MULTIPLEX

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

New Sydney Fish Market



Multiplex Constructions Pty Limited

L22, 135 King St
Sydney, NSW 2000
Australia
T: +61 2 9322 2000
F: +61 2 9322 2001

multiplex.global

Document Revision: 8 **Date:** 17.05.2022

Contents

Contents **2**

1. Introduction **4**
1.1 Abbreviations 4
1.2 Project Description 5
1.3 Purpose 5
1.4 Scope of this Plan 5
1.5 Precedence 6
1.6 Interface with other Operational Procedures and Project Plans 6
1.7 Project Scope 6
1.8 Legal and Other Requirements 10
1.9 Document Control 25

2. Environmental Management System Framework **27**
2.1 Approach to Environmental Management 27
2.2 Management System Framework 27

3. Responsibility and Accountability **28**
3.1 Environmental Policy 28
3.2 Objectives, Targets and Programs 28
3.3 Management Review 28
3.4 EMS Organisational Chart 28
3.5 Multiplex Roles and Responsibilities 29
3.6 Contractor Roles and Responsibilities 32

4. Communication and Consultation **32**
4.1 Communication 32
4.2 Consultation 33

5. Contractor Management **33**
5.1 Evaluation and Selection of Contractors 33
5.2 Subcontractors Environmental Management Plans and EWMS 33
5.3 Contractor EMS Submission Requirements 34
5.4 Subcontractor Environmental Management Monitoring 34
5.5 Purchasing of Goods and Services 34

6. Risk Management **35**
6.1 Risk Workshops 35
6.2 Aspects and Impacts 35
6.3 Environmental Controls Map 36

7.0 Training and Competency **37**
7.1 Training and Competencies 37
7.2 Induction Training 37
7.3 Tool Box Meetings 37

8 Incident and Emergency Management **38**
8.2 Incident Management 38
8.3 Emergency Management 38

9.0 Inspections, Testing and Monitoring **39**
9.1 Environmental Site Inspections 39
9.3 Environmental Site Testing and Monitoring 39

10. Audits and Non-Conformances **40**
10.1 Audits 40
10.2 Non-Conformances, Corrective and Preventative Action 40

11 Document and Records Management 41
11.1 Document Control 41
11.2 Record Control 41

12 Reporting 42

13 Environmental Management Sub Plans 42
13.1 Construction Noise and Vibration Management Sub-Plan 42
13.2 Dust and Air Quality Management Sub Plan 45

13.3 Water Quality Management Sub-Plan 48

13.4 Erosion and Sediment Control Management Sub-Plan 52

13.5 Chemicals Management Sub-Plan 55

13.6 Land Contamination Management Sub-Plan 56

13.7 Waste Minimisation and Management Sub Plan 58

13.8 Heritage Management Sub-Plan 61

13.9 Flora and Fauna Management Sub-Plan 62

13.10 Site Office Environmental Management Sub-Plan 64

14 Appendices 69
Appendix 1: Environmental Policy 69
Appendix 2: EMS Forms and Guides 70
Appendix 3: Aspects and Impacts Register 71
Appendix 4: Environmental Control Map 98
Appendix 5: Construction Noise and Vibration Management Plan 99
Appendix 6: Construction Air Quality Management Plan 100
Appendix 7: Air Quality Report 101
Appendix 8: Dewatering Management Plan 102
Appendix 9: Soil and Water Management Plan 103
Appendix 10: Hazardous Materials Management Plan 104
Appendix 11: Acid Sulphate Soils Management Plan 105
Appendix 12: Remedial Action Plan 106
Appendix 13: Waste Management Plan 107
Appendix 14: Maritime Structures Heritage Impact Statement 108
Appendix 15: Arboriculture Impact Statement 109
Appendix 16: Marine Ecology Statement 110
Appendix 17: Microbat Management Plan 111
Appendix 18: Unexpected Finds Protocols 112
Appendix 19: Environmental – Pollution Incident Response 115
Appendix 20: Civil Engineering Drawings 117
Appendix 21: Revised Construction Staging Plan 118
Appendix 22: Environmental Assessment 119
Appendix 23: Marine Ecology Statement 120
Appendix 24: Air Quality Statement 121
Appendix 25: Tidal Flow Assessment 122

1. Introduction

1.1 Abbreviations

The abbreviations used in this Plan are outlined below.

Abbreviation	Definition
ACM	Asbestos Containing Materials
ANZECC	Australian and New Zealand Environment and Conservation Council
AS/NZS	Australian and/or New Zealand Standard
ASS	Acid Sulphate Soil
CAQMP	Construction Air Quality Management Plan
CEMP	Construction Environment Management Plan
CNVMP	Construction Noise Vibration Management Plan
DA	Development Application
dB	Decibel
DIA	Department of Indigenous Affairs
EPA	Environment Protection Authority
EMP	Environmental Management Plan
EMS	Environmental Management System
EWMS	Environmental Work Method Statement
HVAC	Heating Ventilation and Air Conditioning
INSW	Infrastructure New South Wales
MPX	Multiplex Constructions Pty Ltd
MSOPs	Multiplex Safe Operating Procedures
MSOP	Management System Operational Procedures
NABERS	National Australian Built Environment Rating System
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measures
nSFM	new Sydney Fish Market
NSW	New South Wales
NTU	Nephelometric Turbidity Units
PCG	Project Control Group
PM_{10}	Particle Matter (10 micrometres or smaller)
POEO	Protection of the Environment Operations
SDS	Safety Data Sheet
SWC	Sydney Water Corporation
SWMS	Safe Work Method Statement
TPZ	Tree Protection Zone
UFP	Unexpected Finds Protocol
UPSS	Underground Petroleum Storage Systems

VOCs	Volatile Organic Compounds
WAD	Works Authorisation Deed
WHS	Workplace Health & Safety
WHS&E	Workplace Health Safety & Environmental

Figure 1 *Abbreviations*

1.2 Project Description

The existing Sydney Fish Market is the largest market of its kind in the Southern Hemisphere and the third largest seafood market, in terms of variety, in the world. The existing SydneyFish Market sources product both nationally and internationally and trades over 13,500 tonnes of seafood annually.

The proposal is to design and construct a new fish market with a contemporary urban design that will provide unique experiences for visitors as well as 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 market in a new setting designed to achieve design excellence, functional performance, and environmental sustainability.

The New Sydney Fish Market (nSFM) will include retail and food and beverage premises, wholesale facilities and auction rooms, offices and commercial space, the Sydney Seafood School, and back-of-house facilities including 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 state of the art back-of-house plant and recycling/waste management facilities.

The existing Sydney Fish Market must continue to operate and trade without disruption while works relating to the nSFM are undertaken.

1.3 Purpose

The purpose of this Construction Environmental Management Plan (**CEMP**) is to provide a coordinated high level plan that details, at a Project level, the environmental management strategies and procedures that will be adopted on the nSFM (**nSFM** or the **Project**) on which Multiplex is operating as the Principal Contractor. This project is a State Significant Development SSD 8925, that the NSW government has engaged Multiplex as the primary contractor to conduct construction works. This CEMP is designed to assist in meeting both legislative requirements and environmental objectives such as the one listed below.

- prevent, minimise, or offset adverse environmental impacts;
- Set standards and performance measures for acceptable environmental performance;
- Require regular monitoring and reporting; and
- Provide for the ongoing environmental management of the development.

This plan is a sub-plan of the Project Management Plan, which forms part of Multiplex Management System which is certified to:

» AS/NZS ISO 9001:2015 – Quality Management System

» AS/NZS ISO 14001:2015 – Environmental Management System

» AS/NZS 4801:2001 – Occupational Health and Safety Management System

» New South Wales Government Accreditation Scheme.

Copies of these certifications can be found on the Multiplex Operating System ‘Document and Forms Library’.

1.4 Scope of this Plan

This Plan applies to the works associated with the Project and consists of:

» The Development of an Environmental Management System (EMS) to meet project objectives and align with legislative requirements.

» The organisational structure for environmental management

» Applicable legislative requirements

» Develop Sub-plans to manage the various environmental aspects of the Project

» Provide a process to manage Environmental incident.

» Provide processes to monitor and evaluate environmental performance

1.5 Precedence

Where ambiguity is detected between the procedures and requirements in this plan and the Multiplex Safe Operating Procedures (MSOPs) located on Multiplex Operating System, then the procedures nominated in this Plan will take precedence.

1.6 Interface with other Operational Procedures and Project Plans

This Plan should be read in conjunction with the MSOP and Management Plans detailed in Section 2.2 of this Plan.

The MSOP referenced in this Plan are confidential documents, and as such, will not be issued outside of Multiplex. However, they will be made available, for the purpose of surveillance and audit of the EMS.

1.7 Project Scope

The New Sydney Fish Market is a proposed design, construct and relocation of the existing Sydney Fish Market to Blackwattle Bay, whilst ensuring that the existing Sydney Fish Market remains operational and trade without disruption. The development aims to expand and improve the functions of the existing Sydney Fish Markets allowing visitors to experience world class facilities, and will consist of the following elements:

- Undertaking Main Works as per scope.
- A new Public Domain providing linkages to the existing waterfront promenade around Blackwattle Bay as well as Wentworth Park and adjoining public transport networks. Additionally features include a water play area, integrate soft landscaping and irrigation systems, water access and water edge treatment.
- Provide new wharves suitable for ferry and commercial fishing fleet operations, charter fishing boat and public recreational marine craft berthing and mooring.
- Design and construct the works to raise Bridge Road to suit the levels of the nSFM.
- Selected retail fit-out for tenant operations.
- Retail and food and beverage premises, wholesale facilities and auction rooms, offices, commercial space and the Sydney Seafood School.
- Back-of-house facilities including car, truck and coach parking spaces as well as plant and recycling/ waste management facilities.
- A long span glulam timber structure and canopy roof including cassettes, roof soffit and fascia.
- Achieving a 5-Star Green Star rating for sustainability

1.7.1 Project Hoarding Plan

There are three typical scenarios where hoarding is to be utilised

- Site boundary
- Staged construction zones during Bridge Road upgrades
- Exclusion Zones

A combination of hoarding types will be used to ensure the safety of the existing Sydney Fish Market users, construction workers and the public, including but not limited to:

- **Existing chain wire mesh fence –** until removed to complete northern section of Bridge Road upgrade works
- **Staged hoardings and traffic barriers –** during Bridge Road upgrade works by subcontractor
- **A Class hoardings –** 2.4m ply wood hoarding to delineate site boundary and prevent unauthorised access
- **Jersey Kerbs –** where there is a danger of deep excavation or areas adjacent to high traffic volume
- **Floating Booms and silt curtains –** to delineate northern site boundary in Blackwattle Bay

Multiplex will incorporate NSW Government Waratah logo, images and text into the hoarding schematic design for Infrastructure NSW review and consent prior to installation

The site hoarding lines are outlined in the below diagram:

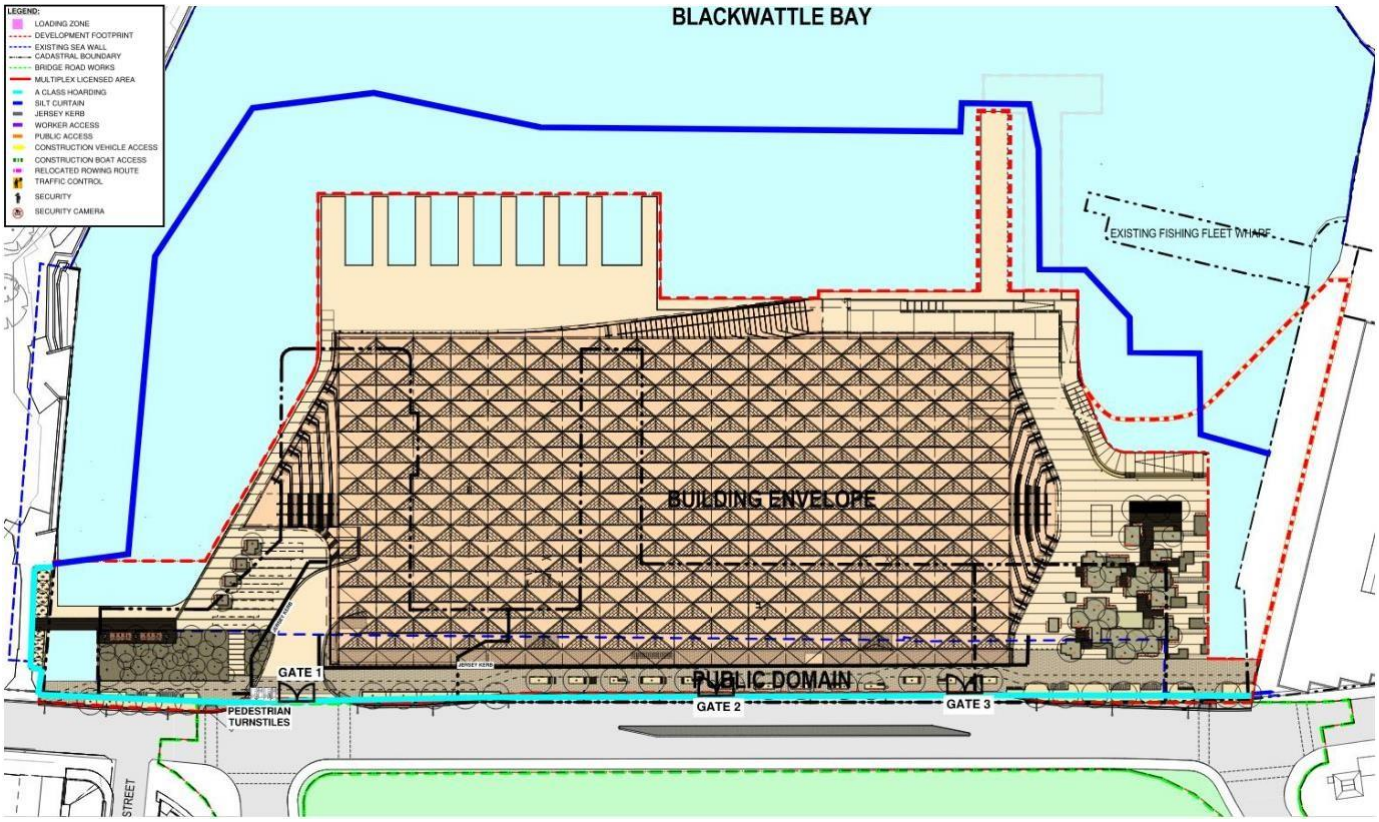


Figure 2 *Hoarding Plan*

1.7.2 Staging

The project scope can be broken into the following major work streams;

Work stream	Location/Precinct	Work Program	Timeframe
Building Structure	» Precinct 1,3,5	» Coffer Dam » Foundations + Piling » Basement Backfill » Basement » Cores » Suspended Slabs » Mezzanine	» Apr-21 to Dec-22

Work stream	Location/Precinct	Work Program	Timeframe
Roof	» Precinct 1	» Roof Canopy » Roof Cassette and Fascia	» Aug-22 to Feb-23
Façade & Glazing	» Precinct 1	» Glazing » Louvres	» Aug-22 to Mar-23
Fit-Out/Finishes/FF&E	» Precinct 1	» Operational Areas » Retail Areas » Mezzanine Levels » External Stairs » nSFM Tenant Fit out (by others)	» Jun-22 to Nov-23
Services and Commissioning	» Precinct 1	» Freezer Rooms » Substations » Vertical Transport » Other	» Aug-22 to Jun-23
Fish and Recreational Wharves	» Precinct 2	» Operational Wharves » Public Wharf	» Nov-22 to Apr-23
Public Domain and Landscaping	» Precinct 2,3,5	» Planting » Hardstands » Public Art	» Nov-22 to May-23
Bridge Road Works	» Precinct 4	» HV Feeder Supply to Site (Off-site) » Stage 1 – Bridge Road Promenade In-ground Works » Stage 2 – Bridge Road WAD Works » Stage 3 – Bridge Road Finalisation	» Jan-22 to Jun-23
Basement Structure	» Precinct 1	» Land-Based Piling » Floor Slabs » Walls	» Jun-21 onwards

Figure 3 *Project Staging*

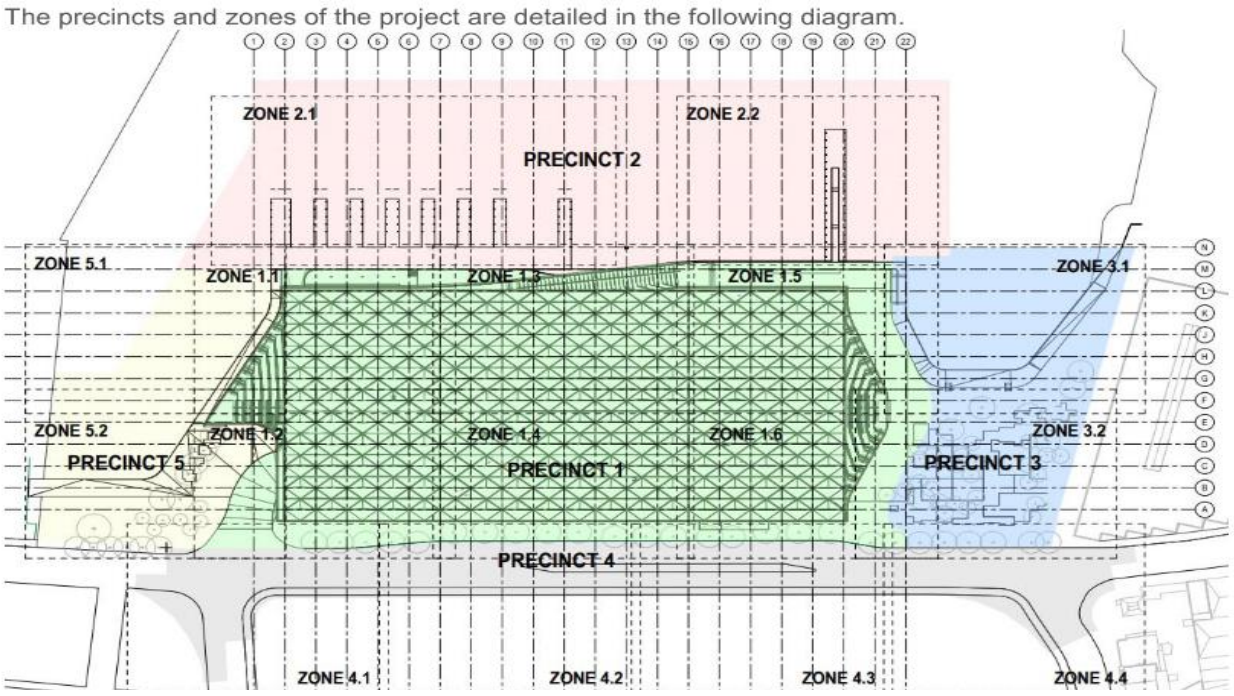


Figure 4 *Project Precincts Plan*

1.7.3 Key Risks and Control Measures

As part of the scope outlined above, Multiplex has identified control measures for some of the key environmental risks in the below table. Additional controls for these risks are identified within the Aspects and impacts Register in appendix 3.

Marine Ecology and Water Quality	
Sediment Disturbance	» Silt Curtain - Following the Early Works and site establishment, a perimeter silt curtain will be maintained throughout construction to help contain sediments disturbed during construction activities. This will supplement other primary controls. » Coffer Dam - As part of the basement construction, a perimeter coffer dam will be established. Besides protecting against water ingress, this will help to contain the significant disturbance caused by ground slab preparations and general site run-off
Erosion and Site Run-Off	» Stormwater Diversions - To help deal with the flow from live stormwater lines, temp and permanent diversions will be designed to help bypass work zones. This will reduce potential for erosion and contamination. » Detention and Outlet Control - In areas where site run-off is unavoidable, controls will be installed to direct water to nominated basins or sumps, where it can be appropriately tested, treated and discharged in line with project requirements. It is understood there is no requirement for such treatment of seawater seepage »Hard Stand - To reduce the potential for dust and sediment run-off, Multiplex will accelerate the paving slab over the existing earth zone in the Bridge Road Promenade, such that it acts as a construction hardstand.
Spills	» Containment Bunds - All chemicals will be stored in portable chemical containment bunds to prevent the leaking of any environmentally hazardous chemicals. » Spill Kits - Appropriate training will be provided to any subcontractor using chemicals onsite in the event of a spill.
Soils and Contamination	
Acid Sulphate Soils	» Conform With Existing Documentation - A detailed Acid Sulphate Soil Management Plan by JBS&G has been provided. This comprehensive document draws upon a broad range of data, and has been written in accordance with current regulatory guidelines. On this basis, Multiplex understand that it can be reasonably relied upon to inform the Acid Sulphate management strategies. » Elimination - Accordingly, Multiplex has worked with our respective trades and consultants, to help develop methodologies which align with recommendations provided therein. An emphasis has been placed on minimising disruption of Potential Acid Sulphate Soils (PASS), to negate the need for treatment or disposal. Examples of this include the revetment wall zones, and marine piling. » Neutralisation - Where elimination is not achievable, treatment methods such as neutralisation will be implemented. Rigorous classification, testing and monitoring regimes will help ensure treatment is successful.
Noise and Vibration	

Construction Impacts » Established Limits	- It is anticipated that the Principal's consultant team will liaise with the relevant authorities (e.g. City of Sydney) and stakeholders to prescribe construction noise and vibration limits for the project. » Noise and Vibration Consultant - Multiplex will engage a noise and vibration consultant to assist in preparing a project-specific Construction Noise and Vibration Plan outlining the targets, management strategies, monitoring requirements and reporting procedures that will be implemented. » Monitoring - Monitors will be used to measure actual results for comparison against prescribed limits so that construction practices can be modified to reduce noise and vibration if required. These monitors will be positioned on the site at the commencement of specified operations. They will be programmed to provide notifications and alarm locally whenever noise or vibration levels exceed the limit and detailed monthly reports.
Air Quality	
Construction Impacts » Dust & Air Quality Consultant.	- Multiplex will engage an air quality consultant to assist in preparing a project-specific Construction Air Quality Management Plan. This plan will outline the targets, management strategies, mitigation measures, monitoring requirements and reporting procedures that will be implemented to ensure compliance with relevant ambient air quality criteria for particulate matter and other relevant air pollutants at surrounding receptor locations. » Monitoring - Monitors will be used to measure actual results for comparison against prescribed limits so that construction practices can be modified to reduce or alter process generating dust or other air quality contaminants. These monitors will be positioned at determined sensitive areas as determined by the consultant. Reports based of collected data will be generated frequently and reviewed and monitored by consultant and project team.
Other	
Tree Protection	» Arborist Consultation - In line with existing documentation, Multiplex will engage a qualified arborist to undertake tree protection and pruning works. » Tree Protection Zones - Controls (e.g. branch, trunk and ground protection) to protect the root and canopy system within the nominated tree protection zones in accordance with AS4970:2009 and the documented Tree Protection Specification

1.8 Legal and Other Requirements

In accordance with Procedure BU AUS IMS P DIV 050 – Document and Records Management, a schedule of environmental legislation has been developed to identify all environmental legal and other requirements that are applicable to the project. This schedule is maintained on Multiplex Operating System and is reviewed annually by the WHS&E Manager/Coordinator.

