the EPA guidelines and off-site disposal of concrete waste and rinse water. • Provide a management plan for the identification, handling, transport and disposal of any acid sulfate soils containing waste that may be encountered during demolition and early works. • Provide a management plan for the identification, handling, transport and disposal of any asbestos waste and lead-based paint that may be encountered during demolition and early works. <p>18. Utilities and infrastructure</p> <ul style="list-style-type: none"> • Address the existing capacity and any required upgrades of utilities and infrastructure, including staging of infrastructure. <p>19. Demolition and early works construction impacts</p> <ul style="list-style-type: none"> • Provide a Construction Environmental Management Plan for the proposed demolition and early works, that includes the following: <ul style="list-style-type: none"> ○ community consultation, notification and complaints handling ○ impacts of demolition on adjoining development and proposed measures to mitigate demolition impacts
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	<ul style="list-style-type: none"> ○ noise and vibration impacts on and off site ○ air quality impacts on the neighbourhood ○ odour impacts ○ water quality management for the site ○ construction waste classification, transportation and management methods in accordance with DECCW's Know Your Responsibilities: Managing Waste from Construction Sites Guideline. <p>20. Sea level rise</p> <ul style="list-style-type: none"> • Provide an assessment of the risks associated with sea level rise on the development noting the <i>NSW Government Climate Change Policy Framework</i> and <i>NSW Government's Draft Climate Change Fund Strategic Plan and A Plan to Save NSW Energy and Money</i>. <p>21. Developer contributions</p> <ul style="list-style-type: none"> • Provide the scope of developer contributions proposed. <p>22. Ecologically Sustainable Development (ESD)</p> <ul style="list-style-type: none"> • Provide detail of how best practice ESD principles (as defined in clause 7(4) of Schedule 2 of the <i>Environmental Planning and Assessment Regulation 2000</i>) will be incorporated in the demolition, early works and ongoing operation phases of the development. <p>23. Consultation</p> <ul style="list-style-type: none"> • Undertake an appropriate level of consultation with Council and State Government agencies.
Consultation	<p>The Applicant must consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners. In particular, consultation is required with the following agencies:</p> <ul style="list-style-type: none"> • City of Sydney Council • NSW Government Architect's Office • NSW Roads and Maritime Services • Transport for NSW • NSW Office of Environment and Heritage • NSW Department of Primary Industries, including Crown Lands and Water Division • Environment Protection Authority • Sydney Water • The Port Authority of NSW, including the Harbour Master • NSW Police • Infrastructure NSW • Department of Education and Principals of Sydney Secondary College and Blackwattle Bay Campus • Local Aboriginal Land Council and stakeholders • Local Heritage Group/s, if relevant • Relevant commercial fishing groups • Relevant recreational groups including fishing, boating, rowing and dragon boating <p>The EIS must describe the consultation process and the issues raised, and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.</p>
Further consultation after 2 years	<p>If you do not lodge a development application and EIS for the development within 2 years of the issue date of these SEARs, you must consult further with the Secretary in relation to the preparation of the EIS.</p>

References	The assessment of the key issues listed above must consider the relevant guidelines, policies, and plans. While not exhaustive, the following attachment contains a list of some of the guidelines, policies, and plans that may be relevant to the environmental assessment of this proposal.
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Plans & Documents

Plans and Documents

The EIS must include all relevant plans, architectural drawings, diagrams and relevant documentation required under Schedule 1 of the *Environmental Planning and Assessment Regulation 2000*. These are to be provided as part of the EIS rather than as separate documents.

In addition, the EIS must include the following:

1. **An existing site survey plan** drawn at an appropriate scale illustrating:
 - the location of the land, boundary measurements, area (sqm) and north point
 - the existing levels of the land in relation to buildings and roads
 - location and height of existing structures on the site
 - location and height of adjacent buildings
 - all levels to be to Australian Height Datum (AHD).
2. **A locality/context plan** drawn at an appropriate scale indicating:
 - significant local features such as parks, community facilities and open space and heritage items
 - the location and uses of existing buildings, open space, wharves and employment areas
 - traffic and road patterns, pedestrian and cycle routes and public transport nodes.
3. **Drawings at an appropriate scale** illustrating:
 - plans of the proposed building envelope (at a minimum scale of 1:200)
 - the height (AHD) of the proposed building envelope in relation to the land and any changes that will be made to the level of the land by excavation, reclamation or otherwise
 - the location and uses of existing buildings and structures within the site and surrounding area
 - detailed demolition and early works plans.
4. **Shadow diagrams** showing:
 - overshadowing of the building envelope during the summer solstice (Dec 21), winter solstice (June 21) and the equinox (March 21 and September 21) at 9.00am, 12.00 noon, and 3.00pm.
5. **Visual Impact Assessment**
 - The visual impact assessment, including focal lengths, must be done in accordance with Land and Environment Court principles and is to provide the following information:

Visual assessment methodology

- A flow-chart indicating how the analysis is to be undertaken, or a narrative description of the proposed sequence of activities.
- An explanation and justification for the criteria for assessment relevant to the site, local context and proposed built form and public domain outcomes. Criteria must include reference to the planning framework.
- A definition and explanation of the visual catchment should be defined (see below).
- An assessment matrix including number of viewers, period of view, distance of view, location of viewer to determine potential visual impact - i.e. high, medium or low.

Visual catchment

- Potential visual catchments and view locations, including contours (areas from which the development is visible) are to be identified.
- Categories of views (e.g. from public open space, from key streets, from main

	<p>buildings and from key heritage items) are to be defined.</p> <ul style="list-style-type: none"> • Photos are required for representative view categories, plotted on a map. <p><u>Visual material</u></p> <ul style="list-style-type: none"> • Reference to be made to site analysis. • Assessment must benchmark against the existing situation with the proposed plans. • Provide key plan indicating where viewpoints are located and narrative explaining why these have been selected. • The built form should be illustrated in the context of the visual catchment to enable assessment of the visual impact. • The location of cross-sections should be clearly shown on a key plan and the choice of positions explained. The cross sections should be shown in the context of the visual catchment and drawn to realistic scales and shown in context. • Vertical exaggeration should provide an accurate rather than 'flattened' impression of buildings in the context of the visual catchment. • Photomontages to be provided for key viewpoints from all directions, and from several positions within the visual catchment. A key plan is to show the locations of these photomontages with supporting documentation to explaining the choice of these locations. Photomontages should be provided for close as well as distant views. <p>A comparison of 'before' and 'proposed' is fundamental to a visual impact assessment, therefore the visual impact assessment (A3 in size) should be undertaken using human eye focal lengths (50mm at 35mm FX format and 46° angle of view) from long range, medium range and short range positions so that they can be assessed with respect to visibility, visual absorption capacity and visual impact rating.</p>
Documents to be submitted	<ul style="list-style-type: none"> • 1 hard copy and 1 electronic copy of all the documents and plans for review prior to exhibition. • 6 hard copies and 14 electronic copies of the documents and plans (once the application is considered acceptable). Electronic copies of the documentation must be on a USB with documents in PDF format with file sizes not exceeding 5Mb. The hard copies should include plans printed in A3. One additional A1 set of plans may also be provided.

Secretary's Environmental Assessment Requirements

Section 78A(8) of the *Environmental Planning and Assessment Act 1979*
Schedule 2 of the *Environmental Planning and Assessment Regulation 2000*

Application Number	SSD 8925
Proposal Name	Sydney Fish Markets – Stage 2 main works
Location	1A, 1B & 1C Bridge Road, Glebe, Sydney
Applicant	UrbanGrowth NSW Development Corporation
Date of Issue	22 December 2017
General Requirements	<p>The Environmental Impact Statement (EIS) must address the <i>Environmental Planning and Assessment Act 1979</i> and meet the minimum form and content requirements in clauses 6 and 7 of Schedule 2 of the <i>Environmental Planning and Assessment Regulation 2000</i>.</p> <p>Notwithstanding the key issues specified below, the EIS must include an environmental risk assessment to identify the potential environmental impacts associated with the development.</p> <p>Where relevant, the assessment of the key issues as listed below, and any other significant issues identified in the risk assessment, must include:</p> <ul style="list-style-type: none"> • adequate baseline data • justification of impacts • consideration of potential cumulative impacts due to other development in the vicinity • measures to avoid, minimise and if necessary, offset the predicted impacts, including detailed contingency plans for managing any significant risks to the environment. <p>The EIS must also be accompanied by a report from a qualified quantity surveyor providing:</p> <ul style="list-style-type: none"> • a detailed calculation of the capital investment value (CIV) of the development (as defined in clause 3 of the <i>Environmental Planning and Assessment Regulation 2000</i>), including details of all assumptions and components from which the CIV calculation is derived • an estimate of the jobs that will be created by the development during construction and operation • verification that the CIV was accurate on the date that it was prepared.
Key issues	<p>The EIS must address the following specific matters:</p> <ol style="list-style-type: none"> 1. Environmental Planning Instruments (EPIs), policies and guidelines <ul style="list-style-type: none"> • The relevant statutory provisions contained within the applicable EPIs and Development Control Plans including: <ul style="list-style-type: none"> ○ State Environmental Planning Policy (State & Regional Development) 2011 ○ State Environmental Planning Policy (State Significant Precincts) 2005 ○ State Environmental Planning Policy No. 26 – City West ○ State Environmental Planning Policy (Infrastructure) 2007 ○ State Environmental Planning Policy No. 55 – Remediation of Land (SEPP 55) ○ Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 ○ Draft State Environmental Planning Policy – Environment

	<ul style="list-style-type: none"> ○ Draft State Environmental Planning Policy - Infrastructure ○ Sydney Local Environmental Plan 2012 ○ Sydney Harbour Foreshores and Waterways Area DCP 2005 <ul style="list-style-type: none"> ● The relevant provisions, goals and objectives in the following: <ul style="list-style-type: none"> ○ <i>NSW State Priorities</i> ○ <i>NSW Planning Guidelines for Walking and Cycling</i> ○ <i>Better Placed – An integrated design policy for the built environment of New South Wales</i> ○ <i>A Plan for Growing Sydney</i> ○ <i>Towards our Greater Sydney 2056</i> ○ <i>Draft Eastern City District Plan</i> ○ <i>Sustainable Sydney 2030</i> ○ <i>Draft Future Transport Strategy 2056 and support plans</i> ○ <i>Sydney City Centre Access Strategy</i> ○ <i>NSW Freight and Ports Plan 2013</i> ○ <i>Sydney's Light Rail Future</i> ○ <i>Sydney's Ferry Future</i> ○ <i>The Bays Precinct Sydney: Transformation Plan</i> ○ <i>NSW Aquifer Interference Policy</i>. <p>2. Strategic context and concept development application</p> <ul style="list-style-type: none"> ● Consider the proposal in the context of the work being undertaken for the Bays Market District (BMD) nominated as a State Significant Precinct, having regard to relevant State Significant Precinct Study Requirements for the BMD. ● Consider the proposal in the context of the proposed changes to the State Environmental Planning Policy (State & Regional Development) 2011, State Environmental Planning Policy No.26 – City West and Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 and Draft State Environmental Planning Policy – Environment. ● Demonstrate how the proposal is consistent with the Concept development application (SSD 8924), including any relevant Statement of Commitments. <p>3. Design excellence</p> <ul style="list-style-type: none"> ● Demonstrate how the proposal achieves design excellence in accordance with the Design Excellence Strategy prepared in consultation with the NSW Government Architect and the City of Sydney. <p>4. Built form and urban design</p> <ul style="list-style-type: none"> ● Provide a detailed design analysis of the proposed development with reference to the building form, height, setbacks, bulk and scale in the context of the immediate locality, the wider area, and the desired future character, including development options for the remainder of the BMD. ● Demonstrate how the proposal will achieve an optimal design and amenity outcome with specific consideration of the site's character, layout, setbacks, amenity, views and vistas, open spaces and public domain, connectivity and street activation. ● Outline potential design considerations aimed at mitigating any impacts identified. ● Provide a detailed description of all proposed land uses, including gross floor area calculations. <p>5. Scenic quality and visual impacts</p> <ul style="list-style-type: none"> ● Provide a detailed Visual Impact Assessment in accordance with the Plans & Documents section. The Visual Impact Assessment must also identify the following: <ul style="list-style-type: none"> ○ important sight lines and visual connectivity to and through the site ○ visual changes and view impacts of the proposal to/from key vantage points including, but not limited to, Wentworth Park, Anzac Bridge, Bank
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Street, Blackwattle Bay Park and various locations along the existing and future Sydney Harbour foreshore.

6. Public domain and public access

- Provide detail on the interface between the proposed development and the public domain, street activation, harbour foreshore and other surrounding development.
- Identify the proposed public domain including key vehicular, bicycle and pedestrian access points and links to other public domain spaces, including Wentworth Park, Sydney CBD, and the existing and future harbour foreshore.
- An analysis of physical connections between the northern part of Wentworth Park and the Fish Markets should be provided. This should include identifying opportunities and options for improving connectivity for pedestrians and cyclists between the two across Bridge Road while ensuring the primary function of Wentworth Park for active recreation is not reduced and, where possible, enhanced.
- An analysis of the physical connections between existing light rail stations, bus stops and the Fish Markets should be provided, including any works required outside the Fish Markets site boundary.
- Provide detail on any of the public domain elements and associated works that will be Council owned or managed in the future.
- Provide detail on specific design features (where applicable):
 - footpaths and pavements, roads and/or rights of carriageways
 - outdoor seating
 - materials and finishes
 - public art
 - furniture and fixtures
 - street lighting, pedestrian lighting and feature lighting
 - edges, screens, balustrading and fences
 - walls, embankments and mounds
 - steps, ramps, vehicle crossings, decks and pathways
 - civil and stormwater infrastructure
 - tree planting
 - mass planting beds, planter boxes and individual plantings
 - bicycle parking and end-of-trip facilities
 - wayfinding signage.

7. Amenity

- Provide a solar access analysis and shadow diagrams outlining impacts on adjoining developments and spaces (including Wentworth Park).
- Identify and assess potential overshadowing, privacy and view impacts.
- Demonstrate how sunlight access is maximised to the new 30 m foreshore promenade in front of the Fish Markets.
- Provide a wind impact report that addresses the following;
 - demonstrate existing wind characteristics of the precinct
 - advice on measures to ensure the suitability of areas for their intended use with regard to the impact of wind on comfort and safety. In particular, this is to focus on outdoor public space areas
 - advise on placement, orientation, shape and external design of the building and relevant wind mitigation devices
 - identify areas surrounding the development that will be wind affected because of the development.

8. Transport, traffic, parking and access

- Provide detailed plans, including civil engineering plans, of the proposed road network.
- Prepare a Travel Plan, including intended actions, monitoring, review and implementation, as well as responsibilities for implementation and detailing all modes of transport available to visitors and employees of the site.