1.8.1 Legislative References

The pertinent Acts, Regulations and Guidelines that apply to the project are outlined below:

ENVIRONMENTAL LEGISLATION REGULATIONS AND GUIDELINES	
Acts	
» Contaminated Land Management Act 1979	» Ozone Protection Act 1989
» Environmentally Hazardous Chemicals Act 1985	» Pesticides Act 1999
» Environmental Planning and Assessment Act 1979	» Protection of the Environment Operations Act 1997
» Heritage Act 1977	» Soil Conservation Act 1938
» Land and Environment Court Act 1979	» Sydney Water Act 1994
» Local Government Act 1993	» Waste Avoidance and Resource Recovery Act 2001
» National Parks and Wildlife Act 1974	» Water Act 1912
» Marine Pollution Act 2012	
Regulations	

» Contaminated Land Management Regulation 2013
» Environmentally Hazardous Chemicals Regulation 2017
» Environmental Planning and Assessment Regulation 2000
» Heritage Regulation 2012 – various amendments and Regulations
» Land and Environment Court Regulation 2005
» Local Government (General) Regulation 2005
» National Parks and Wildlife Regulation 2009
» Pesticides Regulation 2017
» Marine Pollution Regulation 2014
» Protection of the Environment Operations (Clean Air) Regulation 2010
» Protection of the Environment Operations (General) Regulation 2009
» Protection of the Environmental Operations (Underground Petroleum Storage Systems) Regulations 2014
» Protection of the Environment Operations (Noise Control) Regulation 2017
» Protection of the Environment Operations (Waste) Regulation 2014
» Sydney Water Regulation 2017

Commonwealth (National) Environmental Legislation

» Aboriginal and Torres Strait Islander Heritage Protection Act 1984
» Environmental Protection and Biodiversity Conservation Act 1999
» National Environment Protection Council Act 1994
» National Greenhouse and Energy Reporting Act 2007
» Ozone Protection and Synthetic Greenhouse Gas Management Act 1989
» Product Stewardship Act 2011
» Water Efficiency Labelling and Standards Act 2005

Commonwealth National Environment Protection Measures

» National Environment Protection (National Pollutant Inventory) Measures 1998
» National Environment Protection (Ambient Air Quality) Measure 1998
» National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended 2013)
» National Environment Protection (Diesel Vehicle Emissions) Measure 2001
» National Environment Protection (Used Packaging Materials) Measure 2011
» National Environment Protection (Air Toxics) Measure 2011

NSW Environmental Planning Policies

» State Environmental Planning Policy (State and Regional Development 2011
» State Environmental Planning Policy (Exempt and Complying Development Codes (2008)
» State Environmental Planning Policy (Infrastructure) 2007
» State Environmental Planning Policy (Major Development) 2005
» State Environmental Planning Policy (Building Sustainability Index: BASIX) 2004
» State Environmental Planning Policy No 71 (Coastal Protection)
» State Environmental Planning Policy No 55 (Remediation of Land)
» Sydney Local Environmental Plan 2012

ENVIRONMENTAL LEGISLATION REGULATIONS AND GUIDELINES

Guidelines/ Australian Standards

» Air Quality Guidance Notes for Construction Sites
» Assessing Significance for Historical Archaeological Sites and Relics
» Assessing Vibration – Technical Guidelines (2006) – DEC (EPA) AS1055
» Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)
» City of Sydney Code of Practice for the Construction Hours/Noise 1992
» City of Sydney Council's Policy for Waste Minimisation in New Developments 2005
Abandonment
» Technical Guidelines to Minimise Blasting Overpressure and Ground Vibration
» Environmental Management Systems Guidelines for the Construction Industry
» Interim Construction Noise Guideline
» Know Your Responsibilities – Managing Waste From Construction Sites
» Managing Urban Stormwater – Soils and Construction
» National Australian Built Environment Rating System (NABERS Energy)
»
» NSW Heritage Office Guidelines- Photographic Recording of Heritage Items using Film or Digital Capture.
» AS 1940-2017- The storage and handling of flammable and combustible liquid
» AS 4976-2008- The removal and disposal of underground petroleum storage tanks
» AS 4897-2008 – The design, installation and operation of underground petroleum storage systems
» UPSS Technical Note: Site Validation Reporting
» UPSS Technical Note: Decommissioning,

and removal of UPSS

Figure 6 *Environmental Legislative Regulation and Guidelines*

1.8.2 Approvals, Licenses and Permits

The relevant approvals, permits and licenses for the project are outlined below:

Approval/Licence/Permit	Relevant Authority & Agencies	Details
» Notification of Demolition	» SafeWork NSW	» Notice of intent to demolish a structure, or a part of a structure, that is load-bearing, or otherwise related to the physical integrity that is over six metres high.
» Permit to Discharge Water	» Sydney Water / MPX	» Approval is to be obtained prior to discharge of water
» Notification of Friable/Non-Friable Asbestos Removal	» SafeWork NSW	» Notice of intent to remove friable/non-friable asbestos
» Harbour Master Approval	» Port Authority of NSW	» Approval for proposed works in disturbing the bed of Sydney Harbour port
» SWC-CN181645	» Sydney Water Corporation	» Approval for stormwater diversion works of stormwater culverts and sewer connection point
» Trade Waste Water Permit	» Sydney Water Corporation	» Discharge of trade wastewater into the sewer.
»Asbestos Removalist Licences	» SafeWork NSW	» Class A for removal of Friable ACM. Class B for removal of bonded or non-friable over >10m^2

Figure 7 *Approvals, permits and licenses*

1.8.3 Development Conditions

The relevant development conditions relating to environmental management for the project are outlined below as per SSD 89325 12/06/2020. Multiplex will ensure compliance with the following environmental clauses.

The clauses are broken by the Prefix initials per the following:

Prefix	Condition Type
» A	» Administrative Condition
» B	» Prior to Commencement of Works
» C	» During Construction
» D	» Prior to Occupation or Commencement of Use
» E	» Post Occupation
» F	» Prior to Issue of a Subdivision Certificate
» AN	» Advisory Notes

Figure 8 *Development Condition Types*

Condition No.	Requirement	Responsibility
General		
» A11	If necessary to either improve the environmental performance of the development, cater for a modification or comply with a direction, the strategies, plans and programs required under this consent must be revised, to the satisfaction of the Planning Secretary. Where revisions are required, the revised document must be submitted to the Planning Secretary for approval within six weeks of the review. *Note: This is to ensure strategies, plans and programs are updated on a regular basis and to incorporate any recommended measures to improve the environmental performance of the development.*	MPX with assistance from INSW
» A16	Any condition of this consent that requires the carrying out of monitoring or an environmental audit, whether directly or by way of a plan, strategy or program, is taken to be a condition requiring monitoring or an environmental audit under Division 9.4 of Part 9 of the EP&A Act. This includes conditions in respect of incident notification, reporting and response, non-compliance notification and independent environmental auditing. *Note: For the purposes of this condition, as set out in the EP&A Act, "monitoring" is monitoring of the development to provide data on compliance with the consent or on the environmental impact of the development, and an "environmental audit" is a periodic or particular documented evaluation of the development to provide information on compliance with the consent or the environmental management or impact of the development.*	MPX with assistance from INSW
» A17	The Department must be notified in writing to compliance@planning.nsw.gov.au immediately after the Applicant becomes aware of an incident. The notification must identify the development (including the development application number and the name of the development if it has one) and set out the location and nature of the incident.	MPX
» A18	Subsequent notification must be given, and reports submitted in accordance with the requirements set out in Appendix 1 (of SSD-8925)	MPX
» A19	The Department must be notified in writing to compliance@planning.nsw.gov.au within seven days after the Applicant becomes aware of any non-compliance. The Certifier must also notify the Department in writing to compliance@planning.nsw.gov.au within seven days after they identify any non-compliance.	MPX
» A20	The notification must identify the development and the application number for it, set out the condition of consent that the development is non-compliant with, the way in which it does not comply and the reasons for the non- compliance (if known) and what actions have been, or will be, undertaken to address the non-compliance.	MPX
» B27	The Construction Compliance Reports must include: a) a results summary and analysis of environmental monitoring; b) the number of any complaints received, including a summary of main areas of complaint, action taken, response given and proposed strategies for reducing the recurrence of such complaints; c) details of any review of the **Construction Environmental Management Plan** (CEMP) and the Environmental Management Strategy and associated sub-plans as a result of construction carried out during the reporting period; d) a register of any modifications undertaken and their status; e) results of any independent environmental audits and details of any actions taken in response to the recommendations of an audit; f) a summary of all incidents notified in accordance with this consent; and g) any other matter relating to compliance with the terms of this consent or requested by the Planning Secretary.	MPX
» B28	The Applicant must ensure that all of its employees, contractors (and their sub-contractors) are made aware of, and are instructed to comply with, the conditions of this consent relevant to activities they carry out in respect of the development.	INSW with assistance from MPX

» C23	The Appliant must ensure the requirements of the **CEMP, CNVMP, CPTMP, CVTMP, WMP, WSMP, SMP, CAQMP, HMMP** and the **MMP** required by **Part B** of this consent are implemented during construction.	MPX
» C24	The Applicant must ensure the requirements of the **ACHA**, **AQA** and **MEA** required by **Part B** of this consent are implemented during construction.	
Construction Environmental Management Plan – refer to this plan		
» B77	Prior to the commencement of works, the Applicant shall prepare and implement an updated **Construction Environmental Management Plan** (CEMP) for the development. The CEMP must: a) describe the relevant stages and phases of construction, including work program outlining relevant timeframes for each stage/phase; b) include plans demonstrating the boundary of the construction site and any associated areas to be fenced or closed to the public; c) describe all activities to be undertaken on the site during site establishment and construction of the development; d) include a Dust Management Plan, incorporating the mitigation measures outlined in the Air Quality Impact Assessment, prepared by SLR Consulting, dated April 2019 and the Air Quality Statement, prepared by SLR, dated 15 February 2022; e) clearly outline the stages/phases of construction that require ongoing environmental management monitoring and reporting; f) detail statutory and other obligations that the Applicant is required to fulfil during site establishment and construction, including approvals, consultations and agreements required from authorities and other stakeholders, and key legislation and policies; g) include specific consideration of measures to address any requirements of relevant agencies during site establishment and construction; h) describe the roles and responsibilities for all relevant employees involved in the site establishment and construction of the works; i) detail how the environmental performance of the site preparation and construction works will be monitored, and what actions will be taken to address identified potential environmental impacts, including but not limited to noise, traffic and air impacts; j) include measures to ensure adequate groundwater entitlement is sourced in order to account for groundwater flows into the construction excavations, unless any exemption applies; k) management of groundwater during construction; l) document and incorporate all relevant sub environmental management plans (Sub-Plans), control plans, studies and monitoring programs required under this part of the consent; and m) include arrangements for community consultation and complaints handling procedures during construction. In the event of any inconsistency between the consent and the CEMP, the consent shall prevail. Prior to the commencement of works, details demonstrating compliance with the above requirements (Condition B65 (a)-(m)) must be submitted to the Certifier. A copy of the CEMP must be submitted to the Certifier, Council, TfNSW (Maritime) and the Planning Secretary.	MPX
» B9	Detailed drawings incorporating the wind mitigation measures identified in the Pedestrian Wind Environment Study by Windtech, May 2019, (any alternative solutions approved by Windtech where required), are to be submitted to and approved by the Planning Secretary in consultation with the Design Review Panel prior to the issue of the relevant Crown Building Works Certificate to ensure that the design excellence is achieved.	MPX with assistance from INSW
Construction Noise and Vibration Management Plan – refer to Appendix 5		
» B79	Prior to the commencement of works, a **Construction Noise and Vibration Management Plan** (CNVMP) prepared by a suitably qualified person must be prepared in consultation with, and address the relevant requirements of, Council and the EPA. The CNVMP shall address (but not be limited to):	MPX

	a) Identification of each work area, site compound and access route (both private and public); b) Identification of the specific activities that will be carried out and associated noise sources at the premises and access routes; c) Identification of all potentially affected sensitive receivers using the construction noise objectives identified in accordance with the EPA's *Interim Construction Noise Guideline*, vibration objectives as identified in accordance with the document *Assessing Vibration: A Technical Guideline* (DEC 2006), and the road traffic noise objectives as identified in accordance with the *NSW Road Noise Policy* (DECCW 2011); d) Identification of non-project related constriction activities in the area that may be; e) identify the noise management levels for the project; f) identify the construction methodology and equipment to be used and the key sources of noise and vibration; g) details of all reasonable and feasible management and mitigation measures to be implemented to minimise construction noise and vibration; h) be consistent with and incorporate all relevant recommendations and noise and vibration mitigation measures outlined in the Noise and Vibration Assessment, prepared by SLR, dated April 2019 and the Noise Statement, prepared by SLR, dated 31 April 2022; i) ensure all potentially impacted sensitive receivers are informed by letterbox drops prior to the commencement of construction of the nature of works to be carried out, the expected noise levels and duration, as well as contact details for a construction community liaison officer; and j) include a suitable proactive construction noise and vibration monitoring program which aims to ensure the construction noise and vibration criteria in this consent are not exceeded. Prior to the commencement of works, details demonstrating compliance with the above requirements (B79 (a)-(j)) must be submitted to the Certifier. A copy of the CNVMP must be submitted to the Certifier, Council and the Planning Secretary.	
» B104	Further consultation shall occur with the Body Corporate of No. 84 Wentworth Park Road, including with involvement of an acoustic expert, seeking to incorporate reasonable acoustic mitigation measures at that property to meet acoustic guidelines (subject to agreement of that property). If either agreement is not reached or the applicant believes suggested measures are unreasonable, written proof of the engagement and situation shall be provided to the Planning Secretary. Prior to the commencement of works, details demonstrating compliance with this requirement shall be submitted to the Planning Secretary and Certifier.	INSW
» C2	Construction, including the delivery of materials to and from the site, may only be carried out between the following hours: a) between 7.00 am and 6.00 pm, Mondays to Fridays inclusive; and b) between 7.30 am and 3.00 pm, Saturdays.	MPX
» C3	No work may be carried out on Sundays or public holidays.	MPX
» C4	Activities may be undertaken outside of these hours if required: a) by the Police or a public authority for the delivery of vehicles, plant or materials; b) in an emergency to avoid the loss of life, damage to property or to prevent environmental harm.	MPX
» C5	Notification of such activities must be given to affected residents before undertaking the activities or as soon as is practical afterwards.	MPX
» C6	Rock breaking, rock hammering, sheet piling, pile driving and similar activities may only be carried out between the following hours: a) 9.00 am to 12.00 pm, Monday to Friday; b) 2.00 pm to 5.00 pm Monday to Friday; and c) 9.00 am to 12.00 pm, Saturday.	MPX

» C6A	Notwithstanding Condition C6, rock breaking, rock hammering, sheet piling, pile driving and similar activities can occur within the hours of demolition/construction specified in Condition C2 during the 2021 HSC exam period from Tuesday 9 November 2021 to Friday 3 December 2021 (excluding Saturdays), with respite periods provided in accordance with the table below:	MPX

Date	Respite Period			Total Respite Hours
	1	2	3	
Tuesday 9 November	7.00 am – 7.45 am	9.50 am – 12.30 pm	1.55 pm – 5.00 pm	6 hrs, 55 mins
Wednesday 10 November	7.00 am – 7.45 am	9.25 am – 11.30 am	1.55 pm – 5.00 pm	5 hrs, 55 mins
Thursday 11 November	7.00 am – 7.45 am	11.25 am – 2.30 pm	Nil	3 hrs, 50 mins
Friday 12 November	7.00 am – 7.45 am	9.25 am – 12.30 pm	1.55 pm – 5.00 pm	6 hrs, 55 mins
Monday 15 November	7.00 am – 7.45 am	9.20 am – 12.30 pm	1.50 pm – 5.00 pm	7 hrs, 5 mins
Tuesday 16 November	7.00 am – 7.45 am	9.25 am – 12.30 pm	1.55 pm – 5.00 pm	6 hrs, 55 mins
Wednesday 17 November	7.00 am – 7.45 am	9.25 am – 12.30 pm	1.55 pm – 5.00 pm	6 hrs, 55 mins
Thursday 18 November	7.00 am – 7.45 am	9.25 am – 12.30 pm	1.55 pm – 5.00 pm	6 hrs, 55 mins
Friday 19 November	7.00 am – 7.45 am	9.25 am – 12.30 pm	1.50 pm – 4.00 pm	5 hrs, 55 mins
Monday 22 November	7.00 am – 7.45 am	9.25 am – 12.30 pm	1.55 pm – 5.00 pm	6 hrs, 5 mins
Tuesday 23 November	7.00 am – 7.45 am	9.25 am – 12.30 pm	1.55 pm – 5.00 pm	6 hrs, 55 mins
Wednesday 24 November	7.00 am – 7.45 am	9.25 am – 12.30 pm	1.50 pm – 4.00 pm	6 hrs
Thursday 25 November	7.00 am – 7.45 am	9.25 am – 12.30 pm	1.55 pm – 5.00 pm	6 hrs, 55 mins
Friday 26 November	7.00 am – 7.45 am	9.25 am – 12.30 pm	1.50 pm – 3.30 pm	5 hrs, 25 mins
Monday 29 November	7.00 am – 7.45 am	9.25 am – 12.30 pm	1.55 pm – 5.00 pm	6 hrs, 5 mins
Tuesday 30 November	7.00 am – 7.45 am	9.25 am – 12.30 pm	1.50 pm – 4.00 pm	6 hrs
Wednesday 1 December	7.00 am – 7.45 am	9.25 am – 11.30 pm	1.55 pm – 5.00 pm	6 hrs, 55 mins
Thursday 2 December	7.00 am – 7.45 am	9.25 am – 12.30 pm	1.55 pm – 5.00 pm	6 hrs, 55 mins
Friday 3 December	7.00 am – 7.45 am	9.25 am – 12.30 pm	Nil	3 hrs, 50 mins

» C7	Notwithstanding Condition C6 above, rock breaking, rock hammering, sheet piling, pile driving, and similar activities may be carried out **only** if these activities do not exceed the noise management levels identified in the Noise Impact Assessment prepared by SLR dated April 2019.	MPX
» C8	The development must be constructed with the aim of achieving the construction noise management levels detailed in the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009). All feasible and reasonable noise and vibration mitigation measures shall be implemented and any activities that could exceed the construction noise or vibration management levels shall be identified and managed in accordance with the **CEMP** and **CNVMP**.	MPX
» C9	If the noise from a construction activity is substantially tonal or impulsive in nature (as described in Chapter 4 of the *NSW Industrial Noise Policy*), 5 dB(A) must be	MPX

	added to the measured construction noise level when comparing the measured noise with the construction noise management levels	
» C10	The Applicant must schedule intra-day 'respite periods' for construction activities predicted to result in noise levels in excess of the "highly noise affected" levels, including the addition of 5 dB to the predicted levels for those activities identified in the Interim Construction Noise Guideline as being particularly annoying to noise sensitive receivers.	MPX
» C11	Wherever practical, and where sensitive receivers may be affected, piling activities are completed using bored piles. If driven piles are required, they must only be installed where outlined in the **CEMP** and **CNVMP**.	MPX
» C12	Vibration caused by construction at any residence or structure outside the subject site must be limited to: a) for structural damage vibration to buildings (excluding heritage buildings), *British Standard BS 7385 Part 2- 1993 Evaluation and Measurement for Vibration in Buildings*; b) for structural damage vibration to heritage buildings, *German Standard DIN 4150 Part 3 Structural Vibration in Buildings Effects on Structure*; c) for human exposure to vibration, the evaluation criteria presented in *British Standard BS 6472- Guide to Evaluate Human Exposure to Vibration in Buildings* (1Hz to 80 Hz) for low probability of adverse comment	MPX
» D42	Prior to occupation or commencement of the use, a suitably qualified acoustic consultant is to provide a written Acoustic Verification Report to the satisfaction of the Certifier that the development complies with the requirements set out in the Report and in Condition E8 and E14. Note: Suitably Qualified Acoustic Consultant means a consultant who possesses the qualifications to render them eligible for membership of the Australian Acoustics Society, Institution of Engineers Australia or the Association of Australian Acoustic Consultants at the grade of member.	MPX
Construction Air Quality Management Plan – refer to Appendix 6		
» B81	Prior to the commencement of works, a **Construction Air Quality Management Plan** (CAQMP) must be prepared. The CAQMP must be prepared in consultation with, and address the relevant requirements of, Council. The CAQMP shall address (but not be limited to): a) describe the measures that would be implemented on site to ensure: i. the control of air quality and odour impacts of the development; ii. that these controls remain effective over time; iii. that all reasonable and feasible air quality management practice measures are employed iv. the air quality impacts are minimised during adverse meteorological conditions and extraordinary events; and v. compliance with relevant conditions of consent. b) include performance objectives for monitoring dust and ensuring no off-site air quality impacts to nearby residences and businesses; c) includes an air quality monitoring program that: i. is capable of evaluating the performance of the construction works; ii. includes a protocol for determining any exceedances of the relevant conditions of consent and responding to complaints iii. adequately supports the air quality performance objectives; and iv. evaluates and reports on the effectiveness of air quality management for the construction works d) details on monitoring weather conditions and communicating changing conditions to the workforce; e) stop work procedures if performance objectives are not being met. Prior to the commencement of works, details demonstrating compliance with the above requirements (B69 (a)-(e)) must be submitted to the Certifier. A copy of the CAQMP must be submitted to Certifier and the Planning Secretary.	MPX
» B102	The mitigation measures in Part 7.4 of the Air Quality Assessment (AQA), prepared by SLR, dated April 2019 shall be implemented thorough to the detailed design, construction and operation, including exhausting, treatment of exhaust, temperature control, operational measures and monitoring. Prior to the issue of the relevant	MPX