	<p><u>Operation</u></p> <ul style="list-style-type: none"> • Have regard to and demonstrate consistency with the Concept development application (SSD 8924) Transport, Traffic and Accessibility Impact Assessment. <p><u>Construction</u></p> <ul style="list-style-type: none"> ○ details of construction vehicle routes, truck numbers, peak hour and daily movements, hours of operation, site compound locations, access arrangements and traffic control measures during construction ○ an assessment of construction impacts on road safety at key intersections and locations for potential pedestrian, vehicle and bicycle conflicts ○ assessment of cumulative impacts associated with other construction activities in the area ○ temporary cycling and pedestrian access during construction ○ access arrangements for workers, emergency services and the provision for safe and efficient access for loading and deliveries, including the existing and proposed on-street parking ○ description of vehicle access routes used to access key freight locations/routes and the impact on nearby intersections, vehicle type and likely arrival and departure times ○ detailed plans of the proposed site construction layout, including access to and from the site from the road network, the internal road network, truck marshalling, turning path diagrams depicting vehicles entering, exiting and manoeuvring through the site, staging, driver facility areas and parking provision on-site. ○ preparation of a Construction Pedestrian Traffic Management Plan that includes an assessment of traffic and transport impacts during construction and how these impacts will be mitigated. <p>9. Maritime navigation</p> <p><u>Operation</u></p> <ul style="list-style-type: none"> • Have regard to and demonstrate consistency with the Concept development application (SSD 8924) Navigation Impact Assessment. <p><u>Construction</u></p> <ul style="list-style-type: none"> • Provide a Navigation Impact Assessment (NIA) to address the impacts of construction on the navigation of bulk carriers, cruise ships, ferries and commercial/recreational and other maritime vessels, including the implementation of mitigation measures. • The NIA is to also give consideration to the proposed developments at Glebe Island at berths 1 and 2 (SSD 8544 and SSD 6708) and cumulative impacts to all maritime users. <p>10. Biodiversity</p> <ul style="list-style-type: none"> • Provide a detailed description of any works and materials to be used that will impact aquatic ecology including any dredging, piling, seawall treatments, height of the facility above the substrate and in relation to the Mean High Water Mark, type of decking material to be used and whether any reclamation is associated with the proposal. • Provide a Marine Ecology Report to identify and determine the ecological of the impacts to aquatic ecology, including from shading, vessel use during construction and operation, pile installation, hydrodynamic changes to water circulation and sediment movement, reduced water quality and dredging. • Outline the mitigation measures to avoid, reduce, mitigate and offset these impacts, and provide recommendations to increase the aquatic biodiversity value of the urban waterway.
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	<ul style="list-style-type: none"> • Provide a Biodiversity Development Assessment Report (BDAR) prepared in accordance with the Biodiversity Assessment Method to assess the impacts of the proposed development on biodiversity. • Include consideration of the relevant policies and guidelines, including the <i>Policy and Guidelines for Fish Habitat Conservation and Management (2013)</i>, <i>DPI Fisheries Threatened Species Assessment Guidelines</i>, <i>NSW Biodiversity Offsets Policy for Major Projects – Aquatic Biodiversity Factsheet</i>, <i>Environmentally Friendly Seawalls (2009)</i> and <i>About Fish Friendly Marine Infrastructure</i>. <p>11. Heritage and archaeology</p> <ul style="list-style-type: none"> • Have regard to and demonstrate consistency with the Concept development application (SSD 8924) Heritage Impact Statement, Archaeological Assessment, Maritime Archaeological Assessment and Aboriginal Cultural Heritage Values Assessment. • If required for the detailed design, a historical archaeological assessment should be prepared by a suitably qualified historical archaeologist in accordance with the Heritage Division, Office of Environment and Heritage Guidelines '<i>Archaeological Assessments</i>' 1996 and '<i>Assessing Significance for Historical Archaeological Sites and 'Relics'</i> 2009. This assessment should identify what relics, if any, are likely to be present, assess their significance and consider the impacts from the proposal on this potential resource. Where harm is likely to occur, it is recommended that the significance of the relics be considered in determining an appropriate mitigation strategy. In the event that harm cannot be avoided in whole or part, an appropriate Research Design and Excavation Methodology should also be prepared to guide any proposed excavations. • If required for the detailed design, a detailed maritime archaeological assessment should be undertaken by a suitably qualified and experienced maritime archaeologist. This assessment should identify the archaeological potential and significance of maritime heritage sites including shipwrecks, maritime infrastructure, archaeological items and/or relics (both above and below water) that may be impacted by the proposal. The assessment should also include procedures and management strategies for the unexpected discovery of heritage items and/or relics. Underwater surveys may also need to be undertaken and may require remote sensing and/or diver based investigations. • If required for the detailed design, identify and describe the Aboriginal cultural heritage values that exist across the whole area that will be affected by the development. This may include the need for surface survey and test excavation. The identification of cultural heritage values should be guided by the <i>Guide to investigating, assessing and reporting on Aboriginal Cultural Heritage in NSW</i> (DECCW, 2011) and consultation with OEH regional officers. • Where Aboriginal cultural heritage values are identified, consultation with Aboriginal people must be undertaken and documented in accordance with the <i>Aboriginal cultural heritage consultation requirements for proponents 2010</i> (DECCW). The significance of cultural heritage values for Aboriginal people who have a cultural association with the land must be documented in the EIS. • Assess and document the impacts on Aboriginal cultural heritage values and demonstrate attempts to avoid impact upon cultural heritage values and identify any conservation outcomes. Where impacts are unavoidable, outline the proposed measures to mitigate impacts. Any objects recorded as part of the assessment must be documented and notified to OEH. <p>12. Flooding</p> <ul style="list-style-type: none"> • Have regard to and demonstrate consistency with the Concept development application (SSD 8924) flood assessment.
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	<ul style="list-style-type: none"> • Include consideration of <i>The City of Sydney Interim Floodplain Management Policy</i> and <i>The City of Sydney Blackwattle Bay Flood Study and Floodplain Risk Management Study</i>. <p>13. Water quality, soils and contamination</p> <ul style="list-style-type: none"> • The EIS must describe the background conditions for any water resource likely to be affected by the development (construction and operation), including: <ul style="list-style-type: none"> ○ existing surface and groundwater ○ hydrology, including volume, frequency and quality of discharges at proposed intake discharge locations ○ water quality objectives (as endorsed by the NSW Government), including groundwater as appropriate that represent the community's uses and values for the receiving waters ○ indicators and trigger values/criteria for the environmental values identified above in accordance with the ANZECC (2000) Guidelines for Fresh and Marine Quality and/or local objectives, criteria or targets endorsed by the NSW Government. • The EIS must assess the impacts of the development (construction and operation) on water quality, including: <ul style="list-style-type: none"> ○ the nature and degree of impact on receiving waters for both surface and groundwater, demonstrating how the development protects the Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are currently not being achieved. This should include an assessment of the mitigating effects of proposed stormwater and wastewater management during and after demolition and early works ○ identification of proposed monitoring of quality • The EIS must assess the impacts of the development (construction and operation) on hydrology, including: <ul style="list-style-type: none"> ○ water balance, including quantity, quality and source ○ effects to marine waters ○ effects to water-dependent fauna and flora ○ impacts to natural processes and functions ○ mitigating effects of proposed stormwater and wastewater management during and after the works on hydrological attributes such as volumes, flow rates, management methods and re-use options ○ identification of proposed monitoring of hydrological attributes. • Provide a Stormwater Management Plan outlining the measures for the proposal, particularly WSUD options and including measures for ongoing maintenance including associated funding approaches for ongoing management. • Develop an Integrated Water Cycle Management Strategy that considers water, wastewater and stormwater. The Strategy must consider water sensitive urban design and water conservation measures, including water efficiency and reuse, following appropriate best practice and guidelines and prioritise meeting non-potable water demands with recycled water or harvested stormwater. • Map the following water and soil features: <ul style="list-style-type: none"> ○ acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map) ○ rivers, streams, wetlands, estuaries (as described in Appendix 2 of the Framework for Biodiversity Assessment - NSW Biodiversity Offsets Policy for Major Projects, OEH 2014) ○ groundwater ○ groundwater dependent ecosystems ○ proposed intake and discharge locations. • Undertake an assessment of contamination of shore-side areas of the site and marine sediments.
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	<ul style="list-style-type: none"> • Demonstrate compliance with the requirements of State Environmental Planning Policy 55 – Remediation of Land. <p>14. Noise and vibration</p> <ul style="list-style-type: none"> • Provide a noise and vibration assessment in accordance with the relevant EPA guidelines that addresses the following: <ul style="list-style-type: none"> ○ the impact of noise and vibration associated with construction and operation ○ the cumulative noise and vibration impacts from concurrent surrounding activities during construction and operation ○ the cumulative noise and vibration impacts from activities associated with the Stage 1 demolition and early works (SSD 8924) ○ impacts of operational noise on noise sensitive receivers such as surrounding residences, the Sydney Secondary College Blackwattle Bay Campus (particularly during exam times) and nearby public reserves, including public address systems, waste collection services, dock-side operations and reversing/movement alarms on vehicles ○ mitigation measures to minimise potential noise and vibration impacts during construction and operation, including recommended standard construction hours and intra-day respite periods for highly intrusive noise generating work ○ the proposed noise monitoring procedures. <p>15. Air quality and odour</p> <ul style="list-style-type: none"> • Provide an air quality impact assessment to address the impacts of construction and operation on air quality in accordance with the relevant Environment Protection Authority guidelines. • Identify the key air emission generating sources and activities from the proposed construction and operation. • Identify measures to minimise and mitigate potential air quality and odour impacts on surrounding development. <p>16. Sediment, erosion and dust controls</p> <ul style="list-style-type: none"> • Provide details on sediment and erosion control and dust control measures on site during construction. • Provide details on the measures and procedures to minimise and manage the generation and off-site transmission of sediment, dust and particles. • Provide details of the proposed piling and how this will be constructed within the seabed and relevant environmental controls. <p>17. Waste</p> <ul style="list-style-type: none"> • Provide an assessment of the waste impacts and their management during construction and operation. • Provide a management plan for the identification, handling, transport and disposal of any acid sulfate soils containing waste that may be encountered during demolition, site preparation and construction. • Include measures to ensure effective operational waste management, for example adequate space within the development for waste infrastructure and collection. • Identify solutions to deal with specific waste streams (food waste and polystyrene packaging) in manner that maximises diversion from landfill, including investigation of closed loop polystyrene. <p>18. Utilities and infrastructure</p> <ul style="list-style-type: none"> • Provide detail about proposed upgrades to utilities and infrastructure. • Integrate utilities planning with the outcomes of the Integrated Water Cycle Management Study and the ESD study.
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	<ul style="list-style-type: none"> • Prepare a utility and infrastructure servicing report outlining the development yield and staging which should include a high level assessment of the capacity of Sydney Water's network to service the development. • Provide servicing options considered for the development, including wastewater and stormwater recycling for non-potable use, sustainability initiatives for the development, including any proposed alternative water supply, proposed end uses of drinking and non-drinking water and proposed water conservation measures. • Prepare a staging plan for all civil infrastructure works. <p>19. Construction impacts</p> <ul style="list-style-type: none"> • Provide a Construction Environmental Management Plan that includes the following: <ul style="list-style-type: none"> ○ community consultation, notification and complaints handling ○ impacts of construction on adjoining development and proposed measures to mitigate construction impacts ○ noise and vibration impacts on and off site ○ air quality impacts on the neighbourhood ○ odour impacts ○ water quality management for the site ○ construction waste classification, transportation and management methods in accordance with <i>DECCW's Know Your Responsibilities: Managing Waste from Construction Sites Guideline</i>. <p>20. Sea Level Rise</p> <ul style="list-style-type: none"> • Provide an assessment of the risks associated with sea level rise on the development noting the <i>NSW Government Climate Change Policy Framework</i> and <i>NSW Government's Draft Climate Change Fund Strategic Plan and A Plan to Save NSW Energy and Money</i>. <p>21. Building Code of Australia</p> <ul style="list-style-type: none"> • Provide a BCA report, access report and fire safety assessment demonstrating compliance with the BCA. <p>22. Safety</p> <ul style="list-style-type: none"> • Provide a Crime Prevention Through Environmental Design Report. • Provide details on the measures to ensure the safety of visitors and workers within the development and the surrounding public domain. <p>23. Ecologically Sustainable Development (ESD)</p> <ul style="list-style-type: none"> • Provide detail of how best practice ESD principles (as defined in clause 7(4) of Schedule 2 of the <i>Environmental Planning and Assessment Regulation 2000</i>) will be incorporated in the design, construction and ongoing operation phases of the development. • Outline how ESD measures employed can connect to ESD measures in the remainder of the BMD. <p>24. Developer contributions</p> <ul style="list-style-type: none"> • Provide the scope of developer contributions proposed. <p>25. Consultation</p> <ul style="list-style-type: none"> • Undertake an appropriate level of consultation with Council and State Government agencies. • Provide details of the consultation activities undertaken.
Consultation	<p>The Applicant must consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners. In particular, consultation is required with the following agencies:</p> <ul style="list-style-type: none"> • City of Sydney Council

	<ul style="list-style-type: none"> • NSW Government Architect's Office • NSW Roads and Maritime Services • Transport for NSW • NSW Office of Environment and Heritage • NSW Department of Primary Industries, including Crown Lands and Water Division • Environment Protection Authority • Sydney Water • The Port Authority of NSW, including the Harbour Master • NSW Police • Infrastructure NSW • Destination NSW • Department of Education and Principals of Secondary College and Blackwattle Bay Campus • Local Aboriginal Land Council and stakeholders • Local Heritage Group/s, if relevant • Relevant commercial fishing groups • Relevant recreational groups including fishing, boating, rowing and dragon boating <p>The EIS must describe the consultation process and the issues raised, and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.</p>
Further consultation after 2 years	If you do not lodge a development application and EIS for the development within 2 years of the issue date of these SEARs, you must consult further with the Secretary in relation to the preparation of the EIS.
References	The assessment of the key issues listed above must consider the relevant guidelines, policies, and plans. While not exhaustive, the following attachment contains a list of some of the guidelines, policies, and plans that may be relevant to the environmental assessment of this proposal.

Plans & Documents

Plans and Documents

The EIS must include all relevant plans, architectural drawings, diagrams and relevant documentation required under Schedule 1 of the *Environmental Planning and Assessment Regulation 2000*. These are to be provided as part of the EIS rather than as separate documents.

In addition, the EIS must include the following:

1. **An existing site survey plan** drawn at an appropriate scale illustrating:
 - the location of the land, boundary measurements, area (sqm) and north point
 - the existing levels of the land in relation to buildings and roads
 - location and height of existing structures on the site
 - location and height of adjacent buildings
 - all levels to be to Australian Height Datum (AHD).
2. **A locality/context plan** drawn at an appropriate scale indicating:
 - significant local features such as parks, community facilities and open space and heritage items
 - the location and uses of existing buildings, open space, wharves and employment areas
 - traffic and road patterns, pedestrian routes and public transport nodes.
3. **Drawings at an appropriate scale** illustrating:
 - detailed plans, sections and elevations (at a minimum scale of 1:200)
 - the height (AHD) of the proposed building envelope in relation to the land and any changes that will be made to the level of the land by excavation, reclamation or otherwise
 - the location and uses of existing buildings and structures within the site and surrounding area.
4. **Landscape plan** showing the landscape treatment of the development and public domain.
5. **Shadow diagrams** showing:
 - overshadowing of the proposed development during the summer solstice (Dec 21), winter solstice (June 21) and the equinox (March 21 and September 21) at 9.00am, 12.00 noon, and 3.00pm
 - solar access to the site and any surrounding residential developments during the summer solstice (Dec 21), winter solstice (June 21) and the equinox (March 21 and September 21) at 9.00am, 12.00 noon, and 3.00pm.
6. **Visual Impact Assessment**
 - The visual impact assessment, including focal lengths, must be done in accordance with Land and Environment Court principles and is to provide the following information:

Visual assessment methodology

- A flow-chart indicating how the analysis is to be undertaken, or a narrative description of the proposed sequence of activities.
- An explanation and justification for the criteria for assessment relevant to the site, local context and proposed built form and public domain outcomes. Criteria must include reference to the planning framework.
- A definition and explanation of the visual catchment should be defined (see below).
- An assessment matrix including number of viewers, period of view, distance of view, location of viewer to determine potential visual impact - i.e. high, medium or low.

	<p><u>Visual catchment</u></p> <ul style="list-style-type: none"> • Potential visual catchments and view locations, including contours (areas from which the development is visible) are to be identified. • Categories of views (e.g. from public open space, from key streets, from main buildings and from key heritage items) are to be defined. • Photos are required for representative view categories, plotted on a map. <p><u>Visual material</u></p> <ul style="list-style-type: none"> • Reference to be made to site analysis. • Assessment must benchmark against the existing situation with the proposed plans. • Provide key plan indicating where viewpoints are located and narrative explaining why these have been selected. • The built form should be illustrated in the context of the visual catchment to enable assessment of the visual impact. • The location of cross-sections should be clearly shown on a key plan and the choice of positions explained. The cross sections should be shown in the context of the visual catchment and drawn to realistic scales and shown in context. • Vertical exaggeration should provide an accurate rather than 'flattened' impression of buildings in the context of the visual catchment. • Photomontages to be provided for key viewpoints from all directions, and from several positions within the visual catchment. A key plan is to show the locations of these photomontages with supporting documentation to explaining the choice of these locations. Photomontages should be provided for close as well as distant views. <p>A comparison of 'before' and 'proposed' is fundamental to a visual impact assessment, therefore the visual impact assessment (A3 in size) should be undertaken using human eye focal lengths (50mm at 35mm FX format and 46° angle of view) from long range, medium range and short range positions so that they can be assessed with respect to visibility, visual absorption capacity and visual impact rating.</p>
Documents to be submitted	<ul style="list-style-type: none"> • 1 hard copy and 1 electronic copy of all the documents and plans for review prior to exhibition. • 5 hard copies and 14 electronic copies of the documents and plans (once the application is considered acceptable). Electronic copies of the documentation must be on a USB with documents in PDF format with file sizes not exceeding 5Mb. The hard copies should include plans printed in A3. One additional A1 set of plans may also be provided.