	Crown Building Works Certificate, details demonstrating compliance with this requirement shall be submitted to the Certifier.	
» A22	All plant and equipment used on site, or to monitor the performance of the development must be: a) maintained in a proper and efficient condition; and b) operated in a proper and efficient manner	MPX
» C45	Adequate measures shall be taken to prevent dust from affecting the amenity of the neighbourhood during construction. In particular, the following measures should be adopted: a) physical barriers shall be erected at right angles to the prevailing wind direction or shall be placed around or over dust sources to prevent wind or activity from generating dust emissions; b) earthworks and scheduling activities shall be managed to coincide with the next stage of development to minimise the amount of time the site is left cut or exposed; c) all materials shall be stored or stockpiled at suitable locations and stockpiles shall be maintained at manageable sizes which allow them to be covered, if necessary, to control emissions of dust and/or VOCs/odour; d) the surface should be dampened slightly to prevent dust from becoming airborne but should not be wet to the extent that run-off occurs; e) all vehicles carrying spoil or rubble to or from the site shall at all times be covered to prevent the escape of dust or other material; f) all equipment wheels shall be washed before exiting the site using manual or automated sprayers and drive- through washing bays; g) gates shall be closed between vehicle movements and shall be fitted with shade cloth; and h) cleaning of footpaths and roadways shall be carried out regularly.	MPX
» D29	Prior to occupation of the commencement of the use, written confirmation from a Professional Engineer (as defined in Volume One of the National Construction Code) must be submitted to the Principal Certifier confirming that all recommendations within the air quality report prepared by SLR The New Sydney Fish market, Stage 2 – Main Works (SSD 8925) Air Quality Assessment, reference: 610.17553 Version No: v3.0 April 2019 Trim 2019/520362 must have been incorporated into the development.	MPX
Dewatering Management Plan – refer to Appendix 8		
» B90	Prior to the commencement of works, the Applicant must prepare a **Dewatering Plan** demonstrating that dewatering will not result in the discharge of pollutants at non-trivial levels. The Dewatering Plan must be approved by the EPA and include at a minimum: a) A description of the dewatering process, monitoring methods, management triggers and actions, and discharge location; b) A characterisation of the expected quality of the proposed discharge in terms of the concentrations and loads of all pollutants present at non-trivial levels; c) An assessment of the potential impact of the discharge on the environmental values of the receiving waterway with reference to the relevant Australian and New Zealand Guidelines for Fresh and Marine Quality guideline values; and d) Where relevant; details of proposed measures proposed to mitigate any identified impacts.	MPX
» B91	If any dewatering of the site is to be undertaken, a bore licence may be required from the NSW Office of Water under the provisions of Part V of the Water Act 1912. The NSW Office of Water licenses dewatering to allow excavation for construction for a temporary period, usually 12 months. Prior to the commencement of works, details demonstrating compliance with the above requirements and a copy of the Dewatering Plan must be submitted to the Certifier.	MPX
Soil and Water Management Plan – refer to Appendix 9		
» B82	Prior to the commencement of works a **Soil and Water Management Plan** (SWMP) must be prepared and submitted to the Certifier. The SWMP must include:	MPX

	a) details of all erosion and sediment controls to be implemented during construction; b) a plan of how all construction works will be managed in a wet-weather event (i.e. storage of equipment, stabilisation of the site); c) a summary of any ground investigations to date; d) detail all off-site stormwater flows from the site and methods to ensure that sediment is not mobilised in stormwater flows leaving the site; e) the measures that must be implemented to manage stormwater and flood flows for small and large sized events, including but not limited to 1 in 1-year ARI, 1 in 5-year ARI and 1 in 100-year ARI; f) the proposed stormwater disposal and drainage from the development, designed in accordance with: i. Australian Rainfall and Runoff – A Guide to Flood Estimation, Volumes 1 and 2 (1987); ii. SA/NZS 3500.3.2 National Plumbing and Drainage Part 3.2: Stormwater Drainage – Acceptable Solutions; iii. Managing Urban Stormwater – Soils and Construction Volume 1 (4th Edition March 2004) g) monitoring techniques; h) methods for testing of the water quality (suspended solids, turbidity and contaminants) prior to discharging from the site to ensure compliance with Managing Urban Stormwater – Soils and Construction Volume 1 (4th Edition March 2004) and Conditions C24, C25 and C26 of this consent. Prior to the commencement of works, details demonstrating compliance with the above requirements (Condition B70 (a)-(h)) must be submitted to the Certifier. A copy of the SWMP must be submitted to Certifier and the Planning Secretary.	
» B105	Prior to the commencement of work, suitable measures are to be implemented to ensure that sediment and other materials are not tracked onto the roadway by vehicles leaving the site. It is an offence to allow, permit or cause materials to pollute or be placed in a position from which they may pollute waters.	MPX
» C30	The Applicant must ensure silt curtains are installed throughout the duration of the works to minimise disturbance and mobilisation of sediments and contaminants in the seabed of Blackwattle Bay. The silt curtains must be installed and maintained throughout the duration of works. The silt curtain must extend from the surface of the water to the seabed, and ensure that all attachment points for the silt curtains are firmly anchored to avoid gaps and release of contaminants.	MPX
» C38	All fill imported onto the site shall be validated to ensure the imported fill is suitable for the proposed land use from a contamination perspective. Fill imported on to the site shall also be compatible with the existing soil characteristics for site drainage. The Minister may require details of appropriate validation of imported fill material to be submitted with any application for future development of the site. Hence, all fill imported onto the site should be validated by either one or both of the following methods during remediation works: a) Imported fill must be accompanied by documentation from the supplier which certifies that the material is not contaminated based upon analyses of the material for the known past history of the site where material is maintained; and/or b) sampling and analysis of the fill material shall be conducted in accordance with the NSW EPA (1995) Sampling Guidelines	MPX
» C41	Prior to the commencement of work, suitable measures are to be implemented to ensure that sediment and other materials are not tracked onto the roadway by vehicles leaving the site. It is an offence to allow, permit or cause materials to pollute or be placed in a position from which they may pollute waters.	MPX
» C42	The Applicant must ensure: a) stockpiles of material do not exceed 4 metres in height; b) stockpiles of material are constructed and maintained to prevent cross contamination; and c) suitable erosion and sediment controls are in place for stockpiles.	MPX
» C43	The Applicant must ensure:	MPX

	a) no stockpiles of soil or other materials shall be placed on footpaths or nature strips unless prior approval has been obtained from Council's Construction Regulation Team b) all stockpiles of soil or other materials shall be placed away from drainage lines, gutters or stormwater pits or inlets c) all stockpiles of soil or other materials likely to generate dust or odours shall be covered d) all stockpiles of contaminated soil shall be stored in a secure area and be covered if remaining more than 24 hours	
» C44	All erosion and sediment control measures are to be effectively implemented and maintained at or above design capacity for the duration of the construction works and until such time as all ground disturbed by the works has been stabilised and rehabilitated so that it no longer acts as a source of sediment.	MPX
» D13	The site auditor must also verify that any excavated material disposed off site, has been appropriately classified, validated, managed and the relevant approvals obtained in accordance with the relevant legislation and any relevant approved materials management plan(s).	INSW with assistance from MPX
» D14	On completion of the remediation works, the Council shall be notified in accordance with the relevant requirements of SEPP 55 – Remediation of Land.	MPX
» C13	Any seepage or rainwater collected on-site during construction shall be either re-used or disposed of, so as not to cause pollution. Seepage or rainwater shall not be pumped to the street stormwater system unless separate prior approval is given in writing by the relevant authority.	MPX
» C31	No trenching (except where approved by Sydney Water or required and approved under this consent), dredging or reclamation work in Blackwattle Bay is permitted at any time during the works.	MPX
» C32	All works must be undertaken in a manner that ensures the protection of the water quality objectives and environmental values for Sydney Harbour estuarine waters in accordance with the NSW Water Quality Objectives and the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) for the environmental values under the ANZECC Guidelines.	MPX
» C33	No contaminated or treated site waters (surface, collected groundwater or contaminated construction waters) are permitted to be discharged into Sydney Harbour.	MPX
» C34	No approval is permitted to pollute waters. All water discharge from the site must meet all requirements of the *Protection of Environment Operations Act 1997.*	MPX
» C35	Contaminated groundwater shall not be discharged into Council's stormwater drainage system. Options for the disposal of groundwater include disposal to sewer with prior approval from Sydney Water or off-site disposal by a liquid waste transporter for treatment/disposal to an appropriate waste treatment/processing facility.	MPX
Hazardous Materials Management Plan – refer to Appendix 10		
» B96	Prior to the commencement of demolition works, an updated **Hazardous Materials Management Plan** (HMMP) prepared by a suitably qualified person, shall be submitted to the Certifier. The HMMP must be prepared in consultation with SafeWork NSW. The HMMP must: a) ensure the development complies with the *NSW Occupational Health and Safety Regulation 2001 and Part 7 of the Protection of the Environment Operations (Waste) Regulation 2014;* b) be consistent with Safe Work Australia's codes of practice *How to Safely Remove Asbestos 2011 and How to Manage and Control Asbestos in the Workplace 2011;* c) identify any known or potential areas of concern on site for hazardous and asbestos containing materials; d) outline the procedures for identification, handling and disposal of hazardous materials; e) include an Asbestos Management Plan; f) ensure that all hazardous materials would be handled and disposed of by suitably qualified and licensed experts in accordance with the relevant guidelines and legislation;	MPX

	g) ensure an induction process is in place for site workers and visitors regarding the identification of hazardous and asbestos containing materials and the formal procedures to be followed if such materials are identified on site; h) include a suitable airborne asbestos fibre monitoring program for all asbestos removal works areas; and i) outline the procedures for validation and inspection following the completion of asbestos removal works and issuing of asbestos clearance certificates j) be guided by the processes and procedures outlined in the Hazardous Materials Management Plan, prepared by JBS&G, dated 8 April 2020 and the SEPP 33 Assessment, prepared by RiskCon Engineering, dated 18 April 2019. Prior to the commencement of works, details demonstrating compliance with the above requirements (Condition B96 (a)-(j)) must be submitted to the Certifier. A copy of the HMMP must be submitted to the Certifier, Safework NSW and the Planning Secretary.	
» B97	The Applicant shall comply with any notification requirements to SafeWork NSW concerning the handling and removal of any asbestos.	MPX
» B93	Prior to the commencement of works, the Applicant must engage an EPA-accredited Site Auditor to prepare interim audit advice which comments on: a) The Data Gap Assessment – The New Sydney Fish Market 1A to 1C Bridge Road, Glebe NSW, Revision A (dated 12 March 2019) prepared by JBS&G Australia Pty Ltd for UrbanGrowth NSW Development Corporation which comments on the appropriateness of the assessment and the assessment's conclusions; b) Whether the characterisation of the site is sufficient to ensure any asbestos containing materials in soils and at ground surface are managed appropriately; c) Whether the Hazardous Materials Management Plan, prepared by JBS&G (dated 8 April 2019), requirements for managing asbestos at ground surface and in soils are appropriate. d) (sediment adjustment methodology prepared by Senversa Pty Ltd (dated 15 April 2021), the Acid Sulphate Soil Management Plan prepared by JBS&G Australia Pty Ltd (dated 26 April 2021), and revised Construction Staging Plan and sediment capping methodology prepared by Senversa Pty Ltd (dated 15 February 2022). e) Any deficiencies identified by the auditor in the interim audit advice/s must be addressed Any deficiencies identified by the auditor in the interim audit advice must be addressed.	INSW MPX
» C36	Any hazardous materials, including asbestos, must be identified before demolition work commences and be removed in a safe manner.	MPX
» C37	Removal of asbestos and other hazardous building materials must be undertaken by a suitably licensed contractor and an asbestos clearance certificate must be provided before waste classification, disposal or site validation is undertaken.	MPX
Acid Sulphate Soils Management Plan – refer to Appendix 11		
» C57	The Applicant must ensure that any acid sulfate soil (ASS) and potential acid sulfate soil (PASS) excavated or other disturbed during construction is managed in accordance with *the Acid Sulfate Soils Manual 1988* (NSW Acid Sulfate Soil Management Advisory Committee and the EPA's *Waste Classification Guidelines 2014* (Part 4: Acid Sulfate Soils).	MPX
» C58	All recommendations contained in the Acid Sulfate Soils Management Plan prepared by JBS&G Australia Pty Ltd dated 26 April 2021 must be implemented throughout the works.	MPX
Remedial Action Plan – refer to Appendix 12		
» B94	Prior to the commencement of works, the Applicant must submit to the Certifier a Section B Site Audit Statement, prepared by an EPA accredited Site Auditor that confirms that the remediation action plan is appropriate for the site and that the site can be made suitable for the proposed use.	INSW

» C17	All remediation work must be undertaken in accordance with the remediation action plan and site auditor's section B Site Audit Statement (refer to Condition B72-B73).	MPX
Waste Management Plan – refer to Appendix 13		
» B80	Prior to the commencement any construction (including demolition), a **Waste Management Plan** (WMP) must be prepared. The WMP must: a) demonstrate that an appropriate area will be provided for the storage of garbage bins and recycling containers and all waste and recyclable material generated by the works; b) provide details demonstrating compliance with the relevant legislation, particularly with regard to the removal of asbestos and hazardous waste, the method of containment and control of emission of fibres to the air; c) require that all waste generated during the project is assessed, classified and managed in accordance with the EPA's "Waste Classification Guidelines Part 1: Classifying Waste"; d) require that the body of any vehicle or trailer used to transport waste or excavation spoil from the Subject Site, is covered before leaving the Subject Site to prevent any spill, or escape of any dust, waste, or spoil from the vehicle or trailer; e) require that mud, splatter, dust and other material likely to fall from or be cast off the wheels, underside or body of any vehicle, trailer or motorised plant leaving the Subject Site, is removed before the vehicle, trailer or motorised plant leaves the Subject Site. Prior to the commencement of works, details demonstrating compliance with the above requirements (B68 (a)-(e)) and a copy of the WMP must be submitted to the Certifier.	MPX
» C29	Notwithstanding the WMP, the Applicant must ensure that: a) all waste generated by the development is classified and managed in accordance with the EPA's Waste Classification Guidelines Part 1: Classifying Waste 2009; b) all waste generated by the development is treated and/or disposed of at a facility that has sufficient capacity to and may lawfully accept that waste; c) any vehicle used to transport waste or excavation spoil from the site is covered before leaving the premises; d) the wheels of any vehicle, trailer or mobilised plant leaving the site and cleaned of debris prior to leaving the premises.	MPX
Marine Structures Heritage Impact Statement – refer to Appendix 14		
» C28	All works must be carried out in accordance with the mitigation measures outlined in Section 11 of the Heritage Impact Statement (Revision 5(prepared by City Plan Heritage dated 26 March 2019, particularly regarding the following: a) engagement of a built heritage specialist b) heritage listed stormwater c) preparation of a physical archive d) archival photographic recording of the coal loader and office/weighbridge (prior to commencement of works) e) salvage methodology f) archaeology	MPX MPX INSW INSW INSW INSW
Arboriculture Impact Statement – refer to Appendix 15		
» B108	The Applicant must ensure: a) tree species for the proposed replanting within the site should be selected in consideration of 'Section 3.5.2 Urban vegetation' of the Sydney Development Control Plan 2012 b) the tree species for the replanting proposed for the northern side of Bridge Road must be Lophostemon confertus (Brush Box) in accordance with the City of Sydney Street Tree Master Plan: Part C – Precinct Plans c) soil improvements must be provided for the replanting proposed for the northern side of Bridge Road in accordance with the City if Sydney Street Tree Master Plan: Part D – Technical Guidelines	MPX

	d) all new trees must have a minimum container size of 400L at the time of planting e) all new trees must be grown in accordance with the Australian Standard 'AS2303:2018 Tree stock for landscape use' f) all trees on Bridge Road must be shade tolerant	
» C47	The demolition of the existing footpath, kerb and gutter along the southern side of Bridge Road shall be supervised by the Project Arborist. The works should be undertaken using a compact excavator (<2T fitted with a flat bladed bucket). The excavator operator should be guided by a spotter at all times and machinery movements should be restricted to areas of existing pavement or ground protection. The asphalt surface, kerb and gutter should be broken up into small sections and carefully removed to minimise disturbance to the underlying sub-base/soil profile and prevent root damage. Existing underground structures and sub-base materials should be left in situ and reused (where possible). Where the removal of the sub-base is required, the works should be undertaken using a combination of machine excavation (<2T fitted with a flat bladed bucket) and hand excavation to prevent root damage. Roots (>25mmø) should be retained and protected for assessment by the Project Arborist.	MPX
» C46	The Applicant must ensure: a) no street trees on public land are trimmed or removed unless it forms a part of this development consent or is required in an emergency to avoid the loss of life or damage to property; b) all trees that are not approved for removal are to be suitably protected by way of tree guards, barriers or other measures to protect the root systems, trunk and branches during construction, in accordance with AS 4970:2009; and c) any removal works are to be undertaken by a qualified arborist recognised within the Australian Qualification Framework, with a minimum five years of continual experience within the industry of operational amenity arboriculture and covered by appropriate and current types of insurance to undertake such works and in accordance with AS 4373:2007.	MPX
» C48	Existing pits to be decommissioned within tree protection zone areas should be left in situ and infilled (where possible). Where their removal is required, the pits should broken-up into small sections and carefully removed to minimise disturbance to the adjacent sub-base/soil profile and prevent root damage.	MPX
» C50	The works on Bridge Road shall be undertaken using a combination of machine excavation and hand excavation (as detailed above) to minimise disturbance to the underlying sub-base/soil profile and prevent root damage. Roots (>25mmø) should be retained and protected for assessment by the Project Arborist. Existing sub-base layers should be retained and reused where possible. New pavement sub-base layers should be thinned to enable the retention of roots (>25mmø) as required by the Project Arborist. Root pruning should be undertaken by the Project Arborist only. Roots to be retained should be protected by wrapping in Abelflex (or similar compressible material) with the new sub-base materials installed around the root. Compaction of the surrounding sub-base should be undertaken using hand tools only.	MPX
» C51	The existing masonry boundary wall along the southern side of Bridge Road, wall has three (3) openings and a set of stairs that provide access to the footpath on Bridge Road. In addition, a section of boundary wall is cracked and bowed, presumably due to roots from the fig trees in the park exerting pressure on the rear of the wall. Any works associated with these areas will need to use tree sensitive design and construction methods and may require preliminary, exploratory root investigations to ensure the root systems of the trees in the park is not significantly impacted.	MPX
» C52	Works to the kerb section in the structural root zone of Tree A as identified in the Arboricultural Impact Assessment report, prepared by Tree IQ, dated 26 June 2019 shall use tree sensitive design and construction methods. Preliminary, exploratory root investigations to ensure its root system is not significantly impacted may need to be undertaken.	MPX
» C53	Sections of new stormwater pipes and pits connecting to existing infrastructure are to be installed along the southern edge of the carriageway of Bridge Road and existing pits within the footpath are to be raised in line with new footpath levels. The installation of underground services and pits shall be supervised by the Project Arborist. The works shall be undertaken using a combination of machine excavation	MPX

	and hand excavation (as detailed above) to prevent root damage. Roots (>25mmø) should be retained and protected for assessment by the Project Arborist.	
» C54	Services shall be located around/below roots (>25mmø) and the location of pits adjusted as required by the Project Arborist. Existing pits that are to be raised in line with new footpath levels shall be retained and extended rather than replaced with new pits (where possible). Alternatively, boring methods may be used for underground service installation where the obvert level (highest interior level of pipe) is greater than 1500mm below existing grade. Excavations for starting and receiving pits for boring equipment should be located outside of the tree protection zones areas or located to avoid roots (>25mmø) as required by the Project Arborist.	MPX
» C55	The pruning of trees 1WP, 15-23WP and 25-37WP as identified in the Arboricultural Impact Assessment report, prepared by Tree IQ, dated 26 June 2019, shall be: a) subject to a second assessment of pruning requirements undertaken when Bridge Road is closed to vehicular traffic b) undertaken in accordance with the pruning specifications as identified in Appendix 4 of the Arboricultural Impact Assessment report, prepared by Tree IQ, dated 26 June 2019.	MPX
» C56	An appropriately qualified Consultant Arborist (AQF Level 5 minimum) must provide a secondary pruning specification, at the completion of the road elevation works, to ensure canopy clearance compliance along the Wentworth Park length of Bridge Road. The Consultant Arborist must produce a Pruning Specification Report which specifies the required pruning in accordance with the Australian Standard 'AS4373:2007 Pruning of amenity trees'. The Pruning Specification Report must be provided to the City for consideration. All tree pruning must be undertaken by the City's contractors.	MPX
Marine Ecology – refer to Appendix 16		
» B53	Prior to any seabed disturbance, the Applicant shall obtain a Harbour Master approval under clause 67ZN of the *Ports and Maritime Administration Regulation 2012.*	MPX
» B103	All recommendations within the Marine Ecology Assessment report (MEA), prepared by Ecological Australia, dated 2 April 2019 shall be implemented, including preparation of an Aquatic Biodiversity Management Plan (ABMP), which shall address OEH guidelines. Further, research from Macquarie University and University of NSW to enhance native habitat-forming organisms shall be included in the ABMP, where relevant. Prior to the commencement of works, details demonstrating compliance with this requirement shall be submitted to the Planning Secretary and Certifier.	MPX
» C27	The Applicant must ensure that all the mitigation measures and archaeological test excavation strategy outlined in the Maritime Heritage Impact Assessment prepared by Comber Consultants and Maritime Heritage letter prepared by Comber Consultants (dated 16 April 2021) are implemented throughout construction works.	MPX
Microbat Management Plan – refer to Appendix 17		
» B106	Prior to the commencement of works, the Microbat Management Plan (MMP), prepared by Ecological Australia, dated 6 May 2020, shall be endorsed by EESG. Prior to the commencement of works, details demonstrating compliance with this requirement shall be submitted to the Certifier. A final copy of the MMP shall be submitted to the Certifier and the Planning Secretary.	INSW
» C62	All measures and commitments contained in the Microbat Management Plan (MMP) approved by EESG shall be implemented throughout the works.	MPX
» C63	An ecologist with microbat specialist knowledge and experience must be engaged during the works.	INSW with assistance from MPX
Unexpected Finds Protocol – refer to Appendix 18		
» B98	Prior to the commencement of any work, the Applicant is required to satisfy the requirements of the *Protection of the Environment Operations (Waste) Regulation 2014* with particular reference to Part 7 *'asbestos wastes'*.	MPX
» B92	Prior to the commencement of works, an Unexpected Contamination Finds Protocol (UFP) prepared by a suitably qualified and experienced expert shall be prepared. The protocol should include detailed procedures for identifying and dealing with	MPX

	unexpected contamination, asbestos and other unexpected finds. The Applicant should ensure that the procedure includes details of who will be responsible for implementing the unexpected finds procedure and the roles and responsibilities of all parties involved. The UFP must be submitted to the Certifier and EPA. The UFP must be implemented for the duration of construction works.	
» C25	If during the course of construction, the Applicant becomes aware of any previously unidentified heritage object(s), all work likely to affect the object(s) must cease immediately and the Heritage Division must be notified immediately and consulted with regard to the recommencement of works. This protocol must be included in the induction for all construction workers on the site.	MPX
» C26	If during the course of construction the Applicant becomes aware of any previously unidentified Aboriginal object(s), all work likely to affect the object(s) must cease immediately and EESG informed in accordance with section 89A of the National parks and Wildlife Act 1974. Relevant works must not recommence until written authorisation from the Heritage Division is received by the Applicant. This protocol must be included in the induction for all construction workers on the site.	MPX
» C18	Should any new information come to light during demolition or construction works which has the potential to alter previous conclusions about site contamination, the Department must be immediately notified and works must cease. Works must not recommence on site until the Department confirms works can recommence.	MPX
» C19	The Applicant must ensure the proposed development does not result in a change of risk in relation to any pre-existing contamination on the site so as to result in significant contamination [note this would render the Applicant the 'person responsible for the contamination under section 6(2) of the *Contaminated Land Management Act 1997*].	MPX
» C20	The EPA is to be notified under section 60 of the Contaminated Land Management Act 1997 for any contamination identified which meets the triggers in the Guidelines for the Duty to Report Contamination under the Contaminated Land Management Act 1997 (EPA, 2015) (www.epa.nsw.gov.au/resources/clm/150164-report-land-contamination-guidelines.pdf).	MPX
» C20A	An EPA-accredited Site Auditor must be engaged throughout the duration of works, for the entire development site, to ensure that any work required in relation to soil, groundwater, surface water or sediment contamination is appropriately managed. If work is to be completed in stages, the Site Auditor must confirm satisfactory completion of each stage by the issuance of Interim Audit Advice/s.	MPX

Figure 9 *Development Conditions*

1.9 Document Control

This plan and relevant environmental sub-plans will be revised:

» Six monthly only if necessary.

» In response to future project approvals or modifications

» In response to changes in law, risks or accepted practices

» In response to major changes in site conditions or work methods, or due to incidents

» Commencement of new phases or stages of design and construction

» In response to the findings, recommendations or outcomes of a planned management review, audit or risk assessment

» Requests or requirements of EPA or any other Authority

» In support of planning approvals or licence variations as necessary.

Electronic distribution of this Plan will be made to those detailed on the distribution list on Aconex.

All changes will be identified as below, and communicated to all relevant personnel.

Revision	Date	Description	Page	Reviewed By	Approved By
1	14/07/2020	DRAFT	All	Paul Couani	David Maher
2	12/10/2020	UPDATE TO REFLECT AGREED SSD RESPONSIBILITIES MATRIX	All	Paul Couani	David Maher
3	17/03/2021	UPDATED TO REFLECT ALL REQUIREMENTS OF A CEMP	All	Darcy Lambert and Senversa Consulting	Eric Rolls
4	06/04/2021	General Update	All	Darcy Lambert and Senversa Consulting	Eric Rolls
5	13/04/2021	ALL APPENDICES INSERTED INTO CEMP	All	Darcy Lambert	Eric Rolls
6	12/10/2021	Updated org chart and some appendices with most up to date plans.	28 and Appendix	Darcy Lambert	Paul Couani
7	02/11/2021	Updated - EMS Organisational Chart & Multiplex Roles and Responsibilities	28-30	Warren Hon	Paul Couani
8	09/05/2022	Updated to include Modification 7 conditions	13-25 Appendix 20 - 25	Anthony Toomeh	

Figure 10 *Document Revisions Control*

2. Environmental Management System Framework

2.1 Approach to Environmental Management

Multiplex is continuously seeking to improve environmental culture and standards across its business and the broader industry.

Multiplex works with its clients to integrate environmental management controls at the earliest opportunity. Our aim is to eliminate critical risks which may have long-term consequences.

Multiplex's approach to environmental management is underpinned by a mature and disciplined environmental culture which is embraced by its people and driven by what its leaders do and say. Multiplex encourages its people to learn from each other's experiences and share best practice.

2.2 Management System Framework

Multiplex has a management framework which is applied throughout the business and on all projects it undertakes. The EMS documentation forms part of this System Framework and maintained in electronic format on Multiplex Operating System.

The structure of the overall Management System is explained below.

Element	Content	
Internal Control Framework	» Operating Environment » Risk Assessment » Control Activities	» Information and Communication » Monitoring Activities
Polices	» Work Health and Safety » Environmental » Quality » Risk	» Drugs and Alcohol » Injury and Rehabilitation » Indigenous Engagement » Diversity
Operational Procedures	» Risk Management » Integrated Management » Quality Management » Design Management » Construction Management » Health and Safety Management	» Environmental Management » Project Administration » Bid Management » Human Resources Management » Planning and Programming
Management Plans	» Project » Quality » Design » Work Health and Safety » Environmental » Emergency	» Construction » Stakeholder & Communications » Risk » Completion » Aboriginal Participation » COVID-19 » Workplace Relations
Sub Plans	» Construction Noise and Vibration » Dust and Air Quality » Water Quality » Erosion and Sediment » Chemicals » Land Contamination	» Waste » Heritage » Flora and Fauna » Site Office
Risk Management	» Project Risks	» Aspects and Impacts
Forms and Guides	» As per Appendix 2	

Figure 11 *Management Framework*

3. Responsibility and Accountability

3.1 Environmental Policy

Multiplex policies relating to environmental management are contained in Appendix 1.

This policy will be made publicly available through the Multiplex Intranet and distributed for display in prominent Project locations. In addition, all personnel attending Project inductions will be made aware of the policy and Multiplex's commitment to implement it.

3.2 Objectives, Targets and Programs

Environmental objectives and targets established in the table below and in each sub-plan will be monitored, reviewed and assessed by Senior Management, in accordance with Procedure BU AUS IMS P DIV 030 – *Planning and Performance Measurement*.

Objective	Target	Measure
Maximising opportunity to control risk by design, planning and re-planning.	Conduct an environmental risk workshop within 2 months of project commencement.	Environmental aspects and impacts register established within 2 months of project commencement.
Focusing priority on control of critical risks.	Continuously monitor and improve environmental performance through a program of inspections.	Inspections conducted on a fortnightly basis by the onsite Environmental Coordinator.
Closing the gap between paperwork and practice.	Conduct environmental training of all onsite Environmental Coordinators prior to assigned responsibility.	Training conducted prior to assigned responsibility.
Growing a mature culture: innovative, reporting, learning and collaborative.	No environmental regulatory infringements or major pollution incidents.	Number of environmental regulatory infringements and major pollution incidents.

Figure 12 *Environmental Project Objectives and Targets*

3.3 Management Review

Through the use of audit results, inspection reports, corrective and preventative actions and meetings, Multiplex will continually improve the effectiveness of the Environmental Management System (EMS) in accordance with Procedure BU AUS IMS P DIV 140 – *Management Review*.

Changes to existing procedures will be recorded and communicated to the affected personnel.

3.4 EMS Organisational Chart

Environmental management during construction is the responsibility of each and every member of the Multiplex project team. Management and supervisory personnel lead environmental management by example, through provision of suitable resources to implement and monitor environmental measures, identify and correct any non-conforming conditions or behaviours, and actively promote environmental awareness and individual environmental responsibility.

The organisational chart following identifies the Multiplex personnel responsible for the implementation of the

EMS. The organisation chart will be updated as change occurs.

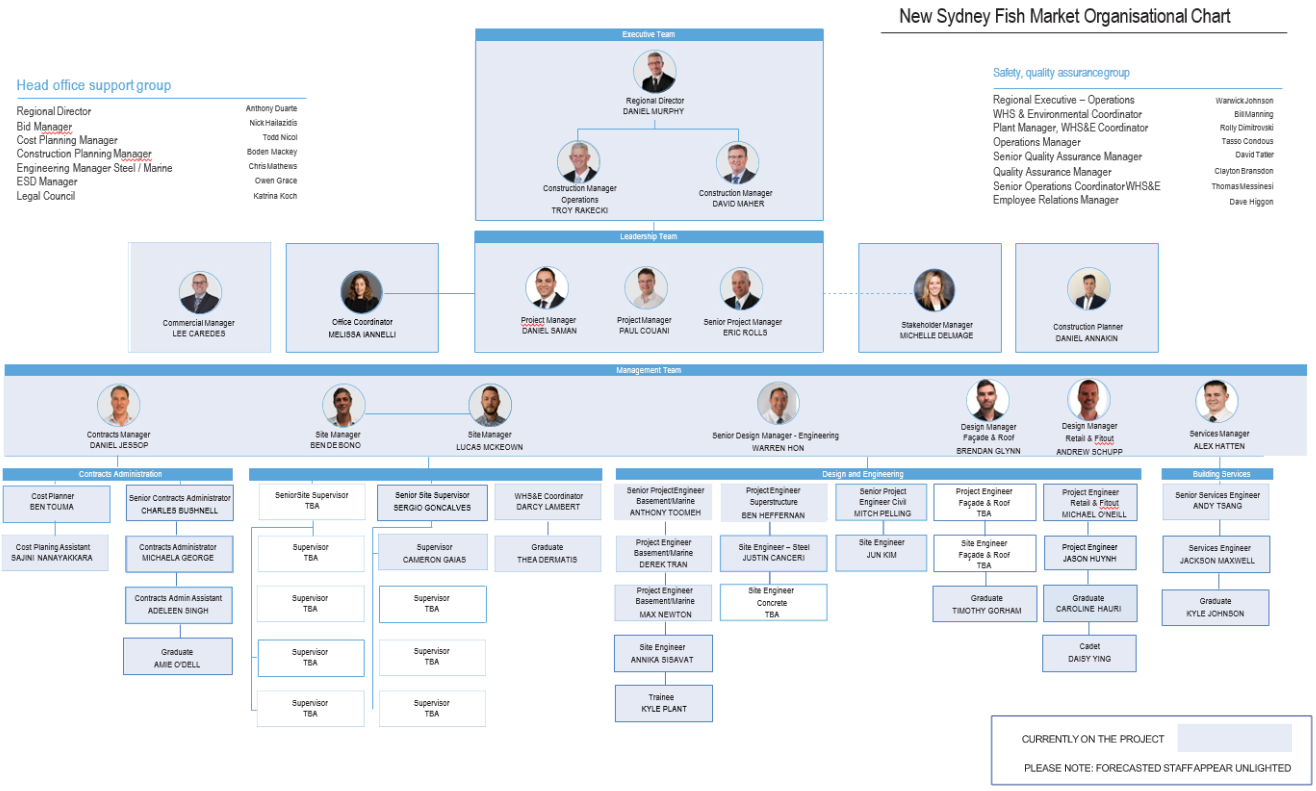


Figure 13 *EMS Organisational Chart*

3.5 Multiplex Roles and Responsibilities

Multiplex has identified appropriate levels of resources, individual responsibility, and accountability for managing environmental across all roles within the Project Team. These are contained in Procedure BU AUS IMS P DIV 010 – *Responsibility and Accountability*. The general responsibilities and accountabilities of key project personnel in relation to Environmental are outlined over.

Role and Responsibility	CEO	Group Sustainability Manager	Regional Managing Director	Regional Director	WHS&E Manager/Coordinator	Project Manager	Site Manager	Design / Services Manager	Contracts Manager/Admin	Engineer/s	Supervisor/s	WHS&E Coordinator	Construction Workers
Provide **resources** including personnel, time and finances to ensure compliance with Environmental legislation and the Environmental Management System.	✓	✓	✓	✓									
Ensure MPX operations identify **monitors and complies with the current legislation** for Environmental Management.	✓	✓	✓	✓	✓								
Ensure that the **MPX Management System**, risk assessment and procedures reflect the requirements of current environmental, legislation, guidelines and standards.		✓		✓	✓								
Identify by way of subscription, all **environmental legislation**, standards, codes of practices and guidelines pertinent to our works.					✓								
Promote a positive workplace **environmental culture.**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Engage in **risk workshops** to identify, assess and determine appropriate controls for all potential risk and opportunity where required.				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Establish realistic project specific measurable **targets.** Monitor and report.					✓	✓	✓						
Have a working **knowledge** of the MPX Environmental Management System.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Complete project specific **environmental documents** utilising templates.					✓	✓	✓					✓	
Establish the environmental requirements for the projects **site establishment and planning** requirements.					✓	✓	✓					✓	
Establish a schedule of **environmental legislation**, Communicate and monitor for change.					✓								
Establish records filing system and maintain **environmental records.**												✓	
Establish and maintain **environmental registers including legislation, training and quantifiable targets.**					✓							✓	
Establish and organise the environmental component of the **induction programme**.					✓		✓					✓	
Identify and assess **competency** of employee's incl. any unforeseen workforce requirements. Undertake training needs analysis and facilitate any **training** requirements.				✓	✓	✓	✓						
Determine and assess requirements for **environmental monitoring** (i.e. noise, air and dust) and implement. Review results to determine compliance.					✓		✓					✓	
Assess subcontractor's ability to comply with the project environmental requirements and environmental contract requirements.					✓	✓	✓		✓			✓	
Provide SC's with relevant **environmental documents** templates, CEMPS, EWMS relevant parts of the site specific MPX CEMP.												✓	
Obtain **Environmental documentation** from each subcontractor prior to commencing. Register and review adequacy and request changes prior to accessing the site.					✓		✓					✓	
Monitor subcontractor activities and report on performance against EWMS and CEMP.					✓		✓				✓	✓	
Conduct **inductions** for all persons attending site and maintain records.												✓	✓
Complete an **environmental aspects, impacts and risk assessment** at commencement of the project and update as required to reflect current site conditions.					✓	✓	✓					✓	

Role and Responsibility	CEO	Group Sustainability Manager	Regional Managing Director	Regional Director	WHS&E Manager/Coordinator	Project Manager	Site Manager	Design / Services Manager	Contracts Manager/Admin	Engineer/s	Supervisor/s	WHS&E Coordinator	Construction Workers
Identify and maintain a register of all onsite **hazardous materials and dangerous goods.**												✓	
Obtain safety data sheets no greater than 5 years old and provide adequate hazardous substances and dangerous goods **storage facilities** onsite.							✓				✓	✓	✓
Conduct **Environmental inspections** distribute for action, obtain sign-offs from SC and close out.					✓							✓	
Attend projects to **monitor and discuss Environmental issues** with project management, supervisors and workers.		✓	✓	✓	✓								
Monitor, resolve and prevent significant **Environmental issues** and share lessons learnt.	✓	✓	✓	✓	✓								
Schedule and conduct environmental **audits** of Subcontractors. Distribute report and monitor status.					✓							✓	
Conduct Environmental **consultation and communication** on environmental matters where required.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Implement **emergency response procedures as outlined in the site Emergency Response Plan**						✓	✓				✓	✓	✓
Record, report and investigate environmental **incidents**. Monitor corrective actions and distribute any lessons learnt.				✓	✓	✓	✓					✓	
Report and distribute **non-conformances** and implement corrective and preventative actions. Review effectiveness of corrective actions.					✓	✓	✓			✓	✓	✓	✓
Implement **environmental sub-plans** and procedures.					✓	✓	✓	✓	✓	✓	✓	✓	✓
Prepare **monthly report** on the status of the environmental management system.						✓	✓					✓	
Review **Environmental performance** including adequacy of resources.	✓	✓	✓	✓	✓	✓	✓					✓	
Obtain feedback for both internal/external training conducted and evaluate the effectiveness of the **training programs.**		✓			✓								
R**eview** environmental objectives and targets annually and provide clear direction of the Environmental management system for the next 12 months.		✓	✓	✓	✓								
Acquire and disseminate **Environmental and related information** including alerts and lessons learnt.		✓			✓								
Review procedures and forms resulting from any changes in legislation, regulation, standards, codes of practices and incidents.					✓								
Attend **collaborative post project review** meeting to assess environmental performance, identify and document lessons learnt.					✓	✓	✓	✓			✓	✓	✓

Figure 14 *Multiplex EMS Roles and Responsibilities Matrix*

3.6 Contractor Roles and Responsibilities

Contractors who present a high risk of environmental harm must have an EMP. All contractors onsite and comply with statutory requirements and instructions given by Multiplex representatives in the performance of work in which they are engaged. Contractors SWMS or EWMS should take into account all environmental management controls outlined within this CEMP. Contractors will be responsible for:

» Working in accordance to the Multiplex EMS.

» Report all incidents, near misses and issues of non-compliance with EMS procedures to their supervisor or Multiplex in line with the reporting requirements outlined in section 8 of this plan.

» Ensuring construction work complies with environmental legislative requirements.

4. Communication and Consultation

4.1 Communication

Multiplex will ensure meaningful and effective communication processes are established and maintained in accordance with Procedure BU AUS IMS P DIV 040 – *Communication and Consultation*. The projects Stakeholder and Communications Management Plan is located on Aconex and the projects S:Drive,

Communication on EMS matters will occur through the mechanisms outlined below.

Event	Frequency Requirement	Participants	Record/Evidence
Project specific induction	Prior to commencement of contracted work	All personnel	Project induction and declaration form
Work activity Induction (in EWMS or equivalent).	Prior to commencing any building/construction work	Personnel carrying out specific work activities	Record of training – listed on the EWMS or toolbox meeting record
Toolbox meetings	During the introduction of a new process (EWMS) or when discussing environmental issues / topics	MPX Supervisors and Subcontractors	Toolbox meeting record
Subcontractor meetings	Weekly or as required	Project team / Subcontractors, their employees and others as required	Minutes of meeting
Project team meetings.	Fortnightly or as required	Project team	Minutes of meeting
PCG meetings	Monthly	Client and Project Manager.	PCG report
Electronic media (i.e. Aconex)	As required	All personnel	Aconex
Project notice board and general signage	As required	All personnel	Project notice board
Environmental Site inspection actions	Fortnightly	Project team and subcontractors	Environmental Site inspection report
Community Consultative Committee	Monthly	Multiplex Nominated Community Consultative and Communications Representative	Minutes of meetings
Enquiries and Complaints	As required	As per Stakeholder Management Plan	Communications register
Other	As required	As per Stakeholder Management Plan	As per Stakeholder Management Plan

Figure 15 *Project EMS Communication Mechanisms*

4.2 Consultation

To ensure effective consultation occurs at all levels throughout the life of the Project, Multiplex will operate in accordance with Procedure BU AUS IMS P DIV 040 – *Communication and Consultation*.

Employees and contractors will be consulted with regard to aspects and impacts that have the potential to impact on the environment.

Consultation on environmental matters will occur through the mechanisms outlined in the table below.

Event	Frequency	Participants	Record
Work activity induction (in EWMS or equivalent)	Prior to commencing work	Personnel carrying out specific work activities	Record of training – listed on the EWMS or Toolbox Talk Record
Aspects and Impacts Risk Workshops	6 monthly	Project team and subcontractors (where required)	Aspects and Impacts Register
Toolbox meetings	As required	Subcontractors	Toolbox meeting record
Subcontractor meetings	Weekly	Project team and subcontractors	Minutes of meeting
Project team meetings	Weekly	Project team	Minutes of meeting

Figure 16 *Project EMS Consultation Mechanisms*

5. Contractor Management

5.1 Evaluation and Selection of Contractors

All Multiplex Contractors (including subcontractors, suppliers and consultants) will be selected and appointed in accordance with Procedures BU AUS IMS P DIV 060 – *Contractor Management*, PAM P DIV 030 – *Tendering Subcontracts* and PAM P DIV 040 – *Letting of Agreements*.

Multiplex's procurement processes ensure that all contractors engaged must meet the environmental management requirements. This is achieved by:

» Documenting and correctly completing subcontract agreements, supplier agreements and consultant deeds that include a scope of work and environmental requirements

» Examination and evaluation of subcontractor's demonstrated experience and capabilities

» Selecting appropriate subcontractors and suppliers for tender

» Conducting a tender interview to verify the environmental requirements related to the contract can be met

» Evaluation, recommendation and seeking approval from senior management for engagement of the preferred contractor.

5.2 Subcontractors Environmental Management Plans and EWMS

All subcontractors are required to operate with the requirements of the CEMP and associated documents.

Based on the CEMP and risks identified in the Project Risk Assessment, MPX will assess the subcontractor's environmental management strategies against the following:

» The potential environmental impacts of the subcontractor's activities

» The environmental sensitivity of the area(s) in which the subcontractors will be working

» The nature and scope of the subcontractor's activities

» The scale of the subcontractor's activities

» The subcontractor's capacity to manage its own environmental performance effectively

» The subcontractor's previous performance.

Where a subcontractor is determined to be working in an area identified as high risk for potential impact to the environment, additional management controls will be put in place. These may include the submission of a

dedicated EMP / EWMS to address the specific work package(s) awarded and be submitted for review to MPX prior to commencement of work on site. Comments resulting from the review by Multiplex will be issued to the subcontractor for action and where required, re-submission. The EMP / EWMS must assess the level of environmental risk and implement appropriate management controls for the subcontractor's full scope of work. Where new environmental hazards and risk are identified these will be added to the project's environmental Aspects and Impacts Register.

EWMSs are aimed specifically for use by foremen and construction workers, and are reviewed by each member of the work team before they commence work. This review provides an opportunity for the work team to contribute to environmental controls, and ensure that the work team is trained in environmental methods. Changes to EWMSs are documented and communicated to workers prior to commencing changed methods.

5.3 Contractor EMS Submission Requirements

A summary of the subcontractors EMS submission requirements is outlined in the table below.

Item	Description	Time Frame / Frequency of Submission
1	Project Environmental Management Plan for selected trades determined by Multiplex	10 days before commencing on site.
2	Environmental Work Method Statement (EWMS) for all high activities	10 days before commencing on site.
3	Incident/Near Miss Report	Following an incident
4	Incident Investigation Reports	Following an incident
5	MPX Inspections – completed and signed off	As per timeframe nominated in report
6	Inspection and Monitoring Records as detailed in each Environmental Sub-Plan	As per Environmental Sub-Plan

Figure 17 *Summary of Subcontractor Environmental Submission Requirements*

5.4 Subcontractor Environmental Management Monitoring

Multiplex will monitor work activities in accordance with Procedures BU AUS IMS P DIV 060 – *Contractor Management* – to ensure that subcontractors are carrying out work in accordance with EWMS documentation. Monitoring may be achieved by one or more of the following:

» Ongoing visual inspections by supervisors

» Environmental inspections

» External Inspections/Audits.

5.5 Purchasing of Goods and Services

Multiplex personnel responsible for the procurement of materials, plant and equipment will ensure that the requirements outlined in Procedures BU AUS IMS P DIV 060 – *Contractor Management* – are implemented to ensure compliance with the relevant Australian Standards and environmental legislation.

Where goods such as materials, plant and equipment are procured, procedures for complying with environmental specifications will be implemented and will cover all environmental standards, legislation or organisational compliance requirements.

Items and equipment that are used to execute the work potentially impacting on the health and safety of a worker of the public, will be subject to hazard identification and risk assessment prior to purchase or hire.

Workers or their WHS Representatives will be consulted regarding any purchasing decisions that could affect their health and safety.

6. Risk Management

6.1 Risk Workshops

Multiplex and its subcontractors will undertake risk workshops outlined in the table below. Further detail relating to risk management is detailed in Procedure BU AUS IMS P DIV 020 – *Risk and Opportunity Management*.