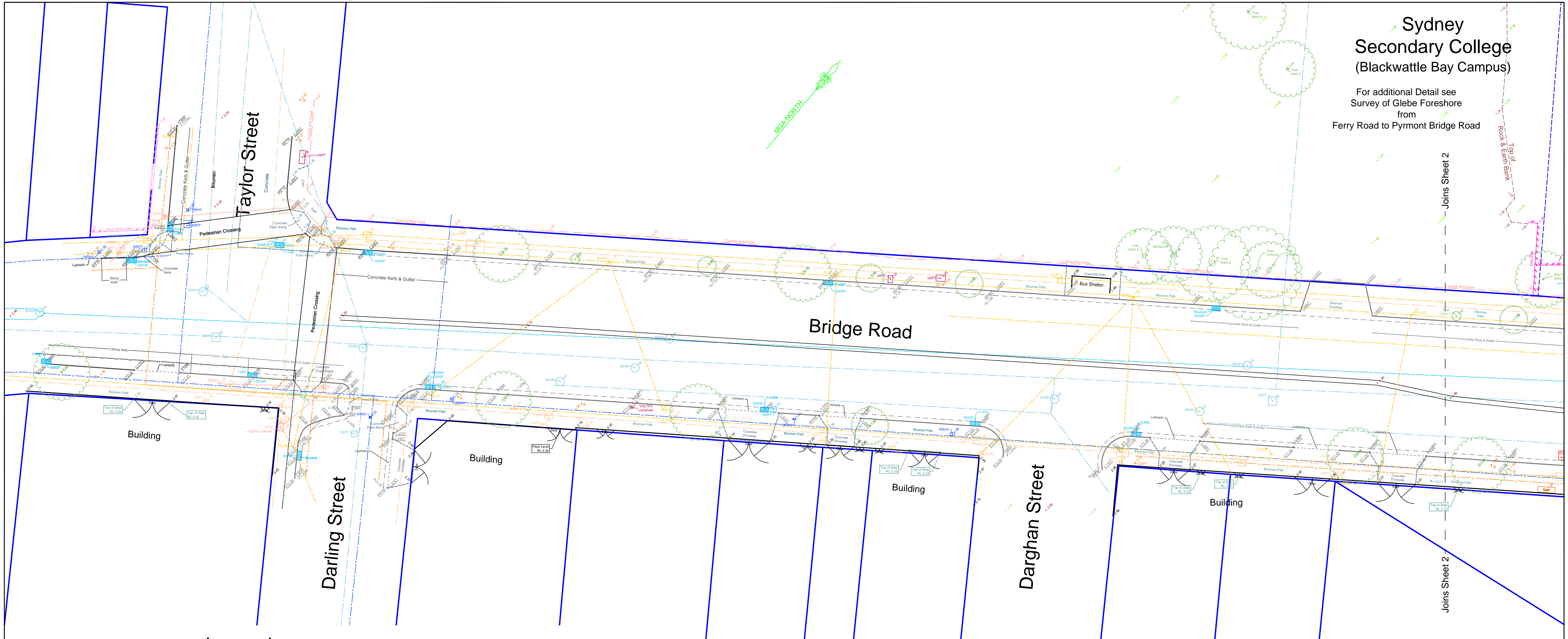
APPENDIX

C

EXISTING GROUND SURVEY

Sydney
Secondary College
(Blackwattle Bay Campus)

For additional Detail see
Survey of Glebe Foreshore
from
Ferry Road to Pyrmont Bridge Road



Legend

- ELDL * Dwarf Light
- ELLP * Power Pole + Light
- ELLT * Light
- ELSL * Light - Solar powered
- ELPO * Power Pole
- ELPT □ Electrical Pit
- ELTU □ Electrical Turret
- TEPT □ Telstra Pit
- TEPL □ Telstra Pillar
- RTPT □ RTA Pit
- RTSG * Traffic Light
- RTBX □ RTA Signal Box
- UKPT □ Unidentified Pit
- UKLH ○ Unidentified Lamphole
- WRBU ● Bubbler
- WRHY □ Hydrant
- WRPC ○ Irrigation Pit
- WRSV □ Stop Valve
- WRTA ▽ Tap
- SWGPI ■ Grated Pit (collecting)
- SWGCB ● Grated Pit (collecting)
- SWPT □ Stormwater Pit (non collecting)
- SWMH ○ Stormwater Manhole (non collecting)
- SEMH ○ Sewer Manhole
- SEPT □ Sewer Pit
- SELH ○ Sewer Lamphole
- GSPT □ Gas Pit
- GBS □ Garbage Bin (square)
- GBC ○ Garbage Bin (circular)
- BDC ○ Bollard (circular)
- Layback
- Door / Opening
- Tree spread / height / diameter
- Electrical (Aerial)
- Electrical (Underground)
- Telecom (Underground)
- Roads & Traffic Authority
- Gas
- Water
- Sewer
- Storm Water
- Top of Kerb & Gutter
- Invert of Kerb & Gutter
- Lip of Gutter
- Top of Kerb (no gutter)
- Invert of Kerb
- Edge of Path
- Edge of Concrete
- Top of Bank
- Bottom of Bank
- Edge of Garden
- Fence
- Top of Retaining Wall
- Bottom of Retaining Wall
- Top of Wall
- Bottom of Wall
- Cadastral Boundary
- Cadastral Boundary - stratum
- Cadastral Boundary - waterway
- Major Contour
- Minor Contour
- KB - Denotes level is back of kerb
- KT - Denotes level is top of kerb
- KI - Denotes level is invert of kerb
- KL - Denotes level is lip of gutter
- IL - Denotes level is invert of pit
- C/R - Denotes Cement Rendered
- State Rail Authority Cables
- Lane Marking (Double Unbroken Line)
- Stormwater tunnel (CL)

NOTE

Level and detail information as shown on these plans has been established by Stadia methods and is within generally accepted accuracies for such surveys, and was correct as at date of survey.

Underground services as shown on these plans have been located by surface investigation only of readily visible features, and may not be exhaustive.

Lines shown indicate that according to the relevant authority's records there is a service line between the identified terminals.

Where no terminals have been found services have been plotted from the relevant authority's records. It should be noted that the authorities give no warranty as to the completeness or accuracy of their plans.

Prior to any excavation works or drilling on the site the relevant authority should be contacted to verify the position of their services in the field.

Where detail, service information, dimensions or levels are critical to the design proposed they should be verified in the field prior to the commencement of construction.

Levels shown on kerbs are TOP of FACE of kerb, unless noted otherwise.

Tree heights and spreads have been estimated only.

Widths of walls are indicative only. Levels shown on walls are base of wall unless noted otherwise.

Features noted as retaining walls on these plans indicate that there is a significant difference in the levels of the ground from one side of the wall to the other.

Boundaries shown on these plans are from the Cadastral Base supplied by Sydney Water. Further survey will be required to refix and/or mark the boundaries.

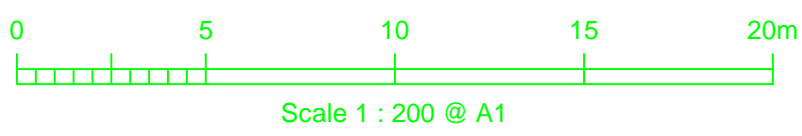
This plan was prepared at a scale of 1:200 for the purpose of showing topographical detail over the site for planning purposes, and may not be suitable for any other use.

These notes form and integral and important part of these plans and copies of the plans should not be distributed without them.

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CADASTRAL BOUNDARIES,
SEWER, WATER &
STORMWATER LINES FROM
DIGITAL DATA SUPPLIED BY
SYDNEY WATER

C	10-02-15	Street trees resurveyed Taylor -Wattle Sts
B	05-12-14	Additional detail to East of Fish Markets
A	29-07-05	Original drawing issued
Rev.	Date	Description



SCALE :	1 : 200
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DATUM :	AHD
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CO-ORDINATE SYSTEM :	MGA
ORIGIN :	PM 14827 - SSM 61968

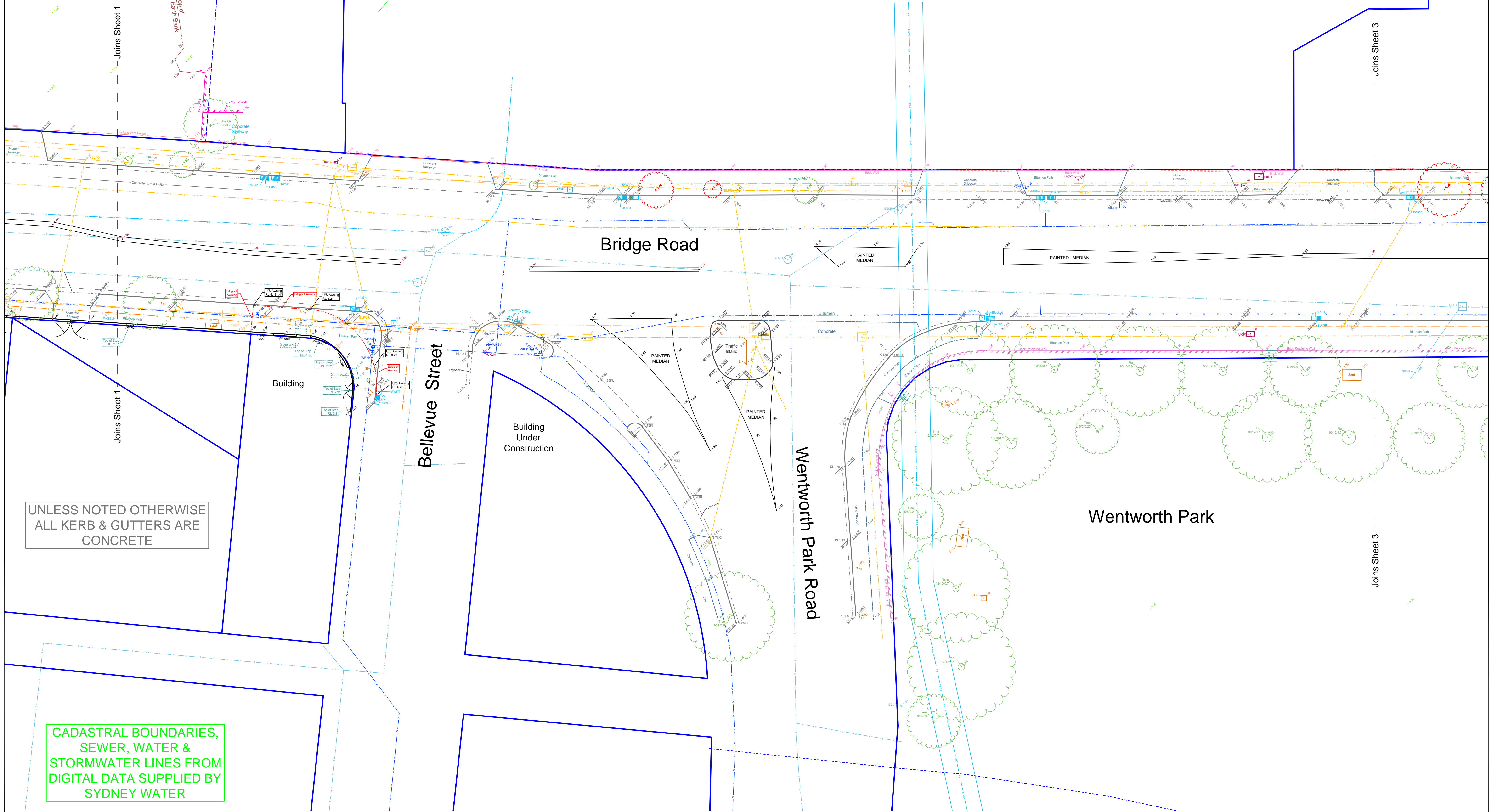
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DATE :	Jan-April, 2005, Dec 2014
DRAWN :	G. L. Bowlie
DATE :	May, 2005
REFERENCE :	03-5124 (14-0039)
PLOT FILE :	DET-200-C

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Level 3, Suite 38, 104 Bathurst Street,
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Telephone : (02) 9261-1244 Facsimile : (02) 9283-5187

DETAIL & LEVEL SURVEY
Bridge Rd & Pyrmont Bridge Road
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GLEBE
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Sydney
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For additional Detail see
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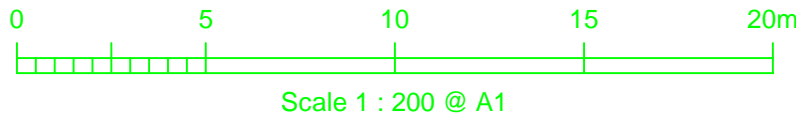


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FOR LEGEND & NOTES SEE SHEET 1

C	10-02-15	Street trees resurveyed Taylor -Wattle Sts
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A	29-07-05	Original drawing issued
Rev.	Date	Description

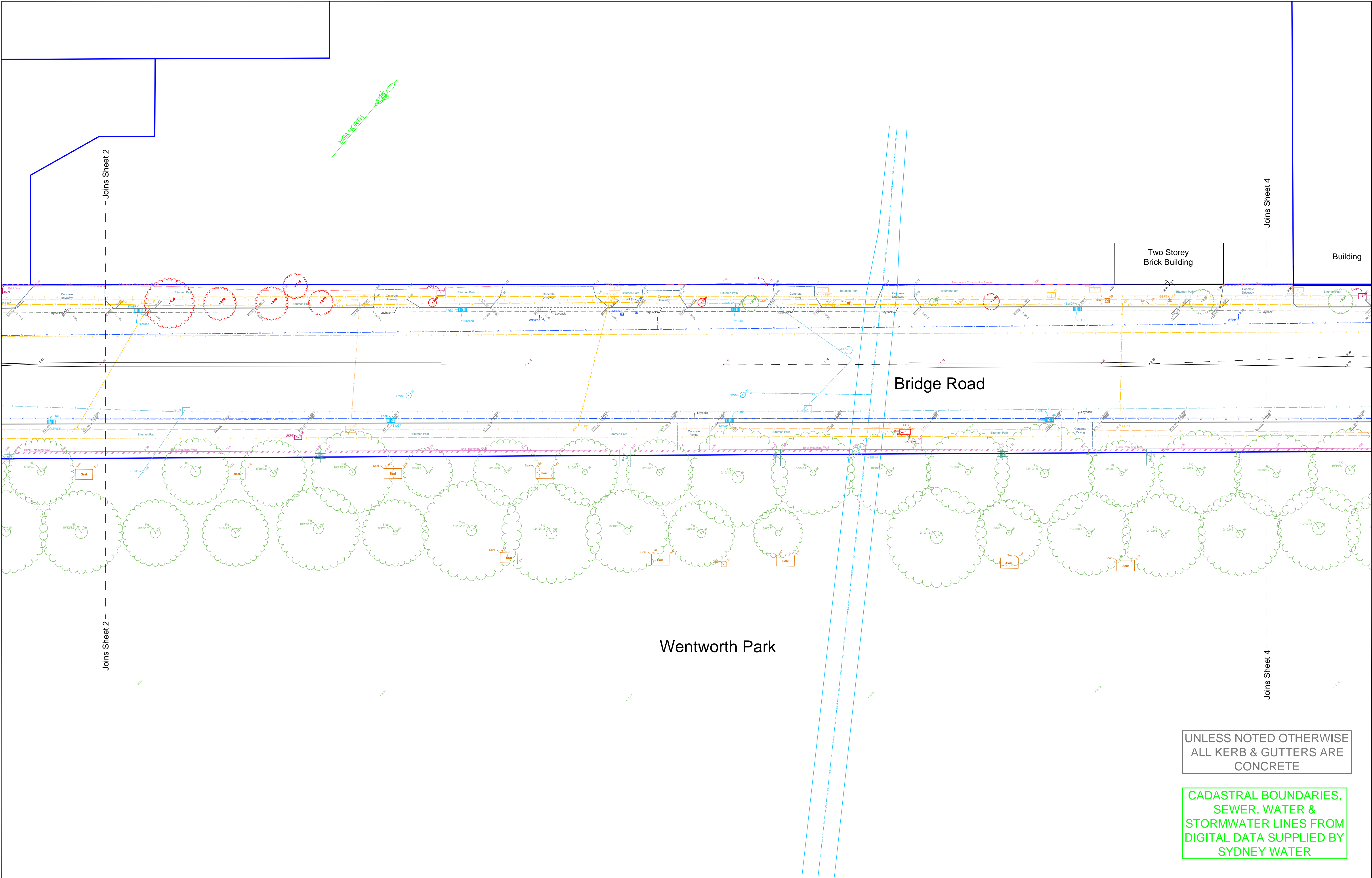


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CO-ORDINATE SYSTEM : MGA
ORIGIN : PM 14827 - SSM 61968

SURVEYOR : D. A. Loomes
DATE : Jan-April, 2005, Dec 2014
DRAWN : G. L. Bowtle
DATE : May, 2005
REFERENCE : 03-5124 (14-0039)
PLOT FILE : DET-200-C

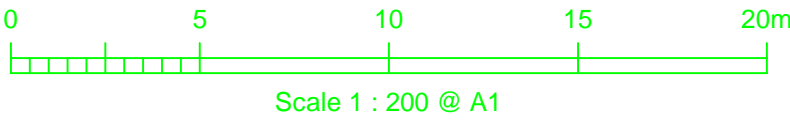
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DETAIL & LEVEL SURVEY
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C	10-02-15	Street trees resurveyed Taylor -Wattle Sts
B	05-12-14	Additional detail to East of Fish Markets
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FOR LEGEND & NOTES SEE SHEET 1



SCALE :	1 : 200
SHEET No. :	3 of 6
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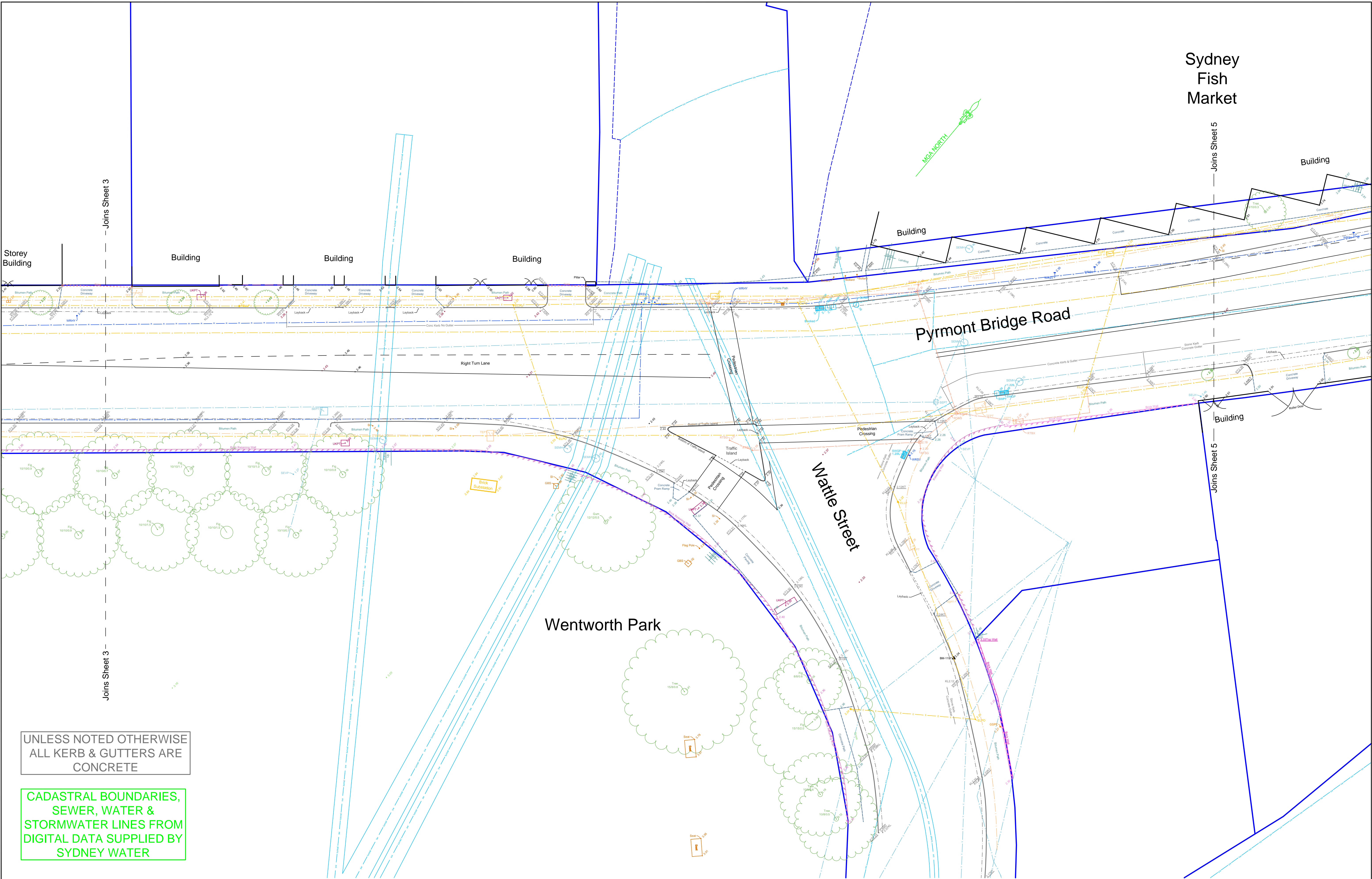
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DATE :	Jan-April, 2005, Dec 2014
DRAWN :	G. L. Bowtle
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REFERENCE :	03-5124 (14-0039)
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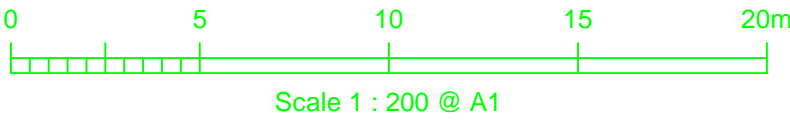


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FOR LEGEND & NOTES SEE SHEET 1



SCALE : 1 : 200
SHEET No. : 4 of 6
DATUM : AHD
ORIGIN : PM 14827 RL 17.995
CO-ORDINATE SYSTEM : MGA
ORIGIN : PM 14827 - SSM 61968

SURVEYOR : D. A. Loomes
DATE : Jan-April, 2005, Dec 2014
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Sydney
Fish
Market

Sydney
Fish
Market

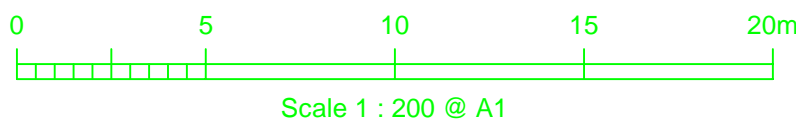
Distributor
Western

Pymont Bridge Road

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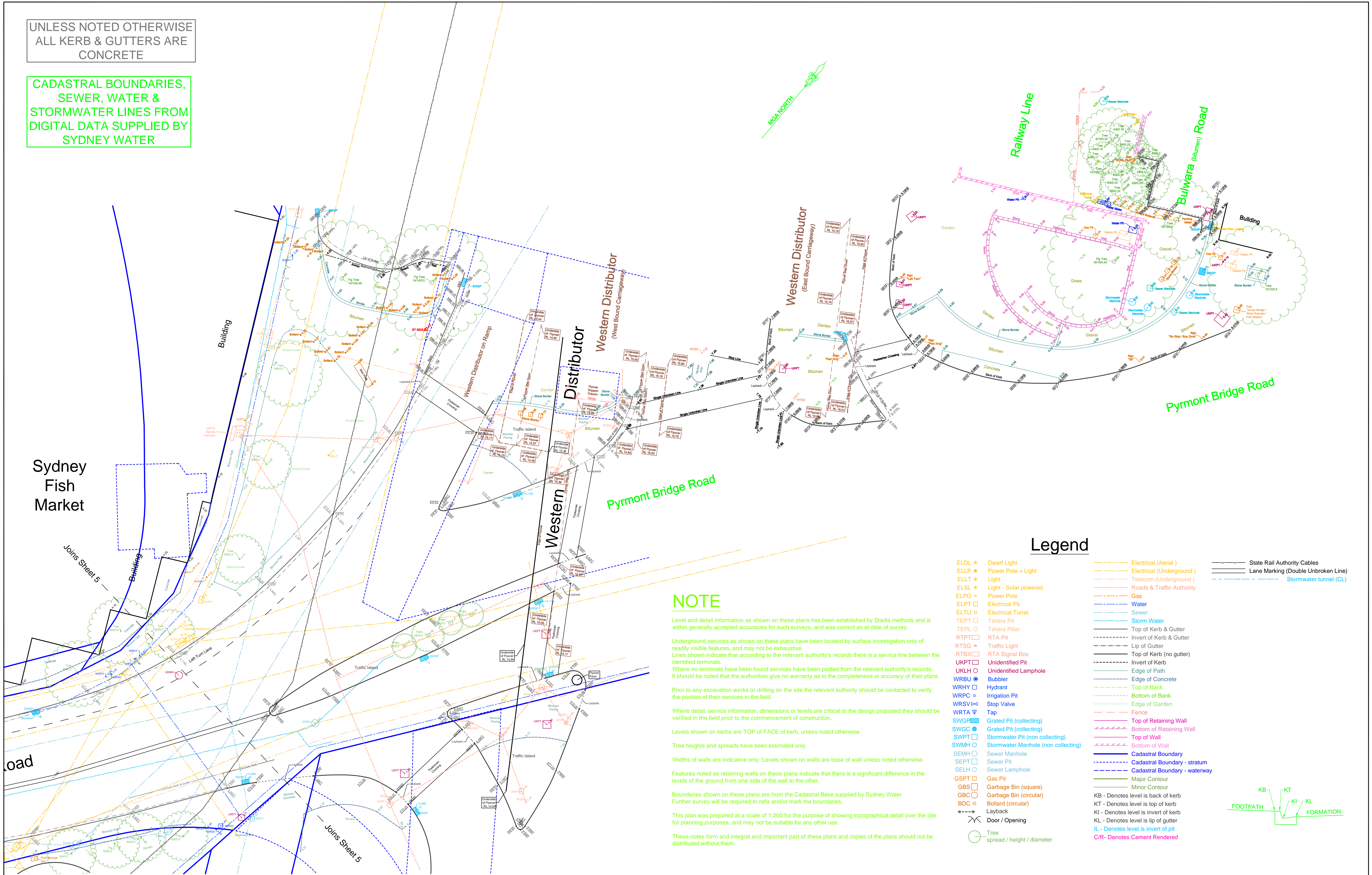
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ORIGIN : PM 14827 - SSM 61968

SURVEYOR : D. A. Loomes
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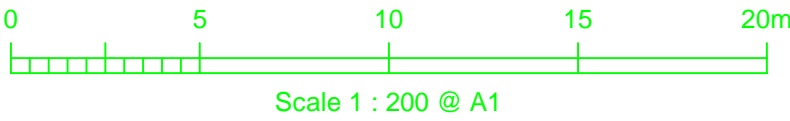
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Legend

- ELDL * Dwarf Light
- ELLP * Power Pole + Light
- ELLT * Light
- ELSL * Light - Solar powered
- ELPO * Power Pole
- ELPT * Electrical Pit
- ELTU * Electrical Turret
- TEPT * Telstra Pit
- TEPL * Telstra Pillar
- RTPT * RTA Pit
- RTSG * Traffic Light
- RTBX * RTA Signal Box
- UKPT * Unidentified Pit
- UKLH * Unidentified Lamphole
- WRBU * Bubbler
- WRHY * Hydrant
- WRPC * Irrigation Pit
- WRSV * Stop Valve
- WRTA * Tap
- SWGPI * Grated Pit (collecting)
- SWGCB * Grated Pit (collecting)
- SWPT * Stormwater Pit (non collecting)
- SWMH * Stormwater Manhole (non collecting)
- SEMH * Sewer Manhole
- SEPT * Sewer Pit
- SELH * Sewer Lamphole
- GSPT * Gas Pit
- GBS * Garbage Bin (square)
- GBC * Garbage Bin (circular)
- BDC * Bollard (circular)
- Layback
- Door / Opening
- Tree spread / height / diameter
- Electrical (Aerial)
- Electrical (Underground)
- Telecom (Underground)
- Roads & Traffic Authority
- Gas
- Water
- Sewer
- Storm Water
- Top of Kerb & Gutter
- Invert of Kerb & Gutter
- Lip of Gutter
- Top of Kerb (no gutter)
- Invert of Kerb
- Edge of Path
- Edge of Concrete
- Top of Bank
- Bottom of Bank
- Edge of Garden
- Fence
- Top of Retaining Wall
- Bottom of Retaining Wall
- Top of Wall
- Bottom of Wall
- Cadastral Boundary
- Cadastral Boundary - stratum
- Cadastral Boundary - waterway
- Major Contour
- Minor Contour
- KB - Denotes level is back of kerb
- KT - Denotes level is top of kerb
- KI - Denotes level is invert of kerb
- KL - Denotes level is lip of gutter
- IL - Denotes level is invert of pit
- C/R - Denotes Cement Rendered
- State Rail Authority Cables
- Lane Marking (Double Unbroken Line)
- Stormwater tunnel (CL)

Rev.	Date	Description
C	10-02-15	Street trees resurveyed Taylor -Wattle Sts
B	05-12-14	Additional detail to East of Fish Markets
A	29-07-05	Original drawing issued



SCALE :	1 : 200
SHEET No. :	6 of 6
DATUM :	AHD
ORIGIN :	PM 14827 RL 7.995
CO-ORDINATE SYSTEM :	MGA
ORIGIN :	PM 14827 -SSM 61968

SURVEYOR :	D. A. Loomes
DATE :	Jan-April, 2005, Dec 2014
DRAWN :	G. L. Bowtle
DATE :	May, 2005
REFERENCE :	03-5124 (14-0039)
PLOT FILE :	DET-200-C

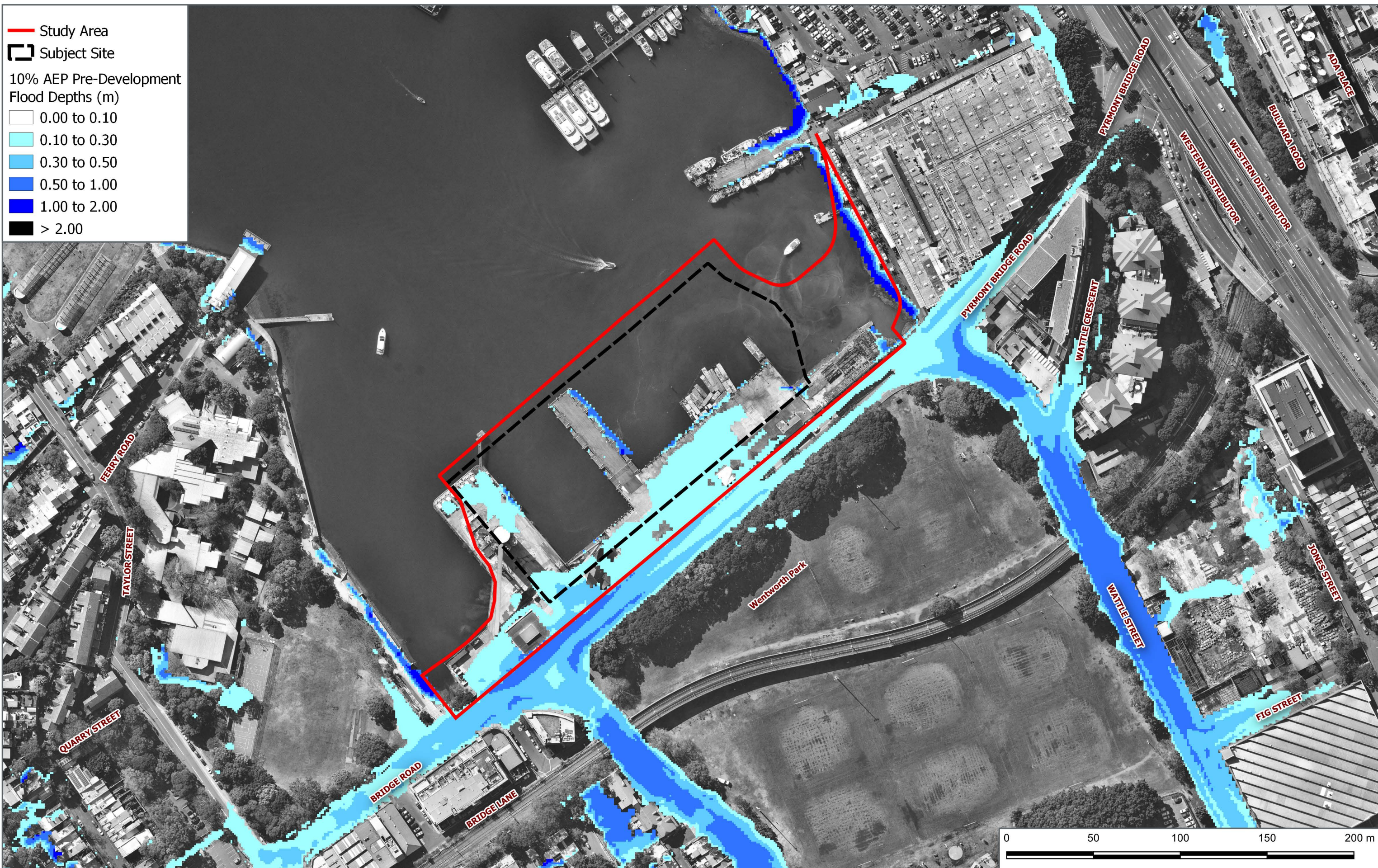
Peter Bolan and Associates Pty Ltd
Consulting Surveyors A.B.N. 55 003 079 605
Incorporating
Loomes Consulting Surveyors
Level 3, Suite 38, 104 Bathurst Street,
SYDNEY N.S.W. 2000
Telephone : (02) 9261-1244 Facsimile : (02) 9283-5187