Type of Risk Programme	Purpose	Frequency	Participants	Record
Project Risk Workshops	Overarching risk workshop conducted to identify all significant risks/opportunities and develop control strategies relating to the project	As per schedule	Project Team & Subcontractors	Project Risk Register
Project EMS Risk Workshops	To identify key EMS aspects, impacts and develop control strategies for all works associated with the project	Six monthly intervals	Project Team, Subcontractors & WHS&E Manager / Coordinator	Project Risk Register
Trade/Element Risk Workshops	To identify key EMS aspects, impacts and develop control strategies for all works associated with the project	As per schedule	Project Team, Subcontractors & WHS&E Manager / Coordinator	Project Risk Register

Figure 18 *Risk Workshops*

6.2 Aspects and Impacts

Key activities carried out by or on behalf of MPX in connection with the Project are identified in the Environmental Aspects and Impacts Risk Register outlined in the table below and in Appendix 3. This register is completed during the preliminary risk assessment process to help establish key project risks in accordance with Procedure BU AUS IMS P DIV 020 – *Risk and Opportunity Management*.

All risks identified are managed in Project Risk Register on Multiplex Operating System. For each activity the environmental aspects and associated actual and potential environmental impacts are identified for normal operations and uncommon events. All aspects are assessed for risk based on standard controls being in place. Any aspects with a risk rating of high or extreme will be considered a significant aspect and require additional controls / plans to minimise the risk. Additional controls or plans will be referenced in the Environmental Management Sub-plans. Furthermore these below aspects have been captured within the environmental Aspects and Impacts register located in appendix 3.

Aspect	Impact	Consequence	Likelihood	Risk Rating
Water Quality	Pollution / contamination of atmospheric, ground or surface water bodies through degradation of water quality.	B	2	5
Erosion & Sediment Control	Soil loss to environment potentially affecting water quality subsequently impacting ecological values.	A	3	4
Site Contamination	Mobilisation of chemicals above the level normally found in nature, potentially having an adverse effect on the surrounding environment.	A	3	4
Air Quality	Pollution/ contamination of atmosphere from dust, exhaust emissions, odour and air-born chemicals.	B	3	8
Noise & Vibration	Disturbance/ nuisance caused from 'unreasonable' or excessive levels of noise to public/ environment.	C	2	9
Hazardous Chemicals	An acute event where hazardous chemicals have the potential to be spilt and released to the environment causing adverse effects.	A	4	7
Cultural Heritage	Damage or disturbance to archaeological/cultural artefacts including skeletal remains, shell middens or other artefacts.	B	3	8

Aspect	Impact	Consequence	Likelihood	Risk Rating
Flora and Fauna	Direct / indirect impact (stress-death) on an individual or species of flora/ fauna.	B	3	8
Waste Management	Degradation of aesthetic values due to ineffective waste management. Build-up of chemical and organic waste.	B	4	12
Office Resources	Depletion of resources as a result of construction and office operations	B	4	12

Figure 19 *Environmental Aspects and Impacts Register*

		Likelihood				
		Almost certain	Likely	Possible	Unlikely	Rare
Consequence	A. Extraordinary	1	2	4	7	11
	B. Major	3	5	8	12	16
	C. Moderate	6	9	13	17	20
	D. Minor	10	14	18	21	23
	E. Insignificant	15	19	22	24	25

Figure 20 *Consequence and Likelihood Matrix*

6.3 Environmental Controls Map

An Environmental Controls Map will be prepared for the Project to include key information from the sub-plans and other sources. The ECM will be regularly reviewed and updated to reflect project stages. The current ECM as seen in appendix 3 will be displayed on site notice boards, and includes

» The worksite layout and boundary

» Location of the nearest noise sensitive receivers

» Planned sediment and erosion control measures

» Noise barriers (N/A)

» Site offices

» Construction traffic routes within and adjacent to the worksite

» Dust control measures (N/A)

» Monitoring equipment (e.g. dust and noise monitors)

» Location of environmentally sensitive areas (e.g. conservation areas, protected trees)

» Location of heritage (indigenous and non-indigenous) items (e.g. artefacts, registered sites) (N/A)

» Planned location of spill containment and clean-up equipment

» Planned location of hazardous substance storage

» Stormwater drainage and watercourses

» Planned location of worksite waste management facilities

» Demolition works.

7.0 Training and Competency

7.1 Training and Competencies

Multiplex is committed to achieving and maintaining high standards in training and development.

Multiplex will implement systems in accordance with Procedure BU AUS IMS P DIV 110 – *Training and Competency* – to ensure employees have the required skills and training to competently perform required tasks. Multiplex will maintain a training program that identifies:

» The training required to meet statutory and legislative obligations

» The training required for each role or position to meet the required competencies

» A schedule of required refresher training.

Training programs will remain current and be reviewed at least annually or:

» When new or unforeseen workplace requirements are identified

» Following significant changes to the division's business operation

» Following a significant incident

» Following changes in legislation

» Following feedback from employees.

Multiplex will review the training programs to ensure that the training has been effective.

7.2 Induction Training

The Project has developed induction programmes for Project personnel. The project induction outlines key environmental issues. All personnel directly or indirectly working on the Project, including sub-contractors, are required to complete the induction prior to starting work, and will be provided with identification to show they have been inducted. The environmental induction will be periodically reviewed for adequacy.

The project induction includes the following environmental aspects:

» Key issues relating to the project and existing environment, such as ecological and heritage conservation areas

» Relevant environmental requirements, relevant conditions of planning approvals and environmental licences, and the obligations of all staff in relation to compliance with approvals and licences

» Environmental policy

» Site specific issues, such as:

- Waste management and minimisation
- Washing, refuelling and maintenance of vehicles, plant and equipment
- Efficient use of plant, equipment and materials
- Minimising potential environmental impacts including noise, air and water quality
- Site-specific erosion and sedimentation controls, and use of spill kits to contain spills
- Environmental emergency plans, and incident reporting procedures for environmental harm/incidents.

7.3 Tool Box Meetings

Where deemed necessary toolbox meetings are used to highlight specific environmental and community issues relevant to site personnel. Toolbox meetings will be held at monthly intervals or as required.

A signoff sheet is completed by all personnel in attendance at toolbox meetings to acknowledge understanding of the information provided.

8 Incident and Emergency Management

8.2 Incident Management

Multiplex maintains a uniform system for the management and investigation of incidents which is outlined in Procedure BU AUS IMS P DIV 100 – *Incident Management*.

Reporting of incidents will be conducted in accordance with the requirements outlined in the table below.

Type	Timeframe	Distribution	Resp.	Record/s
Incidents (actual and potential) and near misses	Immediate	Project Manager, Site Manager	Supervisor	Incident Notification (Aconex) Incident Investigation Reports
Serious incidents and serious potential incidents	Immediate	Regional Director, Construction Manager, and WHS&E Manager	Site or Project Manager	Incident Notification (Aconex) Incident Investigation Reports
	Within 24hrs	Australasian Executive Group Regional Executive Group.	WHS&E Manager	SendWord Now Message and Email
	Within 48 hrs	As above	WHS&E Manager	National Incident Register
	Fortnightly	WHS&E Managers	WHS&E Manager	SPI Summary Reports
Notifiable incidents	Immediate	As above and to the EPA	Site Manager	Statutory Incident Report

Figure 21 *Incident Reporting Requirements*

All incidents and near misses will be investigated by competent personnel, reported and recorded in the electronic database and conducted in line with the requirements set out in the internal investigation proforma and procedures. All incident investigations will identify the root causes of the incident so that appropriate remedial and preventative control measures can be identified and implemented.

Where required and where possible, incidents will be reported to EPA.

Corrective actions resulting from incident investigations will be prioritised and carried out in accordance with defined priorities. The corrective action will be evaluated for its effectiveness and whether the initially identified deficiency has been corrected and prevented from recurring.

8.3 Emergency Management

Emergency situations are to be managed through Procedure BU AUS IMS P DIV 100 – *Incident Management and include*:

» An Emergency Management Plan details a single set of emergency contacts and procedures, consistent with the Project activities that can be scaled as appropriate for any incident or emergency

» A Site Evacuation Diagram identifies the locations of emergency assembly points, fire exits, first aid kits and associated equipment, directional flow of pedestrian traffic and firefighting equipment

» A Crisis Management Plan which provides guidance, details, responsibilities and lines of communication for effective emergency management.

Relevant details of the Emergency Management Plan will be provided to all personnel during the site induction, and

information posted on notice boards. The projects Emergency Management Plan is located on Aconex and the projects S:Drive.

9.0 Inspections, Testing and Monitoring

9.1 Environmental Site Inspections

To ensure compliance with both regulatory requirements environmental inspections detailed in the table below will be implemented in accordance with Procedure BU AUS IMS P DIV 070 – *Inspection Testing and Monitoring*.

The outcomes and status of inspection activities will be recorded in inspection reports and issued to the persons delegated with responsibility for rectifying the impact. The onsite WHS&E Coordinator will be responsible for tracking actions resulting from all inspections.

Type of Inspection	Inspection By	Frequency	Record
General	All Supervisors	Daily	Visual
Environmental Impacts	Environmental graduate	Weekly and after a significant shower / rain event.	Environmental Site Inspection
Environmental Impacts	WHS&E Manager / Coordinator	Monthly	Environmental Site Inspection Report
Other	Project Team / Subcontractors	As per Environmental sub-plans	As per Environmental sub-plans

Figure 22 *EMS Inspection Programme*

9.3 Environmental Site Testing and Monitoring

To ensure compliance with regulatory, testing and monitoring requirements, all monitoring and testing will be conducted in accordance with the environmental sub-plans outlined in section 13 and Procedure BU AUS IMS P DIV 070 – *Inspection Testing and Monitoring*.

10. Audits and Non-Conformances

10.1 Audits

An EMS auditing programme outlined below will be established and implemented to assess compliance, identify trends, drive continual improvement and provide assurance that management processes are being effectively implemented and that performance objectives are being met.

Audit procedures including the scope, frequency and methodology to be used as well as the responsibilities and requirements for conducting audits and reporting results will be in accordance with Procedure BU AUS IMS P DIV 120 – *Internal / External Auditing*.

Type of Audit	Audit By	Frequency	Purpose	Record
Internal EMS audit	WHS&E Manager / Coordinator	3 monthly	To confirm compliance against the MPX EMS.	Audit Report
External surveillance audits	External certified organisation	As per schedule	To confirm compliance of the MPX EMS and AS/NZS 14001.	Audit Report

Figure 23 *EMS Audit Programme*

Audit results will be recorded and an action plan developed identifying the observations and corrective action required against each of the findings in the audit report. Details of any non-conformance reports will be issued in accordance with Procedure BU AUS IMS P DIV 080 – *Control of Non Conformances*.

A follow-up audit will be carried out, as deemed necessary by the auditor, in order to verify and record the implementation and effectiveness of the corrective action taken. Implementation and effectiveness of the corrective actions will be verified and recorded during follow-up. Audits will be closed out in a timely manner.

10.2 Non-Conformances, Corrective and Preventative Action

Deficiencies identified during audits, site inspections or observations of day-to-day operations will be generally recorded on the audit report or inspection report/checklist and actioned.

When non-compliance is identified, Multiplex will document the issue on the Non-Conformance Report in accordance with Procedure BU AUS IMS P DIV 080 – *Control of Non Conformances* – on Aconex identifying the non-conformance and corrective actions. Where appropriate, the recipient and/or Multiplex will also develop measures to prevent recurrence of the non-conformance. The instigator will carry out a follow up review and closeout of the Non-Conformance Report to verify completion of measures taken to rectify and to prevent recurrence of the Non-Conformance within the specified time frame.

11 Document and Records Management

11.1 Document Control

Multiplex's system of document management and record keeping is detailed at Procedure BU AUS IMS P DIV 050 – *Document and Records Management*. The EMS documentation is maintained in electronic format on Multiplex Operating System and describes and provides direction to the core documents that make up the system. The documentation consists of the following:

» Policy statements which summarise and detail Multiplex high level commitment to the implementation of the EMS

» Management System Operating Procedures to effectively and efficiently manage projects from feasibility and planning phase's right through to the design and construct phases of a project

» Supporting materials including Forms, Guides (as outlined in **Appendix 2**) and Management Plans provide the tools to ensure conformance with operational procedures.

Project documentation will be controlled in accordance with the Procedure BU AUS IMS P DIV 050 – *Document and Records Management* – which defines the controls to ensure that:

» The documentation is periodically reviewed, revised as necessary and approved for adequacy prior to issue

» The documentation is current, readily identifiable and available at all points of use

» The staff are immediately notified of any changes in the documentation such as, the development or receipt of new documentation and any amendments to the current documentation

» The documentation of external origin is registered and regularly reviewed for currency

» The obsolete documents are appropriately identified and archived.

11.2 Record Control

The Project will maintain records in Aconex (web-based document control system), S:Drive and other applications as defined in the table below to demonstrate conformance to specified requirements and to ensure the effectiveness of the operation of the EMS. Pertinent EMS records from subcontractors will be an element of this data.

Record	MPX OP System	Aconex	Share Drive	CHEMALERT	SMARTEK
MPX Management Plans	☐	☒	☐	☐	☐
Subcontractor EMP	☐	☒	☐	☐	☐
Subcontractor EWMS	☐	☒	☐	☐	☐
Permits	☐	☐	☒	☐	☐
Incident and Investigation Reports	☐	☐	☒	☐	☐
Inspection and Test Reports	☐	☒	☒	☐	☐
Audit Reports	☐	☒	☐	☐	☐
Safety Data Sheets	☐	☐	☐	☒	☐
Meeting Minutes	☐	☒	☐	☐	☐
Toolbox Meetings	☐	☐	☒	☐	☐
Environmental Risk Workshops	☒	☐	☐	☐	☐
Induction Records	☐	☐	☐	☐	☒
Training Records	☒	☐	☐	☐	☐
Reports	☐	☒	☒	☐	☐
Monitoring Records	☐	☒	☒	☐	☐
Environmental Complaints	☒	☐	☐	☐	☐

Figure 24 *Records Management*

12 Reporting

The Project will establish and maintain a uniform system of record keeping to enable accurate reporting of EMS matters in accordance with Procedure BU AUS IMS P DIV 130 – *Reporting*. Reporting on environmental matters will include those outlined in the table below.

Type of Report	Report By	Frequency	Recipient/s
Monthly PCG Report	Project Manager/Site Manager	Monthly	Client, Client's Representative and Regional Director.
Environmental Incident Notification Report	Project Manager/Site Manager	As required	Directors, WHS&E Manager/Coordinator and NSW EPA Auditor and EPA where required.
Environmental Incident Investigation Report	Project Manager/Site Manager or others nominated by Project Manager /Site Manager	As required	Directors, WHS&E Manage/Coordinator and NSW EPA Auditor and EPA where required.
Environmental Internal Audit Report	Project Manager / Site Manager / Environmental Manager	As required	Project Team and WHS&E Manager/Coordinator
External Surveillance Audit	External Auditor	As required	WHS&E Manager/Coordinator, Systems Manager, Directors, Project Manager
Other	As per environmental sub-plan	As per environmental sub-plan	As per environmental sub-plan

Figure 25 *EMS Reporting Programme*

13 Environmental Management Sub Plans

The below environmental sub plans are to be read in conjunction with their more detailed management plan counterparts where available. Sub plans that have a developed management plans act as an abbreviated guide of the objectives and targets outlined within these detailed management plans. For sub plans that do not have an overarching management plan and or supporting documentation in the form of assessments, these sub plans act as an independent guide for the management of that environmental aspect. Additional controls for many of the below sub-plans have been included in appendix 3 aspects and impacts register, which lists environmental controls required at different work stages of the project.

13.1 Construction Noise and Vibration Management Sub-Plan

» *Appendix 5: Construction Noise and Vibration Management Plan*

13.1.1 Objectives and Targets

Objective	Target	Key Performance Indicator
To ensure any works causing noise or vibration do not effect nearby structures or residents.	No complaints from the community regarding noise or vibration.	No. of complaints from residents / businesses related to noise.
Compliance with State and Local requirements as required.	Compliance with the Environmental Protection (Noise) Regulations 1997 - Section 6 of AS 2436-2010 (Standards Australia, 1981). Compliance with 10mm/s vibration limit or as otherwise specified.	Results from environmental inspections Noise and vibration monitoring records

13.1.2 Management Strategies

Parameter	Action	Timing	Responsibility
Construction Work	All construction work to take place during the hours as determined by either the Client or Environmental Protection (Noise) Regulations 1997, (i.e. 7:00am-7:00pm) and not on Sundays and Public Holidays (except for dust control operations which may be undertaken on Sundays). The client has specified specific DA approved hours for construction work.	Construction	All Subcontractors
Plant and Equipment	Plant and equipment noise control equipment to be maintained in accordance with manufacturer's specification to reduce noise levels.	Construction	All Subcontractors
Plant and Equipment Noise Control	All mobile machinery and stationary equipment to be fitted with noise control equipment as per the manufacturer's specifications.	Construction	All Subcontractors
Noise Monitoring	Noise monitoring to be undertaken if required by the Client and Council conditions or if complaints are received due to unreasonable levels of noise in a noise sensitive area. These levels are to be assessed against levels set in the Environmental Protection (Noise Control) Regulations 2017. A Construction Noise and Vibration Management Plan has been prepared by an appropriately qualified external consultant and attached to this CEMP. This plan is to be approved by the Local Council. For works outside the DA approved hours of work for, Monday to Saturday. As an alternative, consideration is to be given to undertaking works at more suitable times to the complainant.	Establishment / Construction	MPX / Subcontractor



Noise Monitor locations outlined within SLR CNVMP.

Parameter	Action	Timing	Responsibility
Vibration Monitoring	During operation, if equipment is likely to cause excessive vibration, sensitive structures or areas to be monitored for vibration levels. An appropriately qualified external consultant will develop a Construction Noise and Vibration Management Plan which will be attached to this CEMP. Vibration levels monitored at sensitive premises are not to exceed 10mm/s (as per German Standard DIN 4150-03 – *Structural Vibration Part 3 – Effects of Vibration on Structures)* or as otherwise specified in the CNVMP. Regardless of the criteria above, constant observation of vibration levels and any effects on adjoining structures to be monitored closely during construction, as this may alter vibration monitoring trigger levels. Dilapidation studies to be undertaken of surrounding structures and building prior to any construction.	Establishment / Construction	MPX / Subcontractor
Noise / Vibration – Control Measures	If noise and / or vibration complaints are received, the following techniques should be considered to reduce impact to adjoining owners: Undertake works outside of adjoining building operating hours / peak hours as per the approved Noise Management Plan Isolate work activity using noise barriers Ring saw instead of hammering column / beams Use smaller machinery or quieter alternative Use static rolling where possible.	Construction	MPX / Subcontractor
Communication and Notification	A contact list to be prepared to enable nearby residents and owners to be notified regarding works that may impact them as a Result of noise and vibration. This will be managed in accordance with the Communication Management Plan and approved Noise & Vibration Management Plan. Notification will come in the form of PN – project prior to commencing works and SN – specific for scheduled works that are predicted to exceed noise management levels.	Establishment / Construction	MPX
Complaints	Where a complaint is received regarding noise and vibration, the complaint will be investigated and where appropriate, additional control measures will be taken to address the nature of the complaint	Demolition/Civil/ Construction	MPX

13.1.3 Monitoring and Reporting

Type of Monitoring / Reporting	Timing	Responsibility	Record
Vibration monitoring if required by Client, local authority and in response to complaints	At commencement and during excessive vibration	MPX	Vibration monitoring records
Continuous noise monitoring established at 3 noise receptive locations around the project.	At commencement and during excessive Noise	MPX	Noise monitoring records
Integrity of noise control equipment (if deemed applicable)	During construction	MPX / All Subcontractors	Environmental Site Inspection
Number of noise and/or vibration complaints	As required	MPX	Communications Register

13.2 Dust and Air Quality Management Sub Plan

»Appendix 6: Construction Air Quality Management Plan
»Appendix 7: Air Quality Report
»Appendix 20: Air Quality Statement

13.2.1 Objectives and Targets

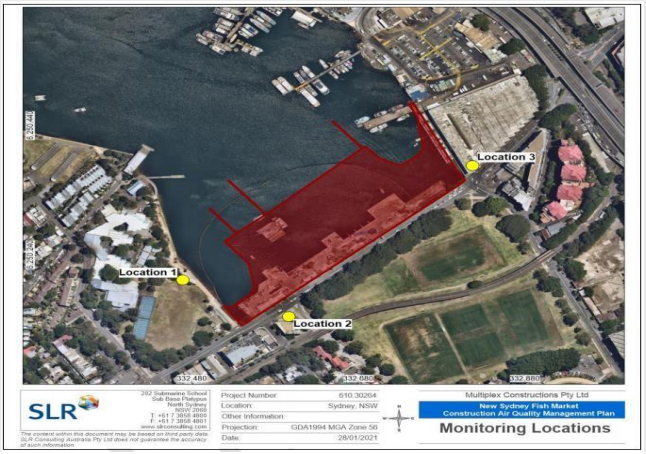
Objective	Target	Key Performance Indicator
Ensure that dust or odour emissions do not adversely affect the health or visual amenity of surrounding communities.	No complaints from adjoining owners in relation to dust emissions from the works.	No. of public complaints from the public related to dust.
Compliance with State and Local regulatory requirements in relation to dust management.	No visual evidence of deposited dust or suspended particulate matter. Compliance with National Environment Protection Measures (NEPM) standards (where required) and EPA standards during construction.	Visual monitoring of dust movement during environmental inspections. Dust monitoring results (where required).
Compliance with Construction Air Quality Management Plan – Prepared by SLR.	No visible dust leaving site, no odours ducted at boundary of site, no visible emissions from idling plant for sustained period of 5 seconds. Compliance with NSW EPA Ambient Air Quality Criteria for Suspended Particulate Matter and Nuisance Dust Deposition.	Visual monitoring during construction, records from dust monitoring devices.