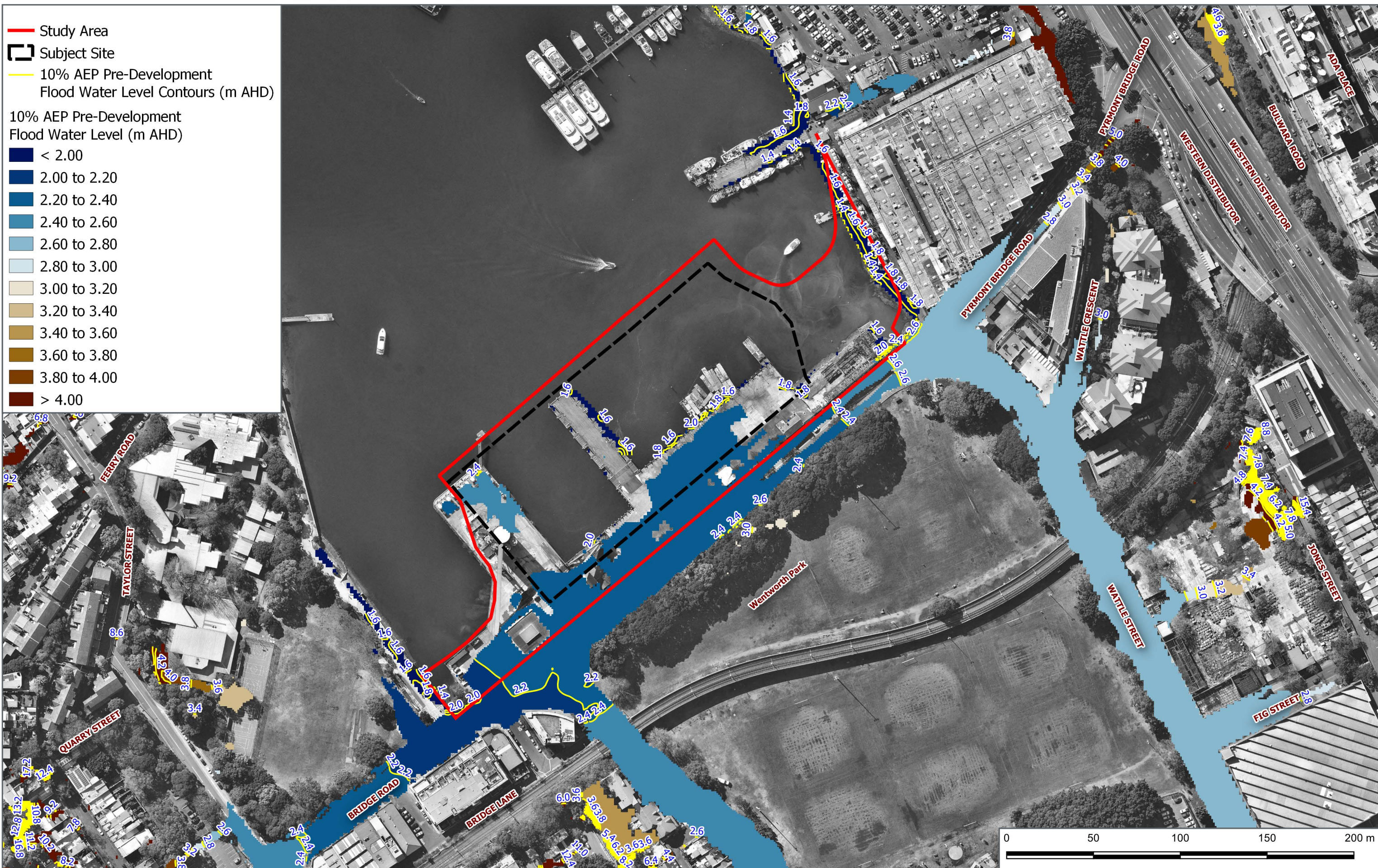
DETAIL & LEVEL SURVEY
Bridge Rd & Pyrmont Bridge Road
from Taylor St to Western Distributor
GLEBE
for Glebe Foreshore Project

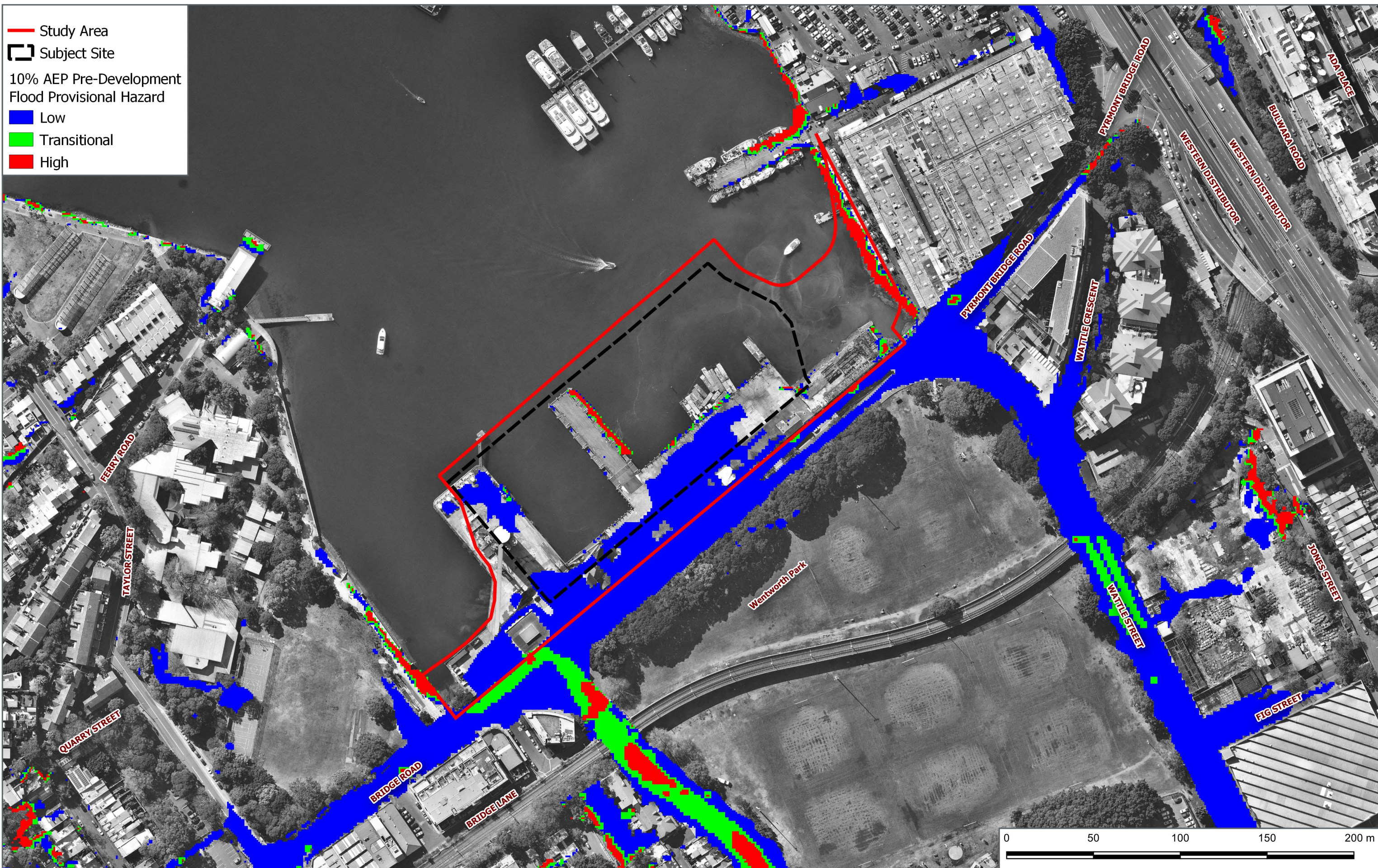
APPENDIX

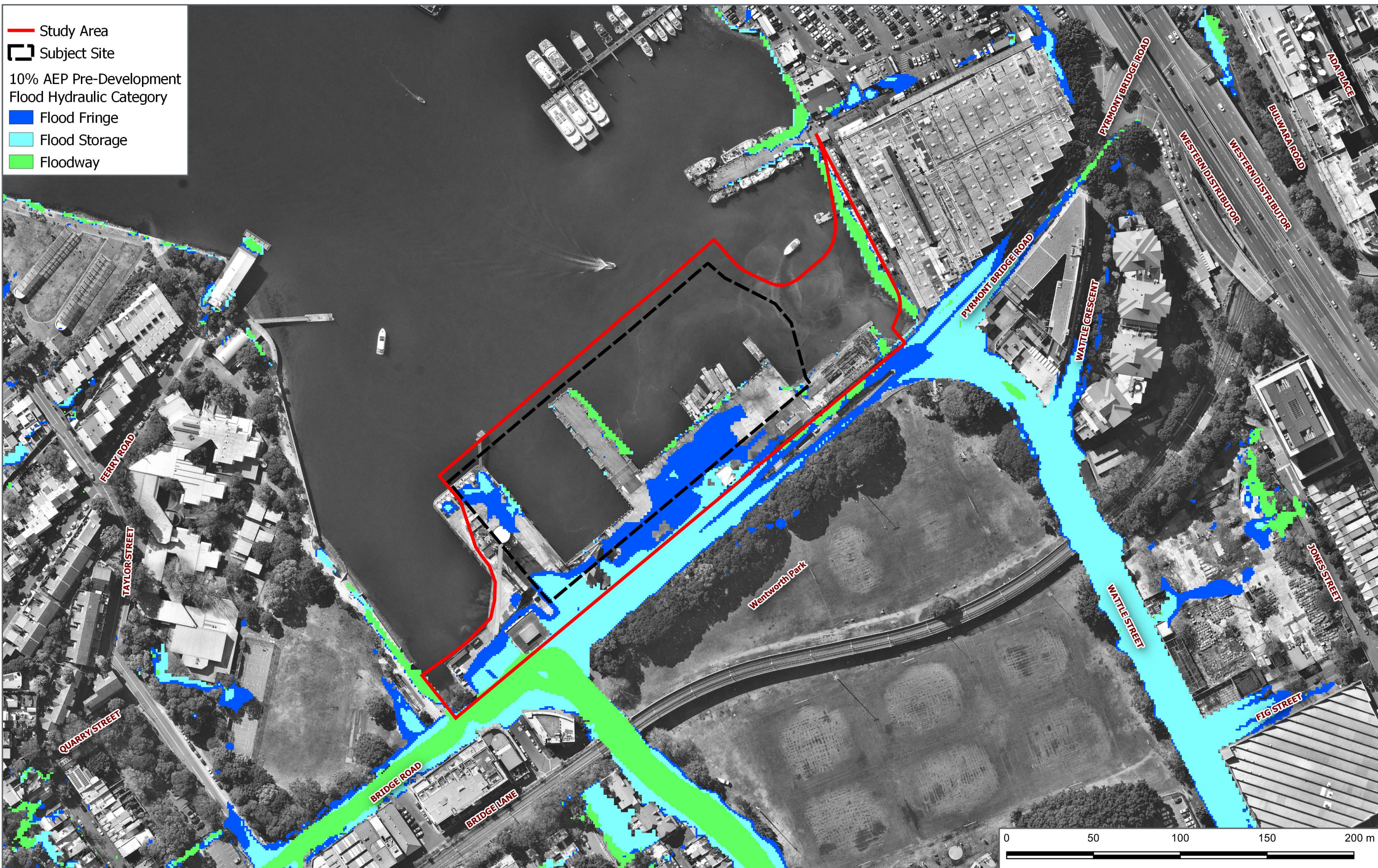
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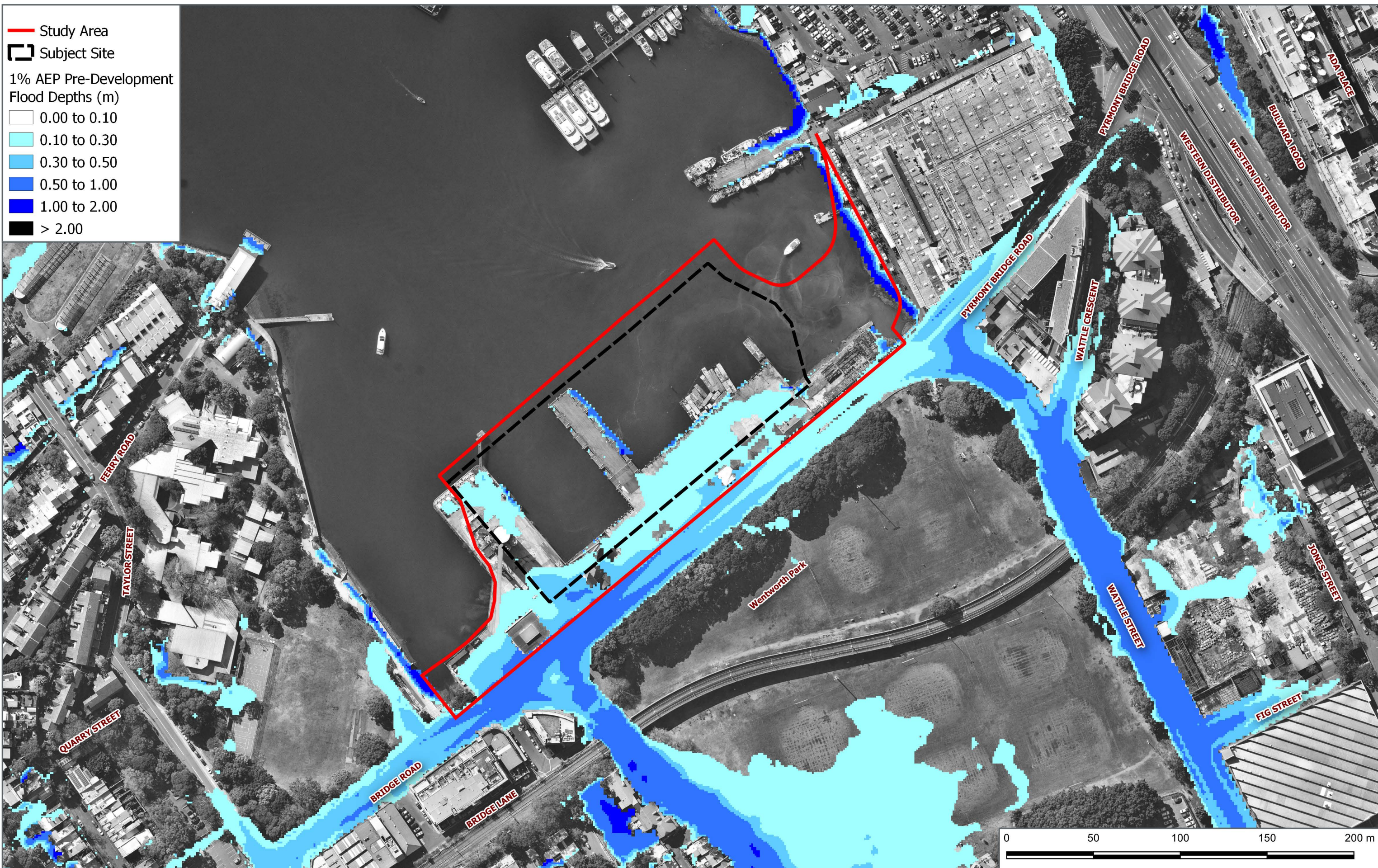
FLOOD BEHAVIOUR MAPS