13.2.2 Management Strategies

Parameter	Action	Timing	Responsibility
Communication	Name and contact details of person(s) accountable for air quality and dust issues will be displayed on the site boundary. Daily pre-start will include information for wind and rain that may impact dust management procedures during the day.	Establishment	MPX
Stabilised Driveways	A stabilised driveway is to be installed to minimise the tracking of dirt on public roadways.	Establishment	MPX
Dust Control Method – Physical Barriers	A physical barrier can be erected perpendicular to prevailing winds prior to the commencement of works along the boundary or around uncontrolled dust sources. Fences can be standard hoarding panels / fence or a fence with a screening material with a porosity of 50% or less.	Establishment	All Subcontractors
Dust Control Method – Chemical Stabilisation	Where an exposed area or stockpile is located away from traffic and needs to sit for up to 3 months or where an area needs immediate stabilisation, a chemical soil stabiliser can be used such as Zerosion or the area hydromulched (seed free).	Construction	Bulk Earthworks / Civil / MPX
Dust Control Method – Wet/Dry Suppression & Extraction	Only use cutting, grinding or sawing equipment that is fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction (vacuum attachments).	Construction	All Subcontractors
External Roads	If any sediment is deposited onto the roads adjoining the site, the roads are to be swept regularly and including prior to any rainfall. No hosing is to be undertaken external to the site. Traffic Controllers to maintain inspection log of external roads and haul routes housekeeping and any subsequent action.	Construction	MPX
Haul roads	Haul roads to be covered with gravel / road base (or similar) to minimise dust production or at best concrete to be regularly swept. All equipment wheels will be washed before exiting site with manual or automated sprayers and drive-through washing bays.	Demolition and Construction	MPX / Subcontractor

Parameter	Action	Timing	Responsibility
Speed limits	The speed of all vehicles on-site to be restricted to 10 km/hr. This speed to be further reduced if large amounts of dust are still being generated.	Construction	All Subcontractors
Traffic & Travel to Site	Workers as part of the green travel plan are encourage to take surrounding developments public transport to and from site. No construction worker parking onsite or surrounding fish market.	Construction	All Subcontractors
Windy Conditions	Dust generating activities to be assessed during periods of excessively windy conditions (>40km/h). Where dust cannot be adequately controlled work is to be ceased and rescheduled to a time when adequate control of dust generation can be achieved.	Construction	All Subcontractors
Water Carts/ Sprays	An adequate water supply will be established on site for effective dust/particulate matter suppression/mitigation. Water carts or sprinklers are to be used for specific process activities that may cause dust, and can be used to assist in the dust control on access tracks. Consideration should be given to water efficiency and the possible use of a dust control method above. Dampening surfaces should only occur to the extent where run-off does not occur. Where dry spillages of dusts occur, these will be cleaned up as soon as reasonably practicable utilising wet cleaning methods mentioned above.	Construction	MPX / Plumbing Contractor and Excavation / Demolition Subcontractor
Dust Control Method - General Waste	Site wheelie bins will be fitted with lids to prevent passive dust generation. Skip & wheelie bins will be controlled via water suppression prior to transferring into larger waste receptacles. No bonfires and burning of waste materials will occur onsite.	Construction	All Subcontractors
Fine Powder Substances and Cement Bags	Fine powder materials and cement bags will be either re-sealed or stored appropriately to prevent passive dust.	Construction	All Subcontractors.
Housekeeping	During construction the site to be kept clean to reduce dust lift off during windy days.	Construction	All Subcontractors
Stockpiles	All materials stored or stockpiled will be at suitable locations away from potential environmentally sensitive areas. Stock piles will be maintained at manageable sizes (not to be over 4m in height) which will allow them to be covered if necessary to control emissions of dust and/or VOCs/odour. Stockpiles of material are constructed and maintained to prevent cross contamination; and Suitable erosion and sediment controls are in place for stockpiles.	Construction	All Subcontractors
Plant and Equipment Maintenance	All construction plant and equipment with access to the site to be properly maintained and serviced in accordance with the manufacturer's specification. During the works maintenance logs are to be maintained and available during inspections and audits.	Construction	All Subcontractors
Odour Control	Potential odour generating activities such as excavation of petroleum hydrocarbon contaminated soils to occur with appropriate odour controls incorporating safeguards and monitoring.	Construction	Civil Contractors
Exhaust Fumes	Operating machinery and vehicles to be visually checked to ensure exhaust fumes are not discharged into adjoining buildings air intakes. Vehicles engines to be switched off when not in use to prevent idling.	Construction	All Subcontractors

Parameter	Action	Timing	Responsibility
Truck Transportation	Trucks transporting materials such as sand, soil, landscape materials and gravel to have loads covered and tailgates secured. Site vehicle gates will be closed between vehicle movements and shall be fitted with shade cloth.	Construction	All Subcontractors
Travel Plan	All workers are encouraged to use surrounding public transport to and from site. Details of routes included within the site induction.	Construction	All Subcontractors
Paint-Spraying	Paint-spraying activities not be undertaken in adverse weather conditions or near building air intakes.	Construction	All Subcontractors
Exposed Areas	Measures including watering down exposed areas and access will be undertaken to reduce dust generation.	Construction	All Subcontractors
Earth Works	Re-vegetation of earthwork and exposed areas/soil stockpiles to occur as soon as reasonably practicable. Geo-fabric/Hessian mesh or builder's plastic may be used as cover where it is not practicable to re-vegetate or cover with topsoil and area is to be exposed for a significant period of time. Cover will only be removed in small areas required for works and not all at once.	Demolition , Excavation and Construction	Excavation / Demolition Subcontractor
Hazmat	Any Hazmat discovered on the project to be left undisturbed and subsequently managed in accordance with the WHS Management Plan. Asbestos or other containment material found in ground will require assessment in accordance with State requirements. Refer to WHS Handbook Rev 3 – - Asbestos - Lead Dust/Paint	Construction	All Subcontractors
Sweeping	Where applicable, sealed roads to be swept to remove deposited material that could generate dust. Dry sweeping of large areas to be avoided, must be completed with aid of dust suppression controls such as vacuums, misting carts etc.	Demolition, Excavation and Construction	All Subcontractors
Complaints	Where a complaint is received regarding dust, the complaint will be investigated and where appropriate, additional dust control measures taken to address the nature of the complaint. All complaints will be logged and available to local authority if requested.	Construction	MPX
Air Monitoring	3x 24hour PM_{10} monitors and 2x Dust Deposition Gauges to be established in below locations as designated in the Construction Air Quality Management Plan – Dust deposition readings will be collected monthly Dust deposition rates greater than 4g/m^2/month triggers the need to implement addition controls and review dust producing activities. If real time air monitors indicate running PM10 average above >40 or 50µg/m^3 review and additional mitigation actions are required.	Establishment	MPX



13.2.3 Monitoring and Reporting

Type of Monitoring / Reporting	Timing	Responsibility	Record
Inspect dust control measures, to ensure they are in place and implemented.	Weekly	MPX	Environmental Site Inspection
Visually inspect emissions from plant to ensure they are not contributing to ill health effects.	Weekly	MPX	Environmental Site Inspection
Visual inspection of vehicle exhaust, dusts and odours travelling offsite conducted on and off-site.	Weekly	MPX	Environmental Site Inspection.
Continuous dust monitoring established at 3x locations around the project in addition with 2x dust deposition gauges. This data will be reviewed in real time and additional mitigation actions to be taken where readings are near exposure standard or above.	Daily	MPX	Dust monitoring records

13.3 Water Quality Management Sub-Plan

»Appendix 8: Dewatering Management Plan

13.3.1 Objectives and Targets

Objective	Target	Key Performance Indicator
Avoid the release of contaminants to waterways or drainage systems.	All water discharged complies with minimum water quality criteria.	Water quality records conforming to minimum water quality criteria (where applicable). No breaches of management strategies in applicable Management Plans. Results from environmental inspections.
Ensure that groundwater quality or height is not significantly affected by the construction.	No significant change in groundwater levels and quality during dewatering activities (if applicable).	Groundwater quality reports.

13.3.2 Management Strategies

Parameter	Action	Timing	Responsibility

Dewatering for construction purposes	Water to be discharged from sediment basins or similar must be tested and, if required, treated to ensure that it meets water quality criteria and that pollution of the receiving waters does not occur; Results of testing and details of any treatment undertaken must be documented The discharge must be monitored throughout to ensure that the water being pumped; » complies with the discharge criteria » Does not come into contact with any soil or exposed surfaces before discharging does not mix with any sediment laden/untested water at either the inlet or outlet. » Water must never be discharged or reused onsite in a manner that exceeds the capacity of sediment controls and/or generates runoff with the potential to discharge from site. » In the case of dewatering of cofferdams, the pumped water is to comply with the allowable parameters from the baseline water condition	Establishment	MPX / Excavation Subcontractor

De-watering Management - Sediment Basin and Ponded Water	All monitoring and discharge is to be undertaken in accordance with the following steps or as outlined within the drafted Soil and Water Management Plan. Step 1. Is the water within the Sediment Basin above the Sediment Storage Zone as indicated by the marker in the Sediment Basin in accordance with most recent engineer's certification? If yes then you have five days to carry out the following steps of this procedure. Step 2. Take pH and turbidity readings. If the turbidity is above 20NTU and pH is above 7.5, then the water can be treated with Gypsum flocculent or alternatively alum sulphate at the rate of 4kg/100m3 or 8L/100m3 of ponded water. The alum sulphate is to be dissolved thoroughly into water within a separate tank and evenly distributed across the entire surface of the ponded water. Allow to settle for 3-6 hours. Step 3. Take pH and turbidity readings. If the water quality is within the criteria established in the MPX permit to Work – Water Discharge or required levels for the Blackwattle Bay region. Obtain approval from WHS&E Coordinator or Site Manager to pump and when obtained proceed to Step 4: Ensure the water quality results are recorded including the place, date and location of the dewatering. If the water did not achieve the above water quality, repeat step 2 or seek assistance from Environmental Consultant. Extreme care should be taken when treating for pH and should only be undertaken by appropriately qualified personnel. If water test results in any of the below values or values determined within the Dewatering Plan contact relevant consultant for treatment. Water Quality Monitoring	Establishment	Multiplex / Civil Subcontractor

Parameters Units	**Trigger Values**
Physio-chemical	**Based on Flooding and Water Quality Assessment and ANZECC Guidelines.**
pH (pH units)	**8 – 8.5**
Salinity (µScm–1)	**20-30**
Dissolved oxygen (% Saturation)	**90-110**
Turbidity (NTU)	**0.5 - 10**
Suspended Solids mg/L	
Total Phosphorus (TP) µg P L-1	**25**

Total Nitrogen (TN) µg P L-1	**120**
Dissolved Metals (µgL)	**TBD by Receiving Water Quality Objectives/Baseline.**
Cadmium	**0.7**
Copper	**1.3**
Lead	**2.2**
Mercury	**0.1**
Zinc	**15**
Chromium (Cr III)	**7.7**
Chromium (CrVI)	**0.14**
Nickel	**7**

Parameter	Action	Timing	Responsibility
	Monitoring of these above values will be conducted at a minimum on a monthly basis by an environmental consultant. Any recommendations will be made based on recorded data from discharge area within Blackwattle bay and at the treatment area onsite. Step 4. Position pump and place intake below water level within a bucket to force water in through the top of the bucket and not 'suck in' settled sediment off the floor of the ponded water. Turn on pump and take sample of the outfall daily and send to NATA registered lab immediately for all water quality criteria. Regularly check on the dewatering during discharge. Step 5. Turn off pump when water level is near empty or below the Sediment Settling Zone.		
Abstraction of groundwater for construction purposes	A Licence to Take Water is to be obtained from Department of Water before abstraction of groundwater can commence for use in dust suppression and other construction activities. A Dewatering Management Plan may be required to be prepared by an appropriately qualified external consultant and attached to this CEMP. A groundwater abstraction licence is to be obtained for all projects before dewatering can commence. Exemption from a dewatering licence is only available if: » Abstraction is from the water table aquifer » Abstraction is solely for the purpose of removing groundwater to facilitate construction » Abstraction pump rate does not exceed 10L/sec over a period of 30 consecutive days The volume of water taken over the 30 days period does not exceed 25,000kL. The projects Dewatering Plan will clarify the above requirements.	Establishment	MPX / Excavation Subcontractor
Acid Sulphate Soil	All excavation with potential to expose Acid Sulphate Soils (ASS) to be determined prior to commencement and an ASS Management Plan is to be prepared to be prepared by an appropriately qualified external consultant and attached to this CEMP.	Establishment / Construction	MPX / Excavation Subcontractor
Trade Waste	Installation of a 3 x 1m3 settlement system for wet-trade washout to be completed	Establishment	Hydraulic Subcontractor
Tool box meeting	All construction personnel undertaking discharge of water to on-site or off-site areas to undergo a tool box meeting to ensure the correct controls are in place.	Establishment	MPX / Subcontractor
Static Concrete Pumping	A designated washout area and purpose built bunded structure to be provided for concrete pumps and their attachments and connected to wet-trade treatment system.	Establishment	Concrete Subcontractor
Mobile Concrete Pumping	An impervious catch tray to be placed below the pump's hopper to contain any possible spillage or droppings. Concrete washout to be undertaken in designated concrete washout area.	Construction	Concrete Subcontractor
Concrete Truck Washout	Concrete trucks are not allowed to wash out on site.	Construction	Concrete Subcontractor

Parameter	Action	Timing	Responsibility
Spills	All spills on site of hazardous chemicals to be cleaned up immediately to minimise pollution of stormwater/groundwater. If water contaminated by hazardous chemicals requires discharge it will need to be sampled and analysed before release to ensure it meets ANZECC water quality criteria for Aquatic Ecosystems. If contaminated, it will need to be removed and treated by an appropriately licence waste contractor.	Construction	MPX / Subcontractor
Chemical Storage	Paint, form oil, solvents and fuels to be stored correctly and bunded in accordance with Chemical Management Sub-plan.	Construction	All Subcontractors
Paint Washout	The painting subcontractor is required to wash out into purpose built tanks that are to be removed by the painting contractor through a licensed liquid waste facility with an arrangement to attain verifiable proof of disposal.	Construction	Painting Subcontractor

13.3.3 Monitoring and Reporting

Type of Monitoring / Reporting	Timing	Responsibility	Record
Dewatering process and water quality results	Daily (while dewatering) or as specified in the management plan	Supervisor / Onsite WHS&E Coordinator	Environmental site inspection Water Discharge permit
Monitor abstraction of ground water to ensure compliance with licence	Weekly or as per licence requirements	Supervisor / Onsite WHS&E Coordinator	Environmental site inspection Abstraction records
Trade waste and washouts	Weekly	Supervisor / Onsite WHS&E Coordinator	Environmental site inspection
Continuous turbidity monitoring outside silt curtain and at a nearby background site to monitor increase in turbidity prior to removal of coffer dam	Daily	TBD	Monitoring Records

13.4 Erosion and Sediment Control Management Sub-Plan

»*Appendix 9: Soil and Water Management Plan*

13.4.1 Objectives and Targets

Objective	Target	Key Performance Indicator
Prevent clay, silt or sand from entering stormwater drains and waterways.	All disturbed stormwater to pass through primary erosion and sediment controls listed below.	Environmental Inspection records of no uncontrolled release of disturbed stormwater to drains and waterways.

13.4.2 Management Strategies

Parameter	Action	Timing	Responsibility
Erosion and Sediment Control Plan	For sites with a soil disturbance less than 2,500m^2 and with slopes <10%, an Erosion and Sediment Control Plan is to be prepared in accordance with MPX minimum requirements. For sites with a soil disturbance greater than 2,500m^2 or on a site with a slope of >10%, an Erosion and Sediment Control Plan is to be prepared by a Certified Practitioner in erosion and sediment control. The soil and Water Management plan provides details on erosion and sediment control measures for the project and is attached as an Appendix to the Construction Environmental Management Plan.	Establishment	Multiplex
Minimum Requirements for sites <2500m2 and less <10% slopes	» Evaluate site limitations: - Isolate retained vegetation from clearing with tape - Identify highly erodible soils with advice from geotech - Identify up-slope drainage catchments to be diverted around works - Identify work areas to allow for erosion and sediment controls. » Sediment controls as outlined within the Soil and Water Management Plan. Stabilise all site entry / exit points in accordance with MPX minimum requirements. Inspect all vehicles for residual mud and remove before leaving the site. Street sweeping (never hosing down) is to be carried out to reduce sediment on roads. » Install sediment fence(s) down-slope of the site. Treat sediment laden water with the use of sediment fencing installed in accordance with MPX minimum requirements to allow ponding. » The runoff from any slope catchment area exceeding 1,500m^2 is to be diverted around works. The diversion drain is to be appropriately lined to prevent erosion and discharged to lawful stormwater connection outlet. » Clear only those areas necessary for building works to occur. » Strip and stockpile any weed-free topsoil to be reused in re-vegetation works. Ensure the top soil stockpile is long and low to maintain aeration and microbiological properties and ensure it is stabilised to prevent erosion. » All stockpiles are to be located away from drainage areas and surrounded with sediment fence or covered with a product that will prevent erosion if in an area where it has the potential to enter the stormwater system. All stockpiles stored for longer than 2 weeks are to be covered to prevent erosion. » Prevent erosion by mulching areas that have achieved final levels but are not ready for landscape works immediately. For completed areas ensure appropriate top soil is available and establish grass cover within 10 days. » Commence building activities. » Ensure all runoff from concreted and roof areas is immediately connected to the stormwater. » Regularly inspect all drainage, erosion and sediment controls and maintain. » Progressively re-vegetate / stabilise the site. » Remove any remaining temporary drainage, erosion and sediment control measures upon complete stabilisation of the site.	Establishment / Construction / Completion	Multiplex
Storm water Drainage and OSD.	» Relevant details/certificate as a result of consultant completion of the Stormwater Management Plan.	Construction	Subcontractor

Stockpiles	» no stockpiles of soil or other materials shall be placed on footpaths or nature strips unless prior approval has been obtained from Council's Construction Regulation Team » all stockpiles of soil or other materials shall be placed away from drainage lines, gutters or stormwater pits or inlets » all stockpiles of soil or other materials likely to generate dust or odours shall be covered » all stockpiles of contaminated soil shall be stored in a secure area and be covered if remaining more than 24 hours	Construction	Subcontractor

13.4.3 Monitoring and Reporting

Type of Monitoring / Reporting	Timing	Responsibility	Record
Inspect erosion and sediment controls are effective and maintained	Weekly or after a significant shower / rain event.	Multiplex/ Subcontractor	» Environmental Site Inspection » Soil and Water Management Plan (erosion and sediment control)

13.5 Chemicals Management Sub-Plan

13.5.1 Objectives and Targets

Objective	Target	Key Performance Indicator
Avoid contamination of soil and water from chemicals.	No release of chemicals/pollutants as listed under the Environmental Protection (Unauthorised Discharges) Regulations 2004, into the environment during construction.	No instances of uncontrolled spills.

13.5.2 Management Strategies

Parameter	Action	Timing	Responsibility
Hazardous Chemicals	Safety data sheets which outline the procedures for handling, storage and emergency response for all hazardous chemicals stored or used on the Project, to be available in the first aid facility.	Establishment	MPX
Spill Kits	Spill kits are to be established at locations adjacent to where chemical spills have the potential to occur. The spill kits are to be maintained and readily available in the event of a spill.	Establishment	MPX / All Subcontractors
Toolbox Talks	Toolbox talks will be undertaken in the use of spill kits and the steps taken in the event a spill.	Construction	MPX / All subcontractors
Tank and Mobile Tankers	Tank and mobile tankers to be fitted with a screw fitting or overflow protection connected to prevent leaks.	Construction	All subcontractors
Bunds	Bunds capable of storing 110% of the largest container volume to be installed around areas where chemicals are stored. The bund is to be impervious, chemically resistant and fire resistant. Further, the bund is to be protected from weather to avoid the potential of rain reducing the bund capacity. Must be compliant with AS 1940 -2017- The Storage and handling of flammable and combustible liquid and EPA's Storing and Handling Liquids: Environmental Protection – Participants Handbook.	Construction	All subcontractors
Labelling of Chemicals	All chemicals and dangerous goods used on site to be appropriately labelled.	Construction	All subcontractors
Fuel Tankers	Fuel tankers to be equipped with an appropriate device to prevent overfilling. An emergency shut off valve is also to be installed.	Construction	All subcontractors
Handling of Chemicals	Handling of chemicals is to take place in a designated area where there is no potential for spills or contaminated run-off that could to reach stormwater. Fuel stored on vehicles is to be stored in a spill tray or other approved container capable of handling a spill.	Construction	All subcontractors

Fuelling of Vehicles or Construction Plant	Refuelling is to take place in designated areas or where contaminated run-off could not reach the stormwater. Fuel tankers will use a spill tray beneath the refuelling connection to prevent spills on ground.	Construction	All subcontractors
Fluid Leaks	Trucks that leak any sort of mechanical fluid will not be permitted on or adjacent to the site.	Construction	All subcontractors
Oil Contaminated Stormwater	Oil contaminated water is to be disposed of through a licensed waste facility by a licensed subcontractor.	Construction	All subcontractors
Minor Spills (<100L)	In the event of a spill, the spill kit is to be utilised and the cleaned up material taken to a licensed facility as trackable waste and reported.	Construction	All subcontractors
Major Spills (>100L)	In the event of a major spill, the procedures contained in the Emergency Management Plan are to be implemented and reported.	Construction	All subcontractors
Volume of Fuel and Chemicals	Volumes of fuels and chemicals kept on site are to include only those volumes necessary to complete the works within a reasonable delivery schedule.	Construction	All subcontractors
Solvent Based Paints	Containers of solvent based paints are to be disposed of at an appropriate recycling depot by the subcontractor and a verifiable receipt or docket retained on file by the subcontractor and produced upon request to Site Management.	Construction	All subcontractors

13.5.3 Monitoring and Reporting

Type of Monitoring / Reporting	Timing	Responsibility	Record
Check all bunds are the appropriate size and they are functioning.	Weekly	Subcontractors / MPX	Environmental site inspection
Check all chemicals are labelled, stored in a container in good condition and in a bunded area.	Weekly	Subcontractors / MPX	Environmental site inspection
Check equipment is free from leaks.	Weekly	Subcontractors / MPX	Environmental site inspection
Check the spill kit is available and adequately stocked.	Weekly	Subcontractors / MPX	Environmental site inspection

13.6 Land Contamination Management Sub-Plan

» *Appendix 8: Dewatering Management Plan*
»*Appendix 10: Hazardous materials Management Plan*
»*Appendix 11: Acid Sulphate Soils Management Plan*
»*Appendix 12: Remediation Action Plan*

13.6.1 Objectives and Targets

Objective	Target	Key Performance Indicator
To manage contamination in accordance with regulatory requirements.	No spread of contaminants onsite	No Environmental Notices issued to MPX. Waste disposal receipts (where applicable)

13.6.2 Management Strategies

Parameter	Action	Timing	Responsibility
Induction/ Contamination Training	During inductions all personnel are to be made aware of individual responsibilities in regards to contamination management.	Establishment	All subcontractors

Contamination Investigation	Where a site is to have known contamination, and has not been remediated, a qualified environmental consultant/professional is to be engaged to determine whether a Contaminated Site Investigation is required. Where required, a Contaminated Site Investigation is to be carried out in accordance with State and Local Government requirements.	Establishment	MPX
Management of Contamination	Where contamination is found and requires additional management measures to that found in this CEMP, a Remedial Action Plan is to be developed and attached to this CEMP as an Appendix.	Establishment	MPX
Contaminated Water	Where contaminated water is proposed to be discharged a full site contamination analysis is to be undertaken on the water prior to works commencing and prior to discharge. Where water is found to be contaminant free in accordance with the ANZECC Water Quality Guidelines, water is to be discharged in accordance with the Water Quality Management Sub Plan. Where water is found to contain contaminates above the criteria in the ANZECC Water Quality Guidelines, water management is be undertaken with advice from a qualified environmental consultant/professional.	Establishment	MPX / Excavation Subcontractor
Acid Sulphate Soils (ASS)	Where a project is in a known ASS risk area and involves excavation, dewatering, or compacting saturated soils or sediments then an ASS Investigation is required. The ASS Investigation and further management are to be undertaken with State and Local Government requirements. Any ASS Management Plan to be prepared by a qualified environmental consultant/professional and is required to be attached to this CEMP as an Appendix.	Establishment	MPX / Excavation Subcontractor
Commissioning and decommissioning and removal of UPSS	SAFEWORK NSW Requirements SafeWork NSW is responsible for the WHS issues relating to decommissioning and removal of tanks from a site. The following SafeWork NSW requirements must be met during decommissioning: the tank and contents made safe in line with Code of Practice: Storage and handling of dangerous goods & AS 1940: 2017 The storage and handling of flammable and combustible liquids SafeWork NSW to be notified of the abandonment within seven days, so the tank can be removed from their database. SafeWork licensed demolition contractors are authorised to carry out decommissioning, abandonment or removal of UPSS that have contained flammable or combustible liquids. Contractors with a restricted demolition licence are not authorised to do demolition of chemical installations unless they have made an application for an upgraded restricted demolition licence that authorises demolition of chemical installations PCBU's should ask for written confirmation that the work will be completed by a Safework NSW licensed demolition contractor who is not restricted for demolition of chemical installations. Installation/Commissioning of storage tanks; The tank must be installed and commissioned in line with POEO- UPSS Regs 2014 & AS 4897 The design, installation and operation of UPSS .	Excavation	Excavation Contractor /Demolition Contractor

Excavated Materials	All excavated materials removed from the site is to be removed in accordance with the approved plan for the management of contamination and disposed of at a facility licensed to take that level of contamination.	Excavation	Excavation Subcontractor
Waste Transport Certificate	A Waste Transport Certificate for all contaminated material is required from the responsible contractor.	Excavation	Excavation Subcontractor
Unexpected Contamination	If unexpected contaminants are identified, all associated activities are to be ceased and a reassessment of the area/contaminants undertaken by a qualified environmental consultant/professional. Contamination is to be managed as per State and Local Government requirements. An Unexpected Find Protocol Has been established and is included in the site induction and this plans Appendix.	Excavation	MPX / Subcontractor

13.6.3 Monitoring and Reporting

Type of Monitoring / Reporting	Timing	Responsibility	Record
Contamination Assessment	Commencement	MPX	Site contamination report / Acid Sulphate Soil Report
Management of Contaminated Material	Construction	MPX	Environmental site inspection Water quality records Remediation Report
Inspection of excavated faces and spoil.	Daily/Weekly	Subcontractor/MPX	Environmental site inspection. Supervisors daily monitoring.