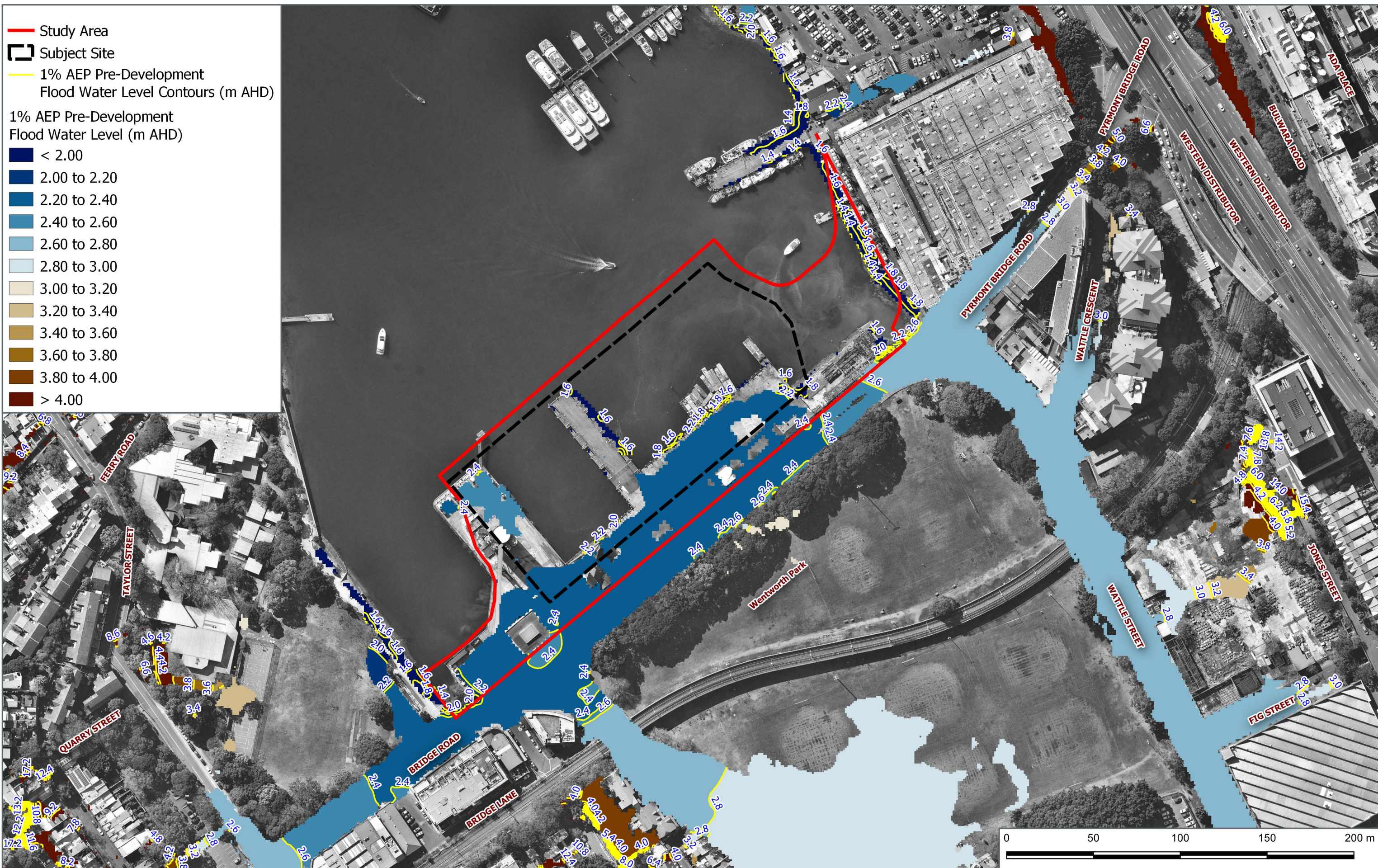


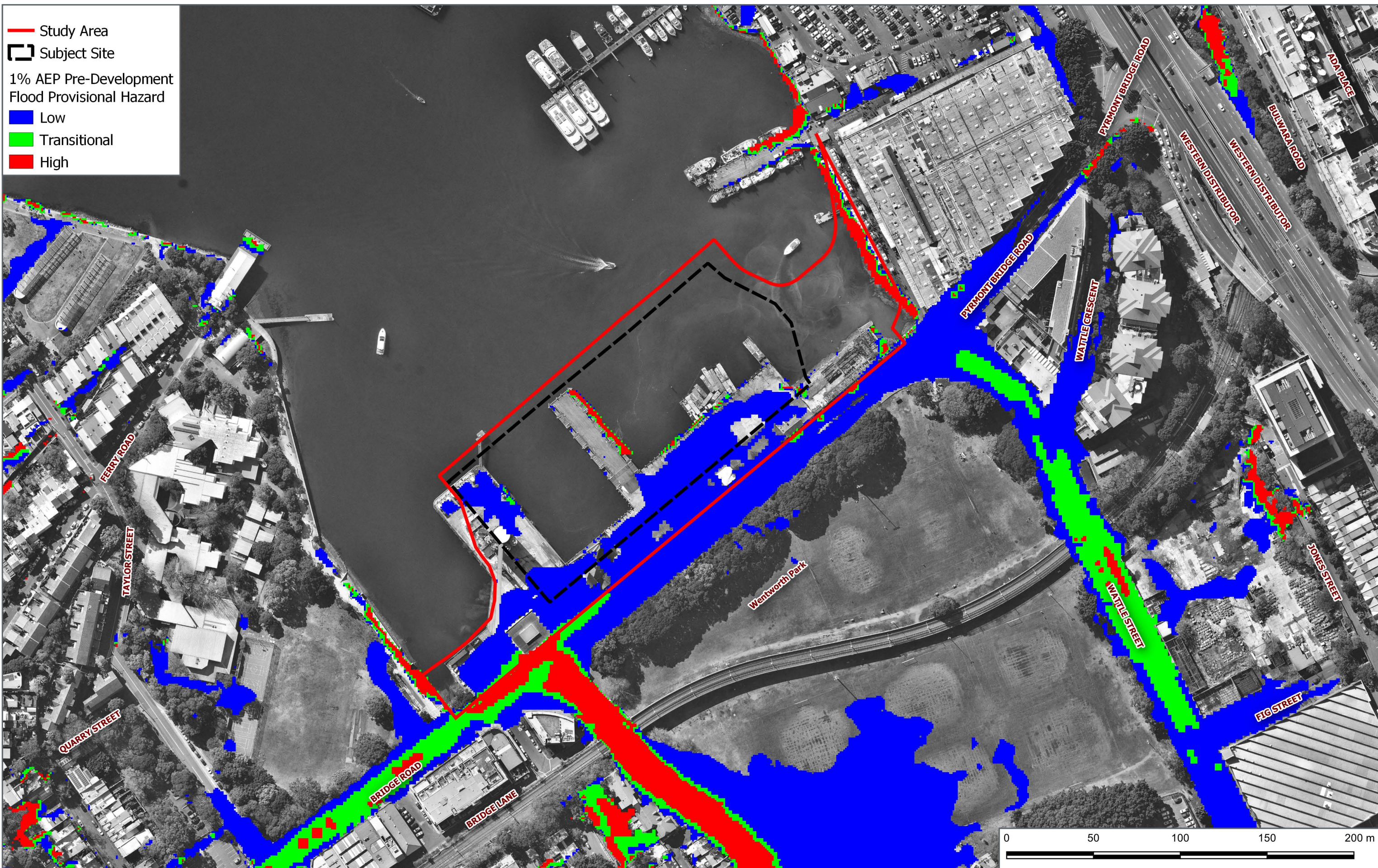


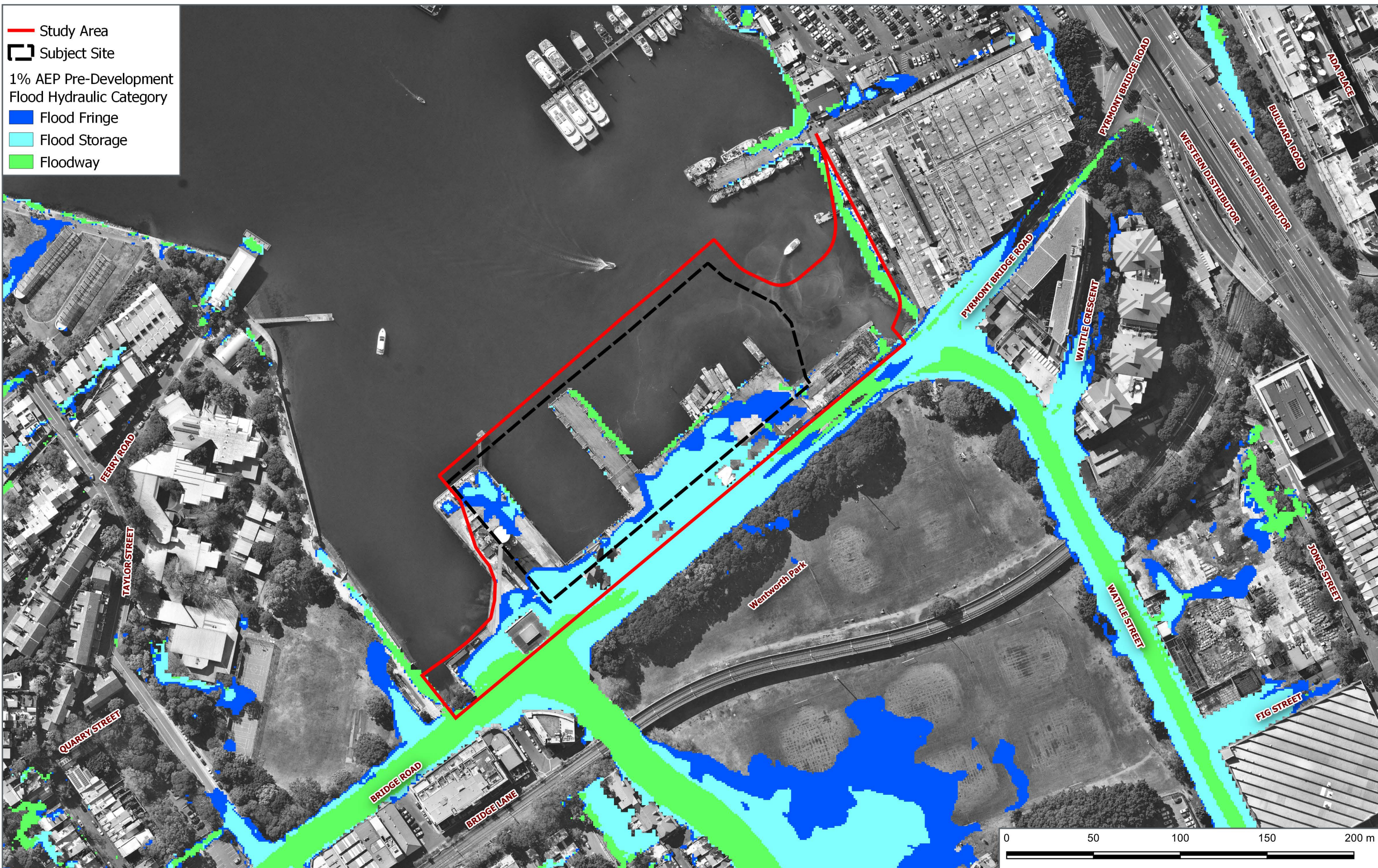


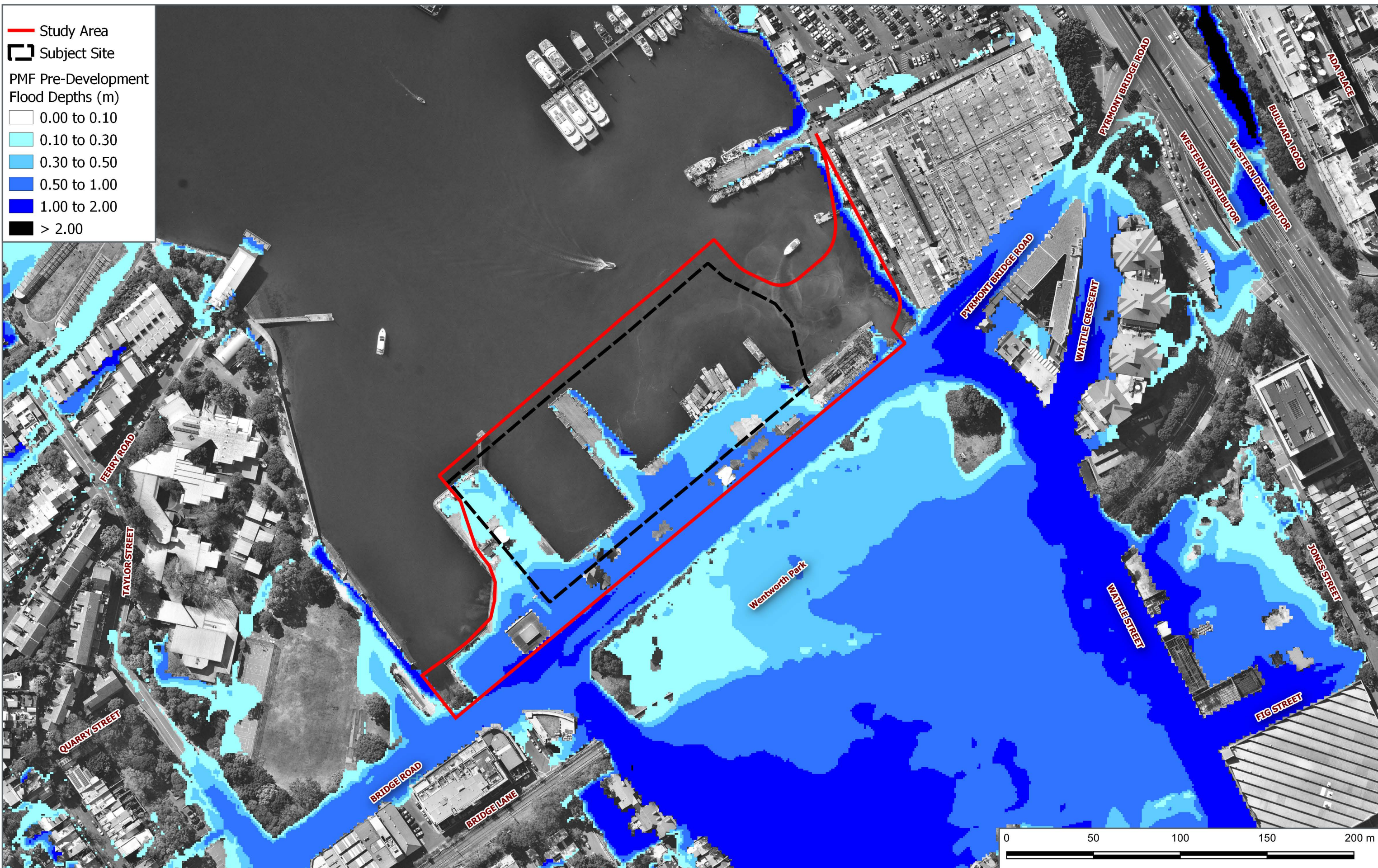


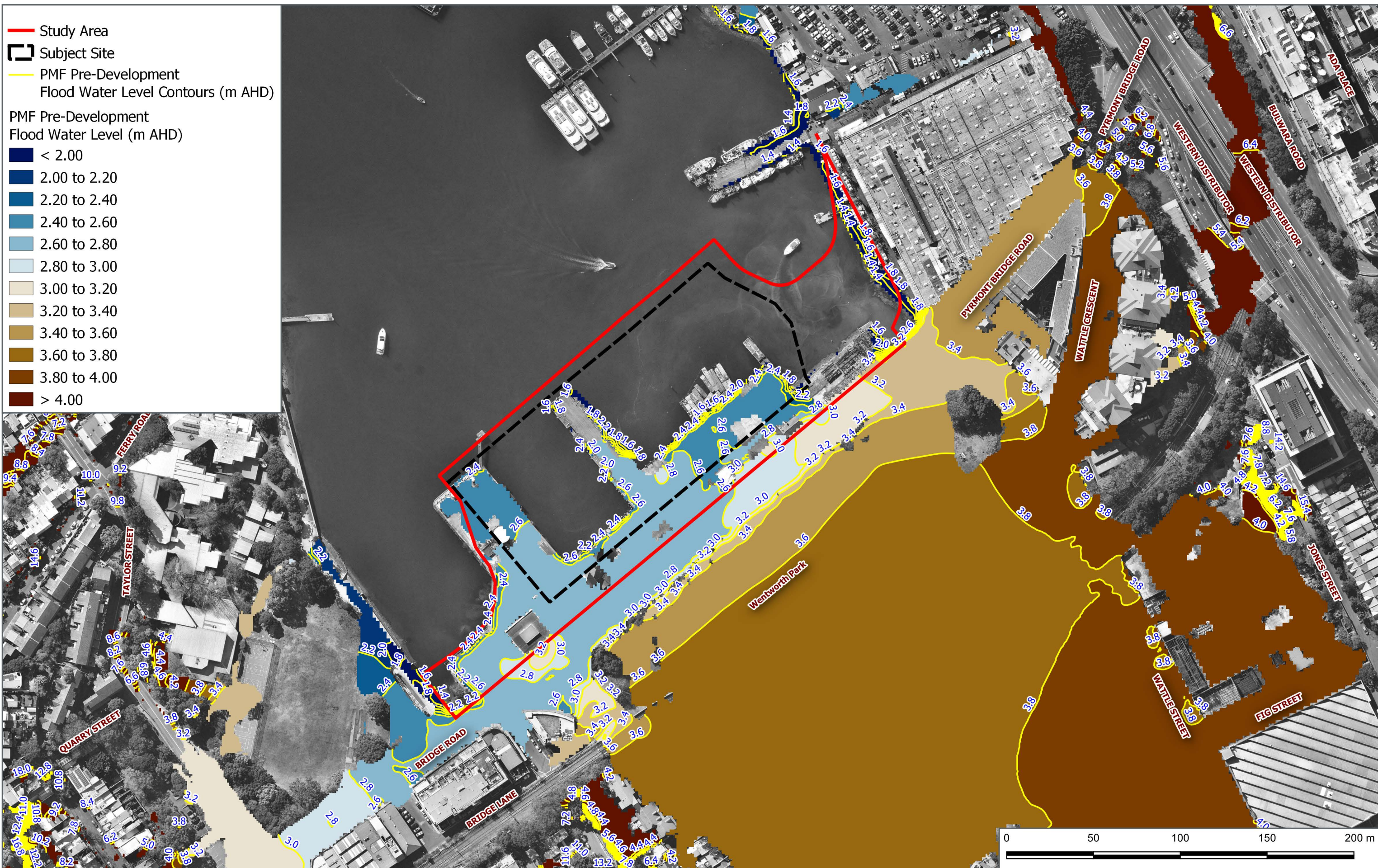


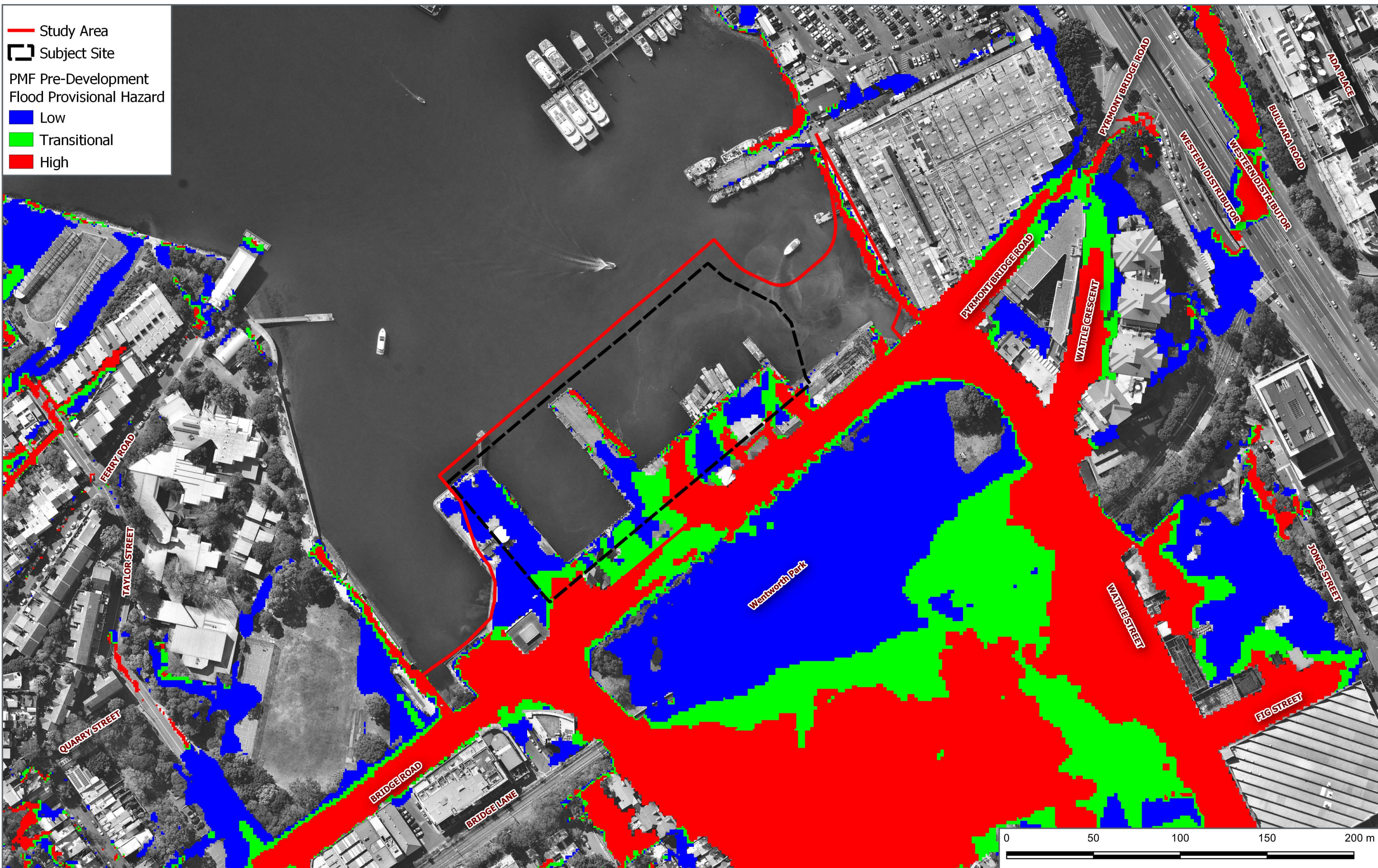