13.7 Waste Minimisation and Management Sub Plan

»Appendix 13: Waste Management Plan

13.7.1 Objectives and Targets

Objective	Target	Key Performance Indicator
Solid and liquid waste to be disposed of as per Regulatory requirements.	All waste to be disposed of by a licensed waste contractor	Onsite waste disposal facilities confirmed and documented.
MPX aim to maximise landfill diversion.	Recycle 90% of demolition and construction waste.	Waste reporting by waste contractors.
No waste to affect nearby premises.	No complaints related to construction waste affecting nearby premises during construction.	No. of complaints relating to waste.

13.7.2 Management Strategies

Parameter	Action	Timing	Responsibility
Induction	During inductions all personnel are to be made aware of individual responsibilities in regards to waste management, including the understanding that all personal rubbish and construction rubbish generated is to be properly disposed of in designated disposal facilities.	Establishment	All subcontractors

Waste Reduction	Design in waste minimisation during the design phases by standard sizing of materials, the use of modular and prefabricated construction techniques. Stockpile clean fill during the excavation phase for use as backfill on-site Provide sub-contractors during the construction phase with clear guidance for reducing packaging on their own materials by both their suppliers and subcontractors, by accurate ordering and handling of materials. Specify reusable, stackable and returnable packaging.	Establishment / Construction	MPX, Consultants and Subcontractors
Waste Management Plan	Demolition and excavation subcontractors will be required to develop a Waste Management Plan for their Scope of Work detailing the type of waste generated, waste avoidance / reduction / reuse / recycling strategies.	Establishment	Demolition and Excavation Subcontractors
Waste disposal Storage area	Appropriate waste disposal facilities (e.g. bins) shall be provided in strategic locations onsite. Waste bins shall be located such that they do not affect the community and not close to surrounding premises. Separation of waste for recycling will be enforced and monitored.	Establishment / Construction	MPX
	Waste disposal facilities shall be regularly collected or emptied by a licensed waste collector in accordance with Local Council Health Laws.	Construction	MPX
	Where possible a storage area allocated for the separation, collection and recycling of wastes will be established.	Establishment	MPX
Waste contractors	Licensed contractors shall be engaged to remove construction waste. A minimum target of 90% landfill waste diversion will be achieved.	Establishment	MPX
Putrescibles waste (Organic waste)	All putrescibles waste to be placed in a lidded bin and removed separately.	Establishment	MPX
Recycling / waste reduction	Recycling initiatives will be investigated and where practicable implemented onsite. This may include dedicated bins for different waste streams and use of alternative products.	Establishment / Construction	MPX / All subcontractors
Site office	The site office shall implement the following office waste minimisation techniques: » Organising recycling paper bins in the office for waste paper » Recycle toner cartridges pick-ups » Using electronic storage to reduce use of paper » Purchasing products in bulk to reduce packaging	Establishment	MPX
Hazardous waste	Hazardous waste will be managed and disposed of as per the Safety Data Sheet requirements and Environmental Protection (Controlled Waste) Regulations 2004.	Construction	MPX / All subcontractors
Servicing	Where practicable plant will be serviced offsite to reduce the generation of hydrocarbon waste onsite and potential for spills.	Construction	All Subcontractors

13.7.3 Monitoring and Reporting

Type of Monitoring / Reporting	Timing	Responsibility	Record
Percentage of diversion from landfill	Monthly	MPX	Monthly Waste Report
Segregated waste and appropriate waste placement	Weekly	MPX	Environmental Site Inspection

13.7.4 Demolition and Excavation Phase Waste Management Plan

MATERIALS ONSITE	REUSE AND RECYCLING		DISPOSAL
ONSITE		OFF-SITE	
Type of Materials	**Specify methods**	**Specify contractor and recycling outlet**	**Disposal**
DEMOLITION			
Masonry, brick & tile	General waste bin	Transfer for reprocess or recycle - Demolition subcontractor	Divert from Landfill
Timber	General waste bin	Transfer for reprocess or recycle - Demolition subcontractor	Divert from Landfill
Metal	General waste bin / dedicated steel scrap bin	Transfer for reprocess or recycle - Demolition subcontractor	Divert from Landfill
Mixed waste	General waste bin	Transfer for reprocess or recycle - Demolition subcontractor	90% Recycling
Asbestos	As per standards	Transfer & disposal at hazardous landfill - Demolition subcontractor	Hazardous Landfill
Bitumen	General waste bin	Transfer for reprocess or recycle - Demolition subcontractor	Divert from Landfill
The demolition contractor prior to commencement shall develop a Waste Management Plan for the Project. Material shall be separated on site and removed in separate trucks for recycling, re-use and landfill.			
EXCAVATION			
Clean Fill	Assess, excavate & stockpile	Transport & fill	Nil
Any hazardous waste will be isolated and managed as per the legislation for hazardous waste. 100% of the clean excavation material will be diverted from landfill.			

13.7.5 Construction Phase Waste Management Plan

MATERIALS ONSITE	REUSE AND RECYCLING		DISPOSAL
ONSITE		OFF-SITE	
Type of Materials	**Specify methods**	**Specify contractor and recycling outlet**	**Disposal**
Concrete	General waste bin.	Transfer for reprocess or recycle - Waste contractor	Divert from Landfill
Masonry, Brick& Tile	General waste bin	Transfer for reprocess or recycle - Waste contractor	Divert from Landfill
Timber	General waste bin	Transfer for reprocess or recycle - Waste contractor	Divert from Landfill
Metal	General waste bin	Transfer for reprocess or recycle - Waste contractor	Divert from Landfill
Plasterboard	Separate in designated bin	Transfer for reprocess or recycle - Waste contractor & plasterboard recycler	Divert from Landfill

Cardboard	Separate in designated bin	Transfer for reprocess or recycle - Contractor to be confirmed	Divert from Landfill
Mixed waste	General waste bin	Transfer for reprocess or recycle - Waste contractor	90% Recycling
Batteries	Separate in designated bin	Recycle – Waste contractor	Divert from Landfill
Glass	General waste bin	Transfer for reprocess or recycle – Waste contractor	Divert from Landfill
Paper	Separate in designated bin	Transfer for reprocess or recycle - Waste contractor	Divert from Landfill
Toner Cartridge	Separate in designated bin	Transfer for reprocess or recycle/Waster contractor	Divert from Landfill
Packaging	Separate in designated bin	Transfer for reprocess or recycle - Waste contractor	Divert from Landfill

Waste will be minimised through reduction of waste generated, reuse of products and recycling. The waste stream will be separated where possible to maximise landfill diversion. Subcontractors will be responsible for recycling and reuse of their waste material.

13.8 Heritage Management Sub-Plan

»*Appendix 14: Maritime Structures Heritage Impact Statement*

13.8.1 Objectives and Targets

Objective	Target	Key Performance Indicator
Comply with the requirements of the Aboriginal Heritage Act 1972.	Protection of all sites of Heritage significance, both known and as yet unknown.	Immediate reporting of archaeological remains if discovered. Level of disturbance to significance sites recorded.
Minimise impacts on unknown Cultural and Aboriginal Heritage sites.	As above.	As above.

13.8.2 Management Strategies

Parameter	Action	Timing	Responsibility
Induction	Aboriginal Heritage protection related material will be included in workforce inductions.	Establishment	MPX / All subcontractors
General	Operations generating vibration and dust will be managed as per the relevant sections of this Plan.	Construction	MPX
Earthworks	Excavations are to be monitored as required by the ethnographic consultant.	Construction	The Client
Object discovery	Objects found during excavation works will be salvaged and managed according to advice from archaeologists. Location and nature of objects will be reported to the local heritage office, local Department of Indigenous Affairs (DIA) etc.	Early Works	MPX
Skeletal remains	If suspected skeletal remains found – works will cease immediately until all clear is given by Police, DIA and archaeologists.	Construction	MPX

	Suspected skeletal remains will be immediately reported to Police Service, local DIA office. If remains are found to be of an Aboriginal Heritage matter and not a police matter, they will be left in situ until a decision is made at an on-site meeting about how to proceed in respect to the remains.	Construction	The Client

13.8.3 Monitoring and Reporting

Type of Monitoring / Reporting	Timing	Responsibility	Record
Report findings to Client and relevant authorities	As required	MPX	Environmental Incident Report
Presence of official monitors during earth works (as required)	As required	MPX	Environmental Incident Report Attendance Records

13.9 Flora and Fauna Management Sub-Plan

»*Appendix 15: Arboriculture Impact Statement*
»*Appendix 16: Marine Ecology Statement*
»*Appendix 17: Microbat Management Plan*

13.9.1 Objectives and Targets

Objective	Target	Key Performance Indicator
To reduce the impact of construction on native flora and fauna.	No damage / injury to preserved flora and fauna.	Weekly Environmental Inspection
Meet Mitigation, Tree Protection and Excavation Requirements As Per Arboriculture Impact Assessment and DA Conditions.	No damaged to root systems of protected trees in Wentworth Park and surrounds of Bridge Road	Weekly Environmental Inspections Arborist Reports
Meet the required actions outlined within the Microbat Management Plan prepared by Eco Logical Australia Pty Ltd	No injury to identified threatened species.	Weekly Environmental Inspection Ecological Reports

13.9.2 Management Strategies

Parameter	Action	Timing	Responsibility
Induction	Undertake a site induction addressing the management of flora and fauna including: » No employee on the Project will intentionally injure native fauna including reptiles. » Construction personnel are not to handle fauna. » All rubbish and food scraps must be placed in lidded bins that will be serviced regularly. » Native fauna are not to be fed by project employees. » Health and safety risk of handling threatened microbats communicated to workers during site induction. » Tree protection zone details.	Establishment	MPX/ All subcontractors
Fencing and bunting	Fencing/bunting, tree guards, barriers or other measures to protect the root systems, trunk and branches are to be installed to protect vegetation identified for retention within the works area. All in accordance with AS 4970:2009.	Establishment	MPX
Vegetation Clearing	A clearing permit must be obtained and approved from the relevant authority prior to any clearing works undertaken. Vegetation removal is to be minimised wherever possible by clearly defining designated work areas. Designated exclusion zones (i.e. retained vegetation) are to be made secure with fencing/bunting and signage.	Construction	MPX / clearing subcontractor

Arborist	All works carried out on either foliage or root systems will be carried out as per the Australian Standard 4970-2009 *Protection of Trees on Development Sites* and will be undertaken in consultation with a qualified Arborist.	Construction	MPX / Clearing subcontractor
Excavation	All trenches / excavations are to be inspected each morning by the excavation subcontractor. Where flora and fauna are discovered, personnel are to cease work in the subject area and notify the WHS&E Manager/Coordinator / MPX Supervisor / or appointed Catcher.	Construction	MPX / Excavation subcontractor
Unidentified Flora or Fauna	If any previously unidentified flora or fauna is discovered on-site, personnel are required to notify the Site Manager.	Construction	All subcontractors
Active Nests of Native Birds	Any trees or shrubs to be removed from the site are to be checked for the presence of active nests of native birds (i.e. those containing fertile eggs or nestlings) and arboreal mammals (e.g. possums) prior to removal or relocation by a Qualified Wildlife Spotter / Catcher.	Construction	All subcontractors
Microbat discoveries	If microbats are discovered during works or observed flying from a roost site or around the project during daylight, works will be ceased and the relevant Multiplex personnel and project supervising ecologist informed. These personnel will then advices of the best course of action. Pictures of microbats will be placed in site crib rooms for workers reference. Potential roosting locations will be marked on the environmental controls map and displayed onsite.	Construction	MPX / all subcontractors.
Rehabilitation	Monitor disturbed areas for weed invasion, and undertake control measures as necessary. Regularly water, weed and fertilise rehabilitated areas to ensure their success.	Construction	MPX / Landscape subcontractor
Weed Management	All declared weeds within the site are to be removed in accordance with the below procedures: » The use of pesticides and herbicides is to be restricted, have specific application, storage and clean up procedures, and meet requirements of relevant agencies. » Herbicides are to be administered by contractors licensed in accordance with the provisions of State Legislation. » Chemical products must always be used as per Safety Data Sheets. » Only qualified personnel should undertake chemical control of weeds. » Correct disposal of weeds is to be undertaken ensuring accidental spread of weeds does not occur. Weeds or material containing weed matter must be transported to a landfill under covered load. The cover must seal the top and sides of the load to prevent any weed material being transported by wind.	Construction	MPX / Landscape subcontractor

13.9.3 Monitoring and Reporting

Type of Monitoring / Reporting	Timing	Responsibility	Record
Protected tress	As per the DA	MPX	Environmental site inspection
Clearing Monitoring	Daily during clearing works	MPX / clearing subcontractor	Clearing permit
Rehabilitation Areas	As per the DA	MPX	Environmental site inspection

13.10 Site Office Environmental Management Sub-Plan

13.10.1 Objectives and Targets

Objective	Target	Key Performance Indicator
Maximise the efficient use of resources within the office environment.	Recycle 100% office paper	Monthly Recycling Reports
	Recycle 100% of materials where available	Monthly Recycling Reports

13.10.2 Management Strategies

Parameter	Action	Timing	Responsibility
Use of Resources	Recycle office paper and cardboard cans, bottles and printer cartridges.	Commencement to completion	MPX
Use of Energy	Turn off electrical equipment where practicable and use energy efficient products.	Establishment to completion	MPX
Use of Resources	Use office paper with recycled content.	Commencement to completion	MPX
Double Sided Printing	Use double sided printing on photocopiers where possible.	Commencement to completion	MPX

13.10.3 Monitoring and Reporting

Type of Monitoring / Reporting	Timing	Responsibility	Record
Percentage of diversion from landfill	Monthly	Waste Contractor	Monthly recycling report.

14 Appendices

Appendix 1: Environmental Policy



OUR COMMITMENT

Multiplex and its senior management is commited to:

- Protecting the health and safety of everyone within our workplaces including employees, contractors, visitors, public, neighbours and the community.
- Ensuring that our activities place minimal impact on the environment including pollution.
- Delivering projects that add economic, social and environmental value to our clients, our community and those who invest in us.

OUR STRATEGIES

Multiplex works collaboratively with key stakeholders, including our clients, regulators, industry peers, suppliers and contractors, to exceed our legal, contractual and other compliance obligations through the following key strategies:

Focusing on critical risks & opportunities	Maximising value and delivery certainty through planning and design	Demonstrating a system that results in actions not just paperwork	Growing a mature and accountable culture driven by senior management

- Managing risks and opportunities through early intervention in planning and design.
- Monitoring constantly the changing landscape over the project lifecycle and develop rigorous controls in response.
- Creating an outlook and culture in which our commitments are front of mind and part of everyday business.
- Valuing the competency (skills, knowledge and experience) of all persons to perform and find better ways of doing the work.
- Providing employees and other stakeholders the opportunity and expectation to acquire the appropriate competency to enable them to carry out their work safely without risk to themselves, fellow workers and the public.
- Focusing on open conversations between our employees, our clients and the people we work with not just paperwork.
- Creating a culture that encourages the reporting of incidents and occurrences to enable knowledge sharing, learning and information to facilitate improvements in performance.
- Promoting strategies that are driven and embedded by senior management who encourage ownership and continuous improvement in behaviours, practices and outcomes by all persons.
- Aligning our behaviour to our values with an emphasis on teamwork and recognition for innovation and initiative.

CEO
Multiplex Australasia
September 2016

MULTIPLEX

Appendix 2: EMS Forms and Guides

Category	Forms	Guides
Planning	» Environmental Subcontractor Documentation Status Chart	» Schedule of Environmental Legislation and Other Requirements NSW
Communication and Consultation		» Environmental Fact Sheets
Incident and Emergency Management	» Incident Investigation Report	
Induction and Training	» Induction Training Handout » Project Induction and Declaration	
Hazardous Chemicals **Wash Box**		» ChemAlert
Inspection and Monitoring	» Environmental Site Inspection	
Subcontractor Management	» Environmental Management Plan Review Checklist » Environmental Safe Work Method Statement Review Checklist	» Subcontractor Environmental Management Plan Template
Audits	» Environmental Internal Audit Checklist	

Note: Reference should be made to the Multiplex Operating System Document and Forms library to obtain the current versions of the documents above.

These forms are available from the Multiplex Connect System or from the projects S:Drive.

Appendix 3: Aspects and Impacts Register

To be reviewed and updated during project stages.

Risk Assessment Matrix

		Likelihood				
		A. Almost certain	B. Likely	C. Possible	D. Unlikely	E. Rare
Consequence	5. Extraordinary	1	2	4	7	11
	4. Major	3	5	8	12	16
	3. Moderate	6	9	13	17	20
	2. Minor	10	14	18	21	23
	1. Insignificant	15	19	22	24	25

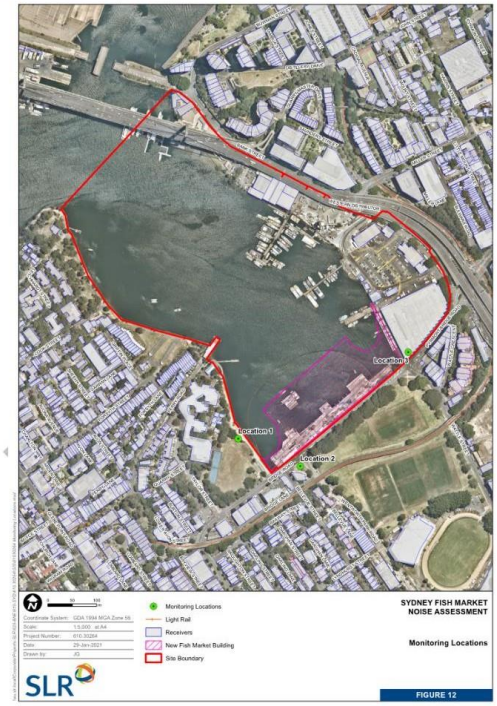
RISK RATING	DESCRIPTION	ACTION
High / 1-6	Those risks or opportunities with a relatively high likelihood and large impact.	Risks are unacceptable. These will require close management attention at project management level and development of risk control measures to reduce their risk to a tolerable level.
Medium / 7-15	Risks or opportunities with a medium likelihood or impact.	These will be managed in consultation with the respective Manager or Supervisor (who will decide whether management attention is required) and risk control measures developed to a level of risk that is As Low As Reasonably Practicable (ALARP).
Low / 16-25	Those risks or opportunities with a relatively low likelihood and impact.	These are regarded as acceptable within normal business activities and are to be managed effectively by existing procedures and controls.

Consequence	Description	Likelihood	Description
Extraordinary	Catastrophic impact on key performance indicators. Major environmental disaster that is severe and likely to spread beyond the immediate site and will remain a serious problem over a prolonged period (greater than 1 year)	Almost Certain	The event/impact is common and expected to occur in most circumstances *(will occur regularly / 10 times for year)*
Major	Major negative impact on key performance indicators. An environmental impact that is severe and likely to impact beyond the immediate site and remain a problem in the medium term (less than one year).	Likely	The event/impact has happened before and will probably occur again *(will occur often / 5-10 times per year)*
Moderate	Significant negative impact on key performance Indicators. Off-site releases with no detrimental effects. Environmental impact that localised and has short term effects (less than one month).	Possible	This event/impact could occur at some time *(is likely to occur few / 2-3 times per year)*
Minor	Minor negative impact on key performance indicators. On-site release immediately contained, a minor and transient environmental impact.	Unlikely	This event/impact is not likely to occur *(is unlikely to occur more than once per year)*
Insignificant	Insignificant negative impact on key performance indicators. No environmental impact occurring	Rare	This event/impact may occur in exceptional circumstances only *(is unlikely to occur during a year)*

	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
1.0	**Early Works / Establishment**								
1.1	Site establishment; Installation of site sheds, commence use of haulage routes and operation of plant and equipment. Marine Works	Generation of Dust	Air pollution	C	3	13	Refer to the Dust & Air Quality Sub-plan in CEMP and the Construction Air Quality Management Plan. Detail includes: • Wet down exposed areas. • Visual dust monitoring. • Dampen or appropriately cover exposed areas and access tracks as necessary. • Use hand-held water sprays as necessary. • All vehicles leaving the site shall enter and exit the site via cattle grid. • Place shade cloth/hoarding around the site perimeter. • Where a complaint is received (re-dust) visual monitoring will be undertaken and activities will be reviewed. • Cutting grinding, sawing equipment to be fitted with suitable dust extraction or governed by use of water suppression. • Use of mains electricity or battery powered equipment instead of diesel or petrol generators. • Maintain good housekeeping • Ongoing dust monitoring.	MPX	Ongoing

		Generation of Noise	Noise pollution	B	3	5	Refer to the Construction Noise and Vibration Management Sub-Plan in CEMP and the CNVMP by SLR consulting in appendix 4.
							