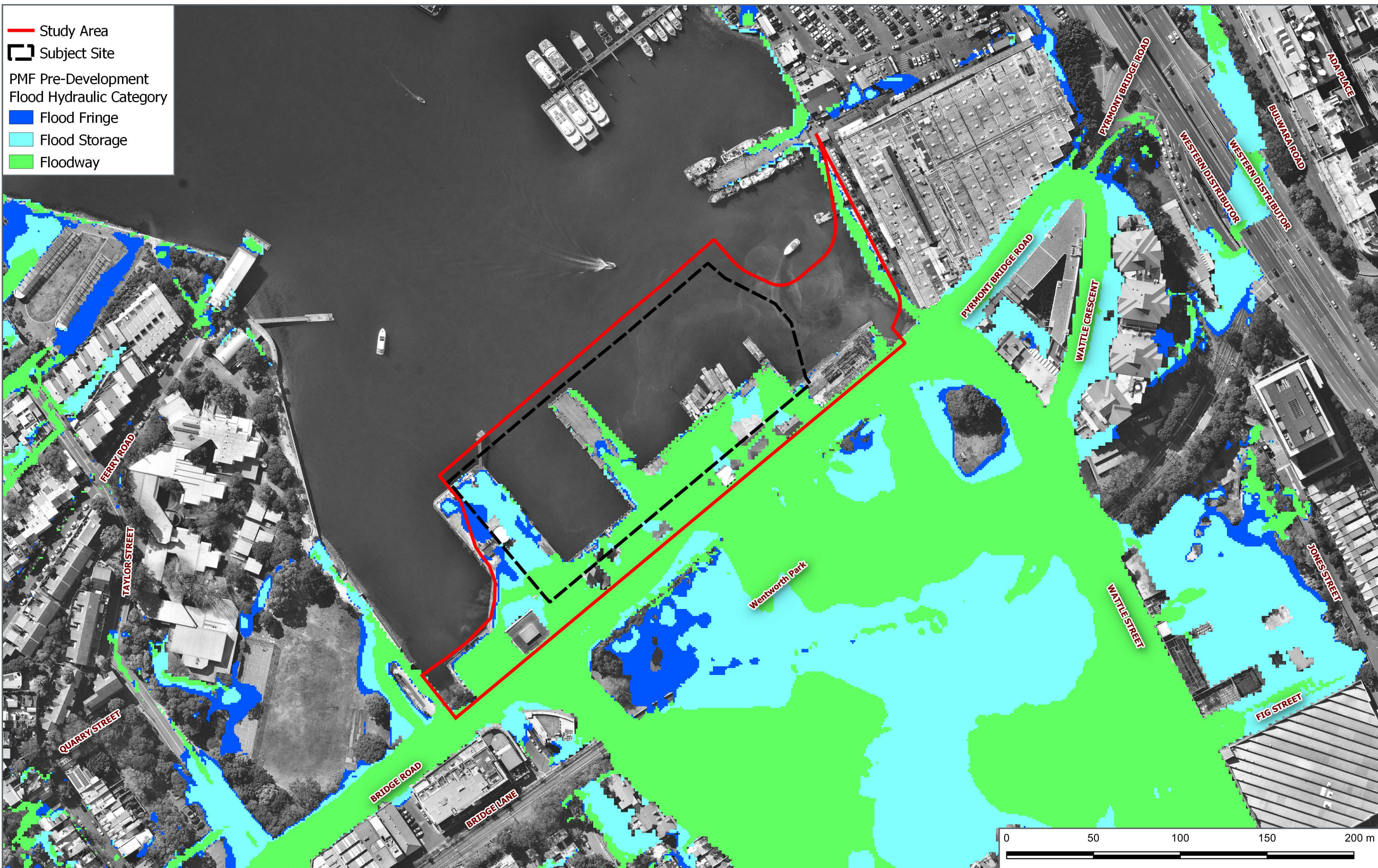


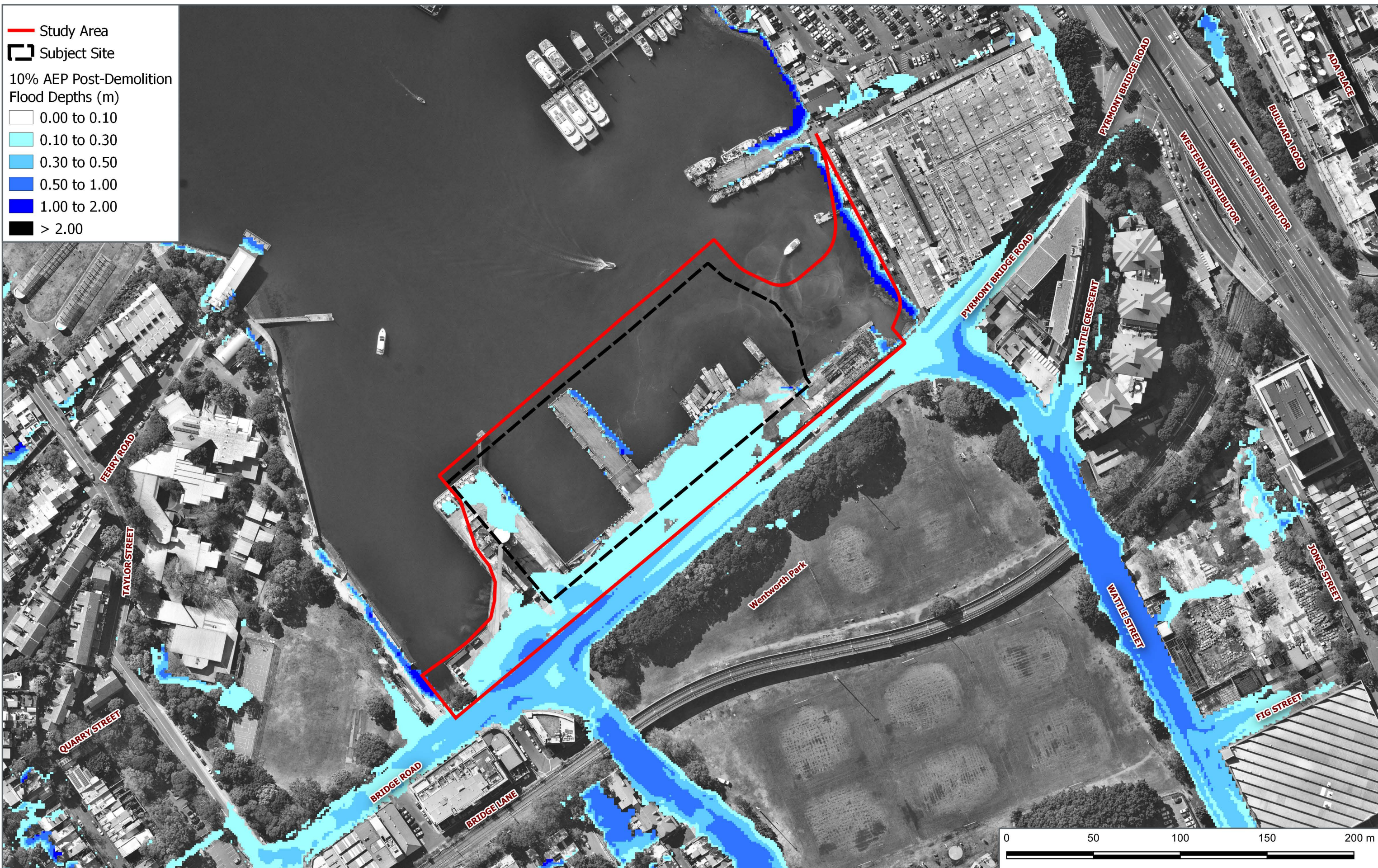


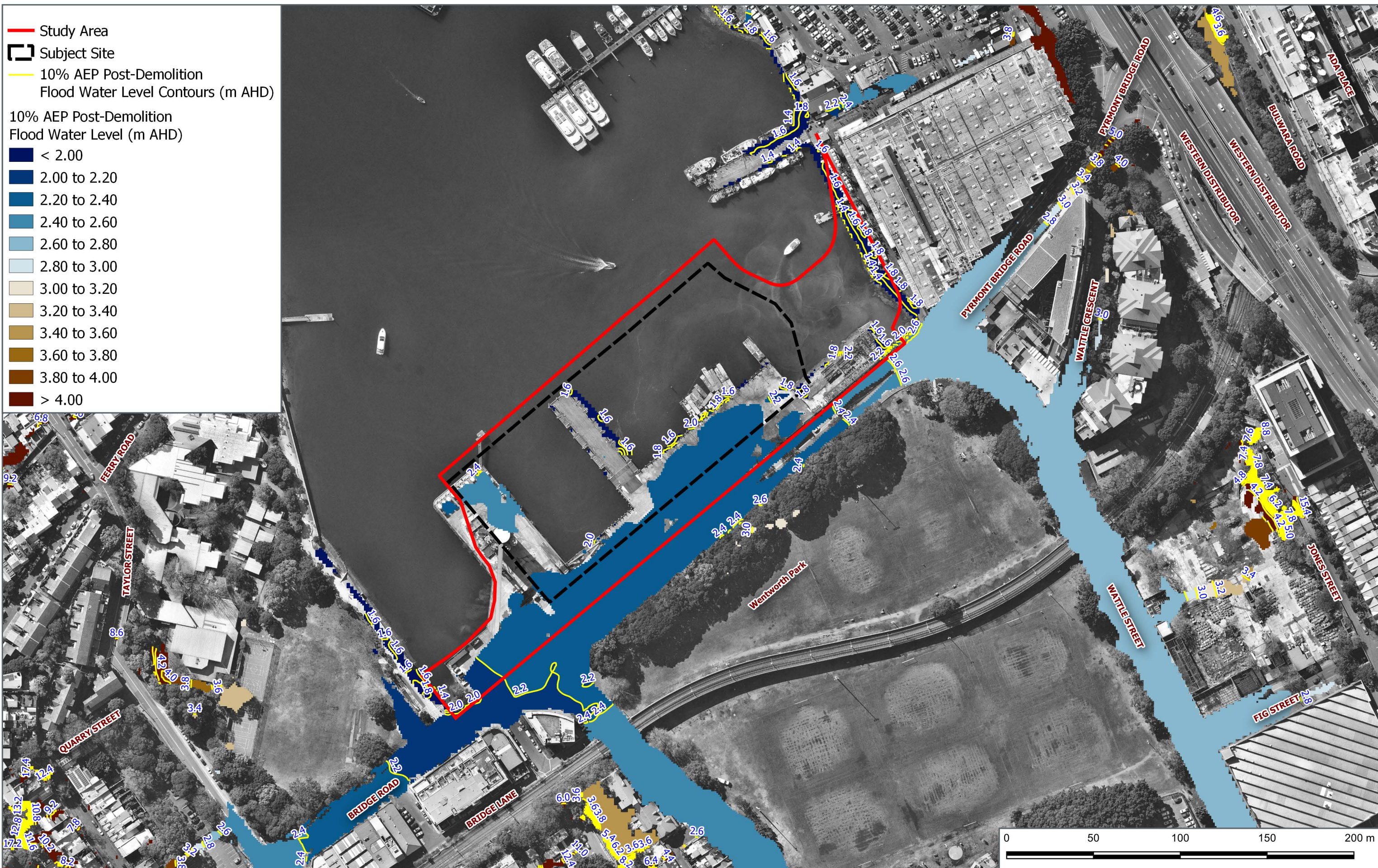




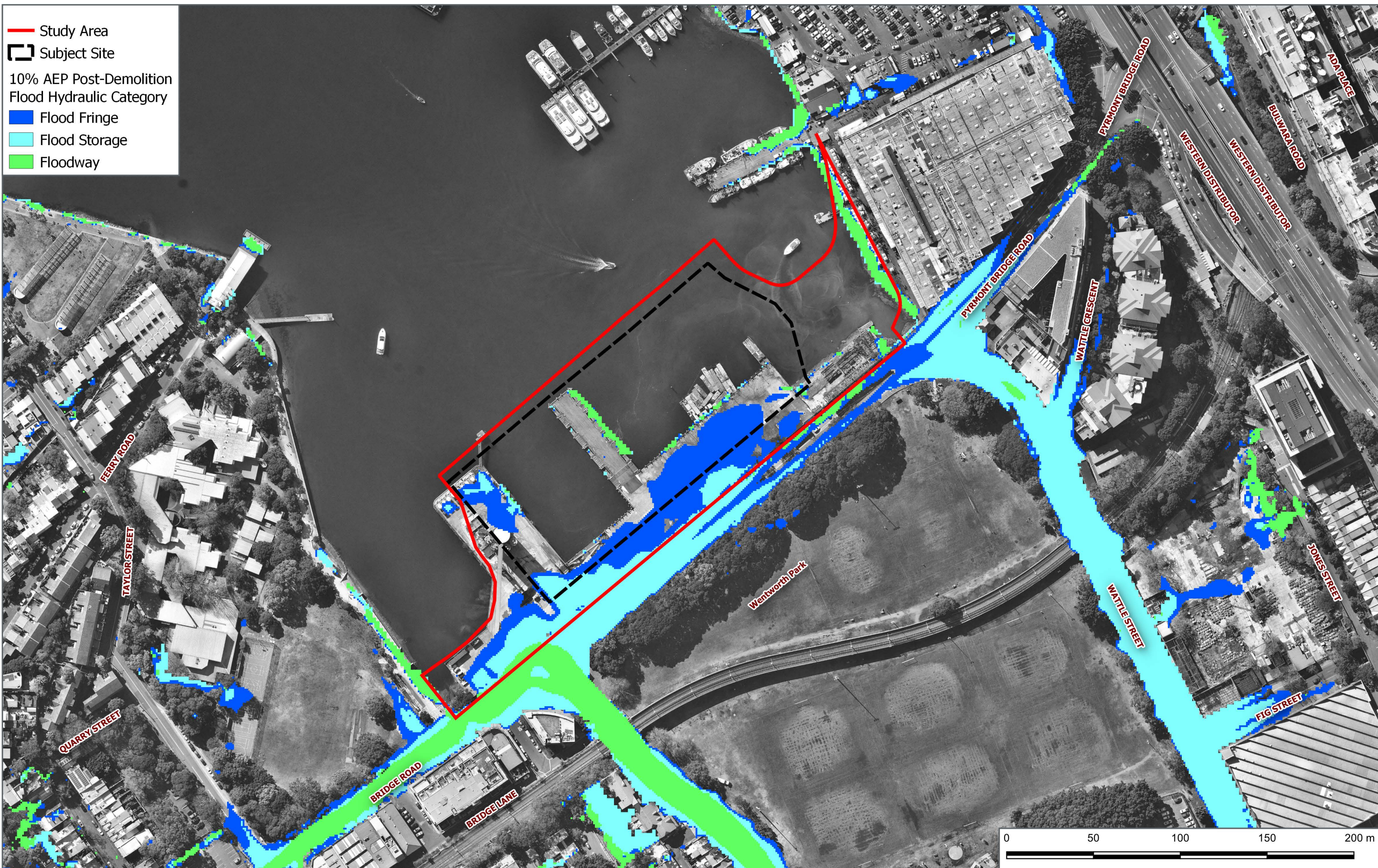


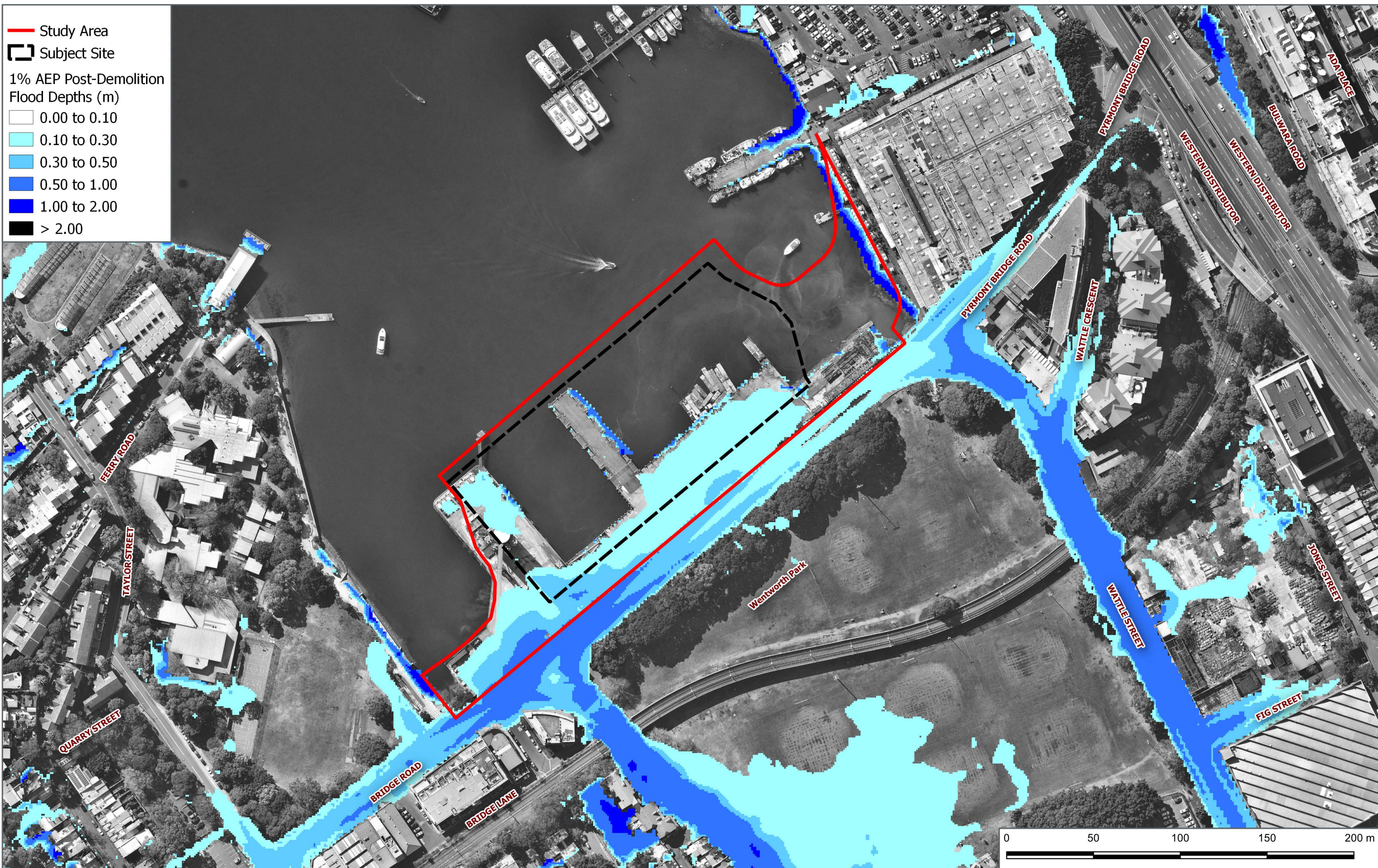


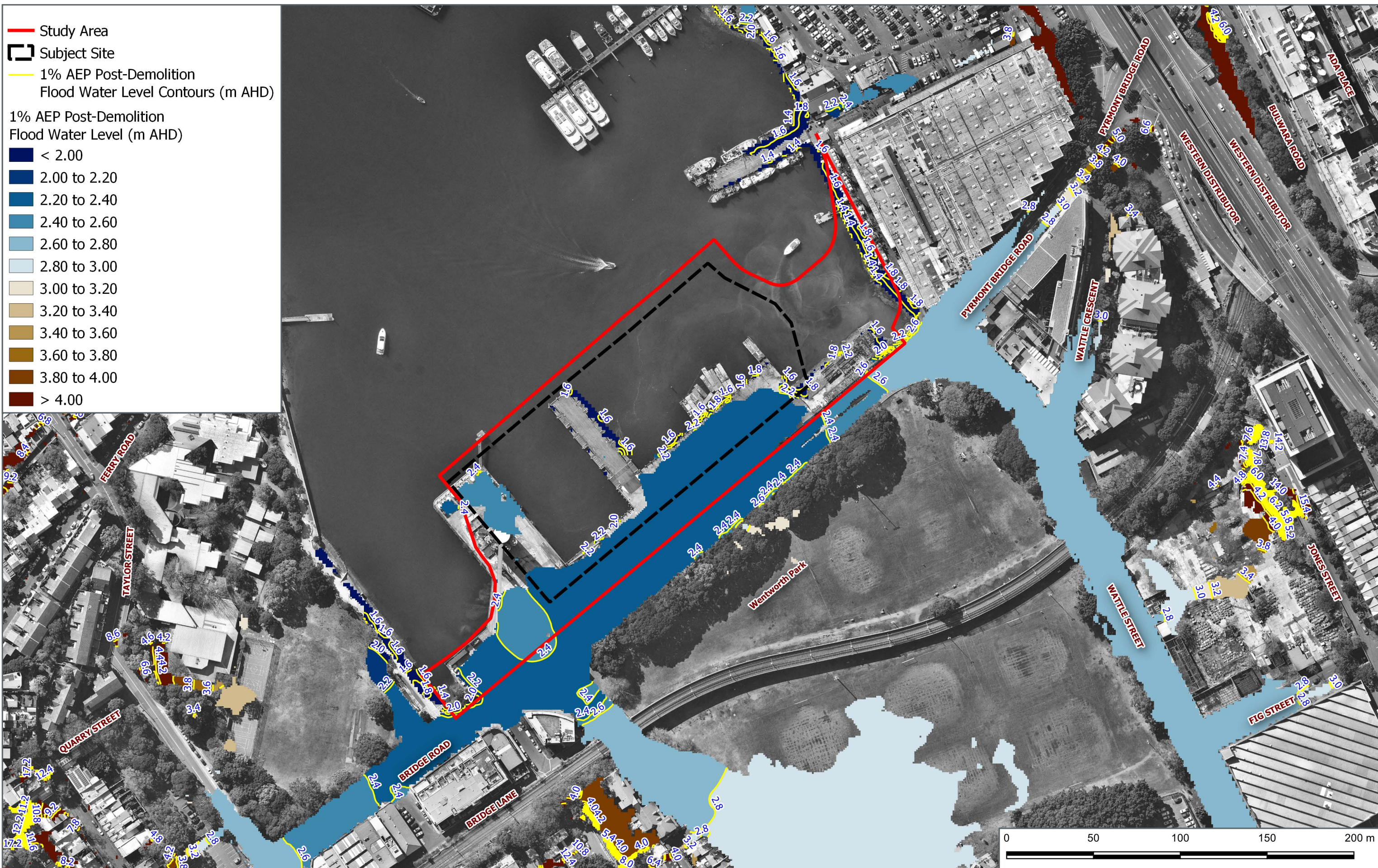


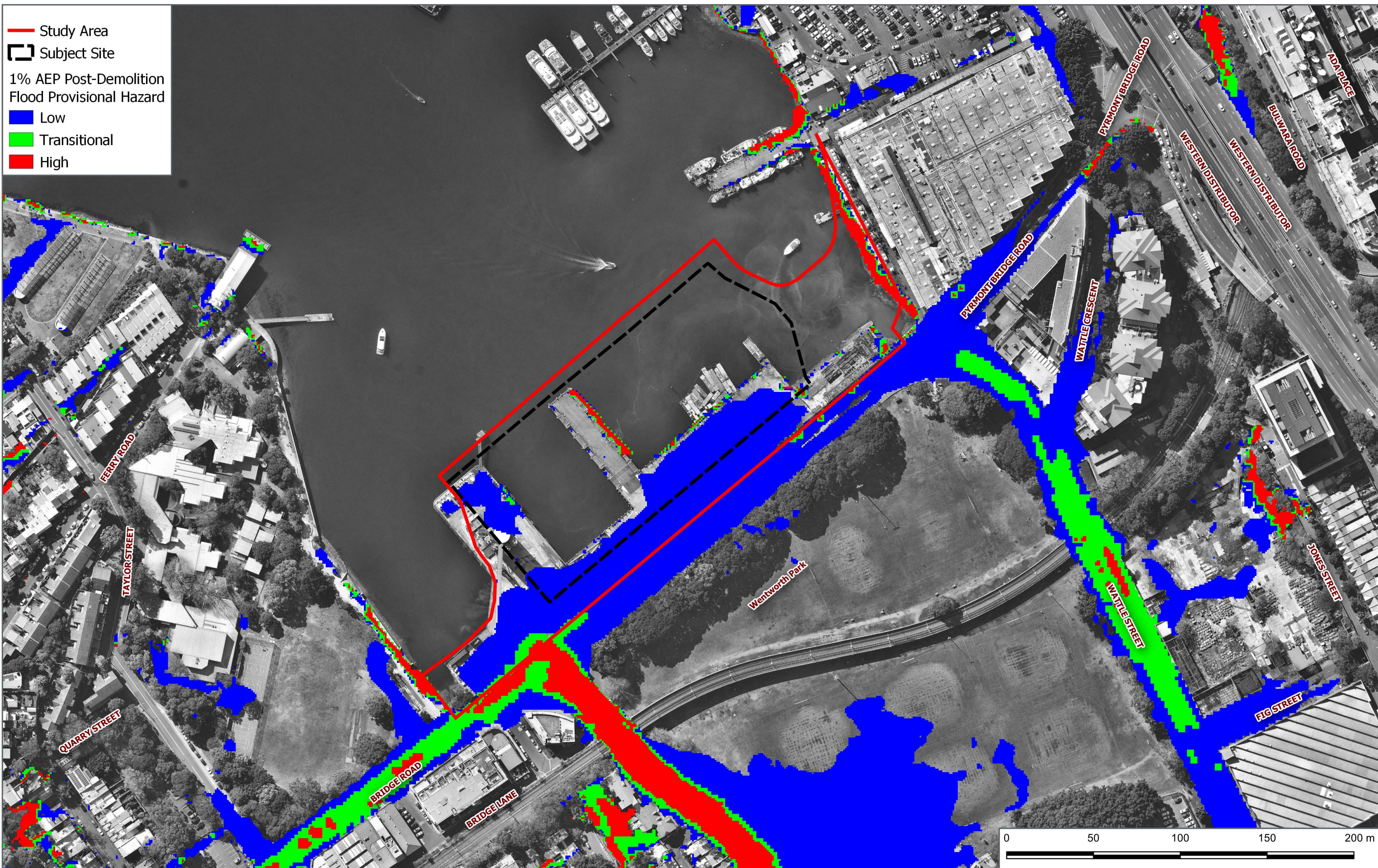


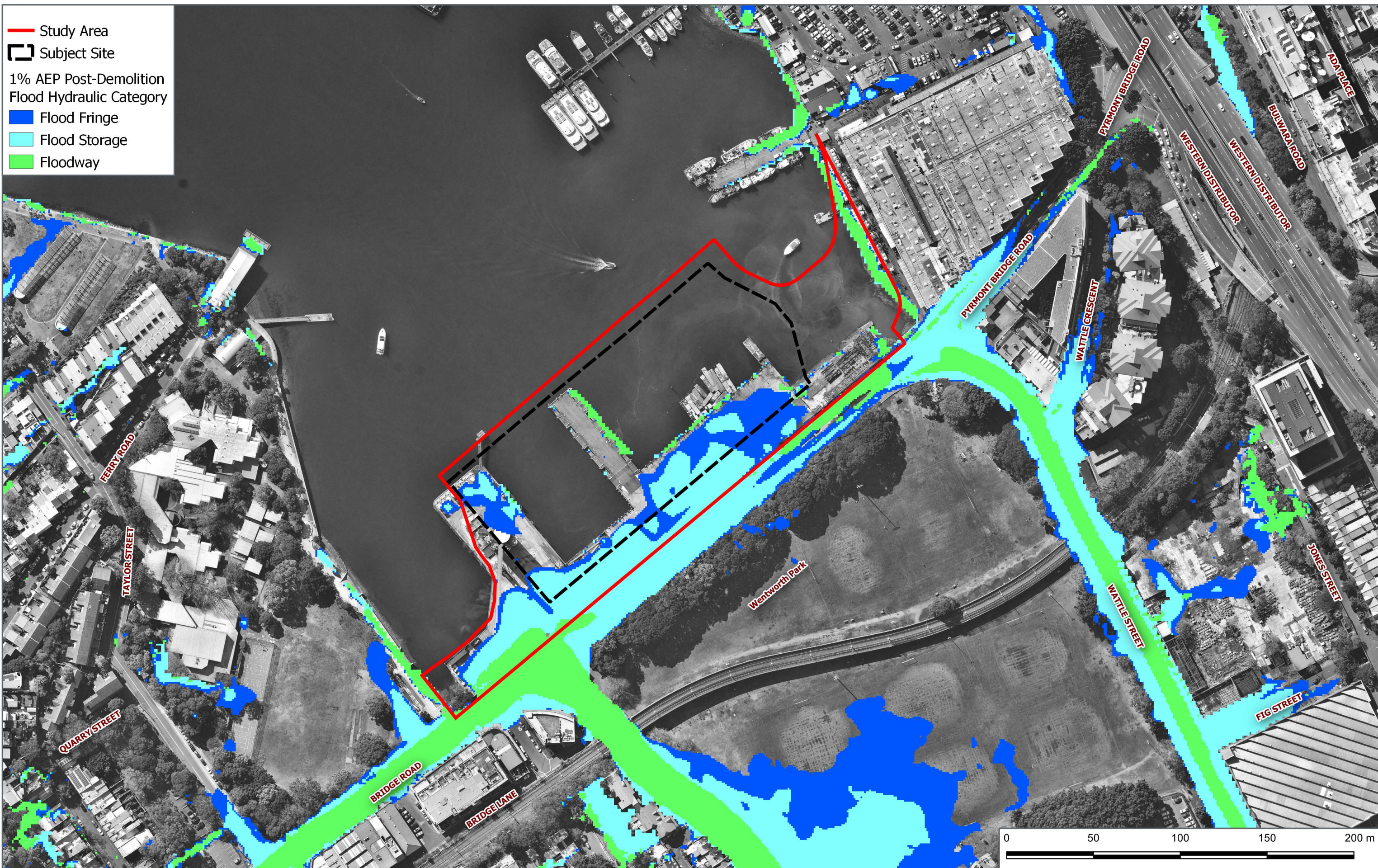












- Study Area
- Subject Site
- 1% AEP Post-Demolition
Flood Hydraulic Category
- Flood Fringe
- Flood Storage
- Floodway