							Detail includes:
							
							• Hours of construction, including the delivery of materials to and from the site, will be carried out between the following:
							  • Between 7:00am and 5:30pm Monday to Friday
							  • Between 7:30am and 3:30pm Saturday
							  • No working Sundays or Public Holidays
							All mobile machinery and stationary equipment to be fitted with noise control equipment as per the manufacturer's specifications.
								MPX	Ongoing

	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
							• Monitors will be used to measure actual results for comparison against prescribed limits so that construction practices can be modified to reduce noise and vibration if required. If noise and / or vibration complaints are received, the following techniques should be considered to reduce impact to adjoining owners: Undertake works outside of adjoining building operating hours / peak hours as per the approved Noise Management Plan • Isolate work activity using noise barriers. • Ring saw instead of hammering column / beams. • Use smaller machinery or quieter alternative. • Use static rolling where possible. • Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly		

	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
							used on site and for any out of hours work. Figure 2 Noise Monitoring locations  • Noise monitoring will be undertake at the three closest, potentially most affected residences using statistical noise loggers as shown in Figure 2. These monitoring will also be supplemented by attended monitoring to id noise sources, and observe any abnormally noise equipment or operations. Noise monitoring results will be reported monthly.		

Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
	Fumes	Air Pollution	D	4	12	Refer to the Air Quality Sub-Plan in CEMP and Construction Air Quality Management Plan. Detail includes: • All construction plant and equipment with access to the site will be properly maintained. • Equipment emitting visible smoke for longer than ten seconds will be taken out of service. • All vehicle wheels (where required) shall be cleaned before leaving the site. • When not in use machine engines are to be switched off and not left idling.	Subcontractors	Ongoing
	Tobacco Smoke	Air Pollution	D	2	21	• Prohibit the use of tobacco products inside the building and within 8 meters of the building entrance during construction	MPX/Subcontractors	Ongoing
	Sediment Disturbance, Erosion and Site Run-Off Dust Control Spills	Marine Pollution	C	4	4	• Silt curtain will be established and maintained throughout construction. • Coffer dam will protect from water ingress and separate construction disturbances cause by ground slab preparations and general site run-off from external marine environment. • Stormwater diversions both temp and permanent to help reduce potential for erosion and contamination. • In areas where site run-off is unavoidable, controls will be installed to direct water to nominated basins or sumps, where it can be appropriately tested, treated and discharged in line with project requirements. It is understood there is no requirement for such treatment of seawater seepage • Water carts to utilised to help contain dust generation • All chemicals will be stored in portable containment bunds • Spill kits dispersed throughout site.	MPX/Subcontractors	Ongoing

	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
		Threatened Species	Injury or death to identified threatened species. Personnel Injury	E	3	20	Refer to the Flora and Fauna Management Sub-Plan and MMP. • Unexpected discoveries procedures and safety risks of handling threatened microbats to be communicated to all workers in the site induction. • Project ecological contact to be established and details presented onsite.	MPX/Subcontractors	Ongoing
		Communication	Workforce inadequately informed of Hazard and Risks relating to works.	E	3	20	Multiplex will communicate to subcontractor's onsite through a daily pre-start listing relevant activities for the day and any particular notices or reminders in regards to environmental safety and controls.	MPX/Subcontractors	Ongoing
2.0	**Foundation & Sheet Piling**	Piling, Sheet Pile Contractor to provide Environment Management Plan including Environmental Work Method Statement							
.2.1	Piling & Sheeting, Set up, Hammering, Screwing. Verifying.	Generation of noise	Noise pollution Breaching prescribed noise management limits.	B	3	5	Refer to the Construction Noise and Vibration Sub-Plan in CEMP and the Construction Noise and Vibration Management Plan. Works only to be completed within permitted hours for noise works: 9:00am to 12:00pm Monday to Friday 1:00pm and 5:00pm Monday to Friday 9:00am and 1:00pm Saturday • Sheet piles to be vibrated into position to lower noise impact. • Piling work will be planned in accordance to Sydney Secondary College's sensitivity to noise for particular time periods of the day and year (exams). • A contact list to be prepared to enable nearby residents and owners to be notified regarding works that may impact them as a result of noise • Static noise monitors may be used to take continual readings in relation to prescribed noise management levels.	Subcontractor MPX	Ongoing

<table>
<tr><th></th><th>Activity</th><th>Hazard/Aspect</th><th>Impact</th><th>Likelihood</th><th>Consequence</th><th>Risk Rating</th><th>Control Measures</th><th>Responsibility</th><th>Close Out Date</th></tr>
<tr><td></td><td></td><td>Vibration</td><td>Structural/Cosmetic damage to surrounding structures

Annoyance to general public</td><td>D</td><td>3</td><td>13</td><td>Refer to the Construction Noise and Vibration Sub-Plan in CEMP and the Construction Noise and Vibration Management Plan.

- Vibration Impact Assessment completed determined that potential vibration impacts are negligible as no receivers are within safe working distance for cosmetic damage at work case use of vibratory roller (Below table from RMS Construction Noise and Vibration Guideline).

- Structural vibration monitoring (where necessary) will be carried out for a period of two months at the beginning of the project to determine the vibratory impacts of impact piling within close proximity of the piling works.
- Geophone mounting plate will be installed within close proximity to construction activities. The monitoring locations on structures adjacent to excavation works.
- An operator warning level 6 mm/s and operator halt level 8mm/s will be established @ 8mm/s the contractor is to implement an alternative excavation technique.
- Weekly vibration reports will be issued by consultant and attendance vibration monitoring may be required and conducted by previously mentioned consultant.

<table><tr><th rowspan="2">Plant item</th><th rowspan="2">Rating / Description</th><th colspan="2">Minimum working distance</th></tr><tr><th>Cosmetic damage (BS 7385)</th><th>Human response (OH&E Vibration guideline)</th></tr><tr><td rowspan="6">Vibratory Roller</td><td>< 50 kN (Typically 1-2 tonnes)</td><td>5 m</td><td>15 m to 20 m</td></tr><tr><td>< 100 kN (Typically 2-4 tonnes)</td><td>6 m</td><td>20 m</td></tr><tr><td>< 200 kN (Typically 4-6 tonnes)</td><td>12 m</td><td>40 m</td></tr><tr><td>< 300 kN (Typically 7-13 tonnes)</td><td>15 m</td><td>100 m</td></tr><tr><td>> 300 kN (Typically 13-18 tonnes)</td><td>20 m</td><td>100 m</td></tr><tr><td>> 300 kN (> 18 tonnes)</td><td>25 m</td><td>100 m</td></tr><tr><td>Small Hydraulic Hammer</td><td>(300 kg - 5 to 12t excavator)</td><td>2 m</td><td>7 m</td></tr><tr><td>Medium Hydraulic Hammer</td><td>(900 kg – 12 to 18t excavator)</td><td>7 m</td><td>23 m</td></tr><tr><td>Large Hydraulic Hammer</td><td>(1600 kg – 18 to 34t excavator)</td><td>22 m</td><td>73 m</td></tr><tr><td>Vibratory Pile Driver</td><td>Sheet piles</td><td>2 m to 20 m</td><td>20 m</td></tr><tr><td>Pile Boring</td><td>≤ 800 mm</td><td>2 m (nominal)</td><td>4 m</td></tr><tr><td>Jackhammer</td><td>Hand held</td><td>1 m (nominal)</td><td>2 m</td></tr></table>Note: More stringent conditions may apply to heritage or other sensitive structures</td><td>Subcontractor
MPX</td><td>Ongoing.</td></tr>
</table>

Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
	Sediment Disturbance	Water Quality	B	4	5	• Prior to any seabed disturbance Harbour Master approval is to be obtained under clause 67ZN of the Prots and Maritime Administration Regulation 2012. • Marine contractor to employ low impact barge positioning to prevent propeller scouring and thrust wash onto shallow habitats, no-go zones will be established in sensitive habitats. • Piling in intertidal zones at low tide will be avoided, in order to reduce the risk of exposing ASSs, Silt-curtain will be used to contain sediment plumes during piling process. • Areas where piling activities may result in localised re-suspension of sediments, dedicated silt curtains surrounding individual work areas will be adopted to minimise the spread of any suspended sediment and ensure its minimisation. • Anchor lines should be suspended of the seafloor where possible to minimise drag across benthic communities. • Surface waters within construction work zone and within Blackwattle Bay will be monitored on a daily basis for pH and turbidity with results compared to established site baseline conditions. (This will be captured within contractor requirements)	Subcontractor	Ongoing
	Interaction with Marine Fauna and marine ecosystem	Disturbance or Injury to Marine Wildlife.	C	3	13	Refer to the Maritime Ecology Assessment. • Large marine mammals are not expected to occur, gentle start-up hammering is recommended to allow undetected aquatic fauna to leave the area and avoid hearing damage. Work should be stopped if large fauna is observed nearby. • Marine contractors to be mindful that equipment such as drill heads, anchors etc. should be thoroughly cleaned of plant propagules and sediment before being used at the project location. • Site induction will make aware to all contractors the possibility of risk of injury to marine wildlife and mitigation measures. • No anchors or mooring blocks/lines should be placed on the intertidal rock habitat as indicated in Marine Ecology Assessment.	Subcontractor / MPX	Ongoing

	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
		Uncovering relics of local or state significance	Damage or destruction of historical items.	E	3	20	Refer to Maritime Structures Heritage Impact Statement. • Employ archaeological testing prior to seabed disturbance through activities such as (a) extraction of existing piles, (b) installation of cofferdam, (c) redistribution of sediment and (d) installation of new piles.	MPX	TBC
2.2	Marine Plant refuelling	Environmental Hazardous Substances	Contamination of surrounding marine environment.	C	4	8	Refer to Chemicals Management Sub-plan • Contractors re-fuelling of any generators/piling power packs and mobile equipment on board the construction vessels will be carried out with the diesel fuel cell on board. The flexible pipe connected to the bowser is fitted with a manually operated pump and this is equipped with a lock that will be locked shut when not in use. The fuel cell has a fire extinguisher and spill kit that is stored nearby and is built with an internal bunded tray. The item being refuelled also needs to be bunded during refuelling. • Multiplex operated work boats must be refuelled within the sites silt curtain. Any fuel stored within marine vessels must be within a spill tray or bund capable of capturing any spill. Work boats must be fitted with a 20L marine spill kit. • Volumes of fuels and chemicals kept onsite are to include only those necessary to complete works. • Machinery and engine maintenance schedule to reduce oil/fuel leakage. • Any spill is to be immediately reported to onsite WHS&E coordinator or relevant Multiplex area supervisor.	Subcontractors / MPX	Ongoing
3.0	**Coffer Dams Work**	Contractor to provide Environment Management Plan including Environmental Work Method Statement							

	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
3.1	Dewatering of coffer dam	Interaction with Marine Wildlife	Disturbance or Injury to Marine Wildlife.	D	3	13	• Submersible pump heads should be covered in a filter to prevent fauna being sucked into the pump. Pumps must also be of a suitable size and capacity with a slow enough velocity to allow fish to escape during any dewatering process. • Prior to closing coffer dam and dewatering a visual check for marine life will be completed to ensure large marine wildlife is free of the construction area.	Subcontractors / MPX	TBC
3.2	Earth bed adjustments within coffer damn structure	Sediment Disturbance	Potential Acid Sulphate Soils Impacting surrounding marine environment.	B	3	9	Water Quality Management Sub – Plan and the Soil and Water Management Plan. • Monitor water quality at frequencies established in the above plans. If trigger values are exceeded then works should cease, and water treated prior to continuing. • Dam structure help eliminate potential for ASS impacts beyond site works area. Works within coffer dam should employ measured excavation procedures, management of overlying water level depths and use of double silt curtains to contain any disturbance activities that may cause acid generation.	Subcontractor	Ongoing
4.0	**Excavation**	Contractor to provide an EMP and Environmental Work Method Statements.							

	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
4.1	Plant refuelling	Discharge of hydrocarbons	Contamination of soils, ground water, water courses	C	3	13	Refer to Water Quality, Contaminated Land and Hazardous Chemical Management Sub-plans • A site Environmental- Pollution Incident response included within the projects Emergency Management Plan for events such as chemical spills. • Register Safety Data Sheets and include information on cleaning up spills. • All chemicals and dangerous goods used on site will require a safety data sheet. • Establish spill kits on site and make readily available. • Conduct tool box talks in how to use spill kits. • Construct bund walls and floors with impervious materials and in accordance with legislation • Clean up any chemical or fuel spills as quickly as possible and place in suitable receptacles for reclamation or disposal, in a manner that does not cause pollution. • Carry out fuelling of vehicles or construction plant in areas from which fuel or oil will not be discharged to waters/street gutters or stormwater drainage systems. • Trucks that leak any sort of mechanical fluid will not be permitted on or adjacent to the site. • Where possible fuel to be brought onto site only for refuelling purposes. • Appropriately bund storage area for refuelling of authorised vehicles on site. • Keep minimal volumes of fuel on site. • Label oil, fuel and chemicals and stored in bunded area. • Report hydrocarbon spills of over 20 litre to council.	Subcontractor/MPX	Ongoing
4.2	Dewatering the site Pumping turbid water into stormwater	Discharge of polluted stormwater from site	Water pollution	B	3	9	Refer to Water Quality Management Sub-plan and Dewatering Management Plan • Obtain permission from authorities before pumping water out. • Set up tank/pond to allow settlement of turbid water; • In the first instance, test water through before pump out (potential for zinc and arsenic, in ground water); • Monitor water for turbidity and PH before pumping out; Record permit to discharge water. • Visually check pump out area for turbidity;	Subcontractor MPX	Ongoing

	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
4.3	Excavation of soil and exposure of soil	Generation of Dust and fumes	Nuisance to nearby property owners Aesthetic impact Reduce Visibility Air quality	A	2	10	Refer to the Air Quality Sub-plan in CEMP and the Construction Air Quality Management Plan. Detail includes: • Wet down exposed areas. • Visual dust monitoring. • Site induction will include some mitigations and procedures in relations to managing dust and fume generation. • Dampen exposed areas and access tracks as necessary. • Use hand-held water sprays as necessary. • All vehicles leaving the site shall enter and exit the site via cattle grid and or temporary sealed roads. • Place shade cloth/hoarding around the site perimeter. • Where a complaint is received (re dust) visual monitoring will be undertaken and activities will be reviewed. Complaint will be logged in complaints register.	Subcontractor MPX	Ongoing
4.4	Excavating of soil and rock	Generation of noise	Annoyance to local community	B	3	9	Refer to the Noise Sub-Plan in CEMP and the Construction Noise and Vibration Management Plan. Detail includes: • Conduct noise monitoring if required by Council and notify Site Manager when noise peaks. • Limit hours of work to permitted hours. • Maintain machinery and use standard noise mufflers. • Monitor equipment if there is excessive vibration. • Erect signs stating permit hours. • Identify plant and equipment generating excessive noise. • Communicate and notify nearby residents and owners if peaks in noise will occur. • Obtain approval if required to work outside specified hours. • Respond to community complaints as per the Communication Management Plan.	Subcontractor MPX	Ongoing

	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
		Mismanagement of Acid Sulphate Soils in excavated areas.	Air Pollution, Soil Pollution, Water Pollution.	B	4	5	Refer to the Acid Sulphate Soil Management Plan Detail includes: • Remediation Action Plan – outlines in the event that excavated materials is identified to be impacted such that contaminant concentrations exceed thresholds for characterisation as General Solid Waste (GSW), GSW mixed with Special or restricted solid waste, material may require to be treated prior to off-site disposal to a lawful facility. • Excavate ASS material will be immediately transferred to treatment area. Treatment of excavated material should occur within one day of being excavated. • If material is to be stockpiled, stockpiles must be covered with plastic. If stored for more than 24hours without treatment stockpiles to be treated with a guard layer of aglime of 5 kg lime / m^2. • Completion of day's activities, where excavation works result in the exposure of known or suspected ASS, a guard layer of fine aglime will be applied to the base of excavation at a rate of 5 kg lime / m^2 of exposed soil. If base of excavation will remain exposed for more than 3 days lime coating should be inspected and re-limed as necessary. Alternatively, the lime may be covered with a layer of compacted non-ASS material at least 0.3 m in thickness. • All monitoring requirements are outlined within REMP and ASSMP • Waste transport certificates. Include details of what area contaminated material has been excavated from and where it is being transported to. • Disposal dockets available for all excavated material and complete report verifying quantities removed from the site.	Subcontractor / MPX	Ongoing

		Asbestos Containing Materials	Workers and or general public exposed to potential ACMs	D	4	12	Refer to Hazardous Materials Management Plan and Haz Materials Section in the MPX Health & Safety Handbook. Prior to excavating, all ACM-impacted soils must be dampened, but not drenched so as to avoid increase in both material weight & the risk of contaminated leachate run-off. If ACM-impacted soils are intended to be retained on site, then they must not be excavated until such times as: • A remediation action plan or asbestos management plan is developed • The location of the burial area is agreed with a Contaminated Sites Auditor, and • The burial area is prepared and capping material is available to cover the material immediately after placement. All ACM-impacted soils must be excavated, stockpiled and / or disposed of in accordance with project construction environmental management plans and associated client / contractual requirements, and Multiplex Safety Handbook guide. Where an unexpected find occurs involving the suspected presence of ACM the following applies: • Work to cease in immediate area • Employee to notify MPX Supervisor • Area must be barricaded and signposted (refer to above section) • A photograph of the suspected ACM and a sample must be taken • Where required contact a Competent Person to confirm the suspected ACM • Information must be recorded on '**Hazardous Materials and Unexpected Finds Register'** and • If required, the ACM sample must be sent for further confirmatory testing (laboratory analysis), this will only occur if the Competent Person concludes that the find is ACM, after visual inspection. • If the sample is confirmed as being ACM after testing, or if MPX believes after a visual inspection that the unexpected find is ACM,	Subcontractor and MPX	Ongoing

	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
							then handling, removal and disposal requirements are to be followed as instructed by the site manager.		
		Other unexpected finds – Underground Storage Tanks, Containers of chemicals (visible), drums, waste pits, former pipework, VOCs etc.	Environmental and damage	D	3	17	Refer to Remedial Action Plan. • In the event that any of these hazardous are encountered onsite – the unexpected finds protocol (UFP) should be followed as outlined in the Remediation Action Plan. A suitably qualified environmental consultant will determine the appropriate strategy. • The UFP will be displayed onsite and referred to in the site induction.	Subcontractor / MPX	Ongoing
		Uncovering Historical Relics or Structures	Damage to items or structures that have a Heritage Significance.	D	3	**17**	Refer to Maritime Structures Heritage Impact Statement. Any earthworks within the vicinity of the nineteenth century seawall and wharf should be monitored by a suitably qualified archaeologist. In the event that evidence of those structures is identified, work should immediately cease in that area to enable the archaeologist to assess the nature and significance of the feature and to provide advice on appropriate management.	Subcontractor / MPX	Ongoing
4.5	Excavation below water table	Discharge of polluted stormwater from site	Contamination of turbid water to storm water	D	3	17	Refer to Water Quality Management Sub-plan and Soil and Water Management Plan. • Obtain permission from authorities before pumping water out. • Set up tank/pond to allow settlement of turbid water; • In the first instance, test water through before pump out (potential for zinc and arsenic, in ground water); • Monitor water for turbidity and PH before pumping out; • Record in site inspection report; • Visually check pump out area for turbidity.	Subcontractor / MPX	Ongoing

	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
4.6	Excavation and stockpile of spoil	Stockpiled soil on site	Contamination of storm water Generation of dust	B	3	9	Refer to Soil and Water Management Plan and the Construction Air Quality Management Plan. • Water Spray and dust retardant on exposed areas. • Use material of nontoxic nature • Implement an Erosion and Sediment Control Plan and maintain during construction. • Install sediment fencing where sediment has the potential to move. • If stockpile is stagnate for over 28 days re seed or treat with Polymer Soil Binder to reduce dust emissions • Reseed and landscape as soon as possible	Subcontractor / MPX	Ongoing
4.7	Piling	Generation of noise and vibration	Noise pollution	B	3	9	Refer to the Noise Sub-Plan in CEMP and Construction Noise and Vibration Management Plan. Detail includes: • Conduct noise monitoring if required by Council and notify Site Manager when noise peaks. • Complete a dilapidation report to adjoining property. • Limit hours of work to permit hours. • Maintain machinery and use standard noise mufflers. • Monitor equipment if there is excessive vibration. • Erect signs stating permit hours. • Identify plant and equipment generating excessive noise. • Communicate and notify nearby residents and owners if peaks in noise will occur. • Respond to community complaints as per the Communication Management Plan.	Subcontractor / MPX	Ongoing

	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
4.8	Tree protection & Fauna Management	Damage to trees due to construction activity	Reduced Bio Diversity	E	1	25	Refer to Flora and Fauna Management Sub-plan and the Arboriculture Impact Statement. • Project Arborist shall be engaged prior to the commencement of the works to monitor compliance with tree protection measures. • Visual tree assessment of identified trees to be undertaken prior to commencement of works. • Pruning works to be carried out by a practising arborist and in accordance to relevant Australian standard 4373. • Tree protection zone fencing will be installed prior to commencement of works. Trunk protection where required shall be installed prior to commencement of works. • Project Arborist shall inspect tree protection measures on a monthly basis, any amendments to facilitate construction works must be approved and documented by the project arborist. • Do not stockpile materials near retained vegetation. • Details on TPZ will be included within the site induction. • If any flora or fauna is discovered, personnel are to notify the Site Manager. • Any trees or shrubs to be removed from the site will be checked for the presence of active nests of native birds prior to removal. • Injured animals will be taken to a local veterinarian, or the local wildlife rescue service notified. • Induct construction personnel not to handle fauna.	Subcontractor MPX	Ongoing
5.0	**Construction**								

	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
5.1	All construction Activities	Noise and Vibration Generation	Noise pollution	B	3	9	Refer to the Noise Sub-Plan in CEMP and the Construction Noise and Vibration Management Plan. • All construction work to take place as determined by approvals from authorities. • Noise monitoring will be undertaken if required by council conditions or if complaints are received due to unreasonable levels of noise in a noise sensitive area. • Identify plant and equipment exceeding 85-db (A) and implement strategies to minimise noise levels • Assess items or adjoining properties that may be affected by construction activity and manage risk via monitoring. • Prepare a communication plan/strategy when work is outside normal operating hours or vibration is a likely for extended periods,	Subcontractor MPX	Ongoing
5.2	Reo and Steel fixing	Offcuts of reo/steel	Waste to landfill	C	2	18	• Ensure the correct quantities of steel is delivered to site, • All Steel and reo offcuts to be disposed of in a steel bin.	Subcontractor MPX	Ongoing
5.3	Installation of formwork	Offcuts of timber Wastage	Waste to landfill	C	2	18	• Use sustainably sourced formwork supplier. • Re-use plywood.	Subcontractor MPX	Ongoing
5.4	Concrete Activities Concrete pumps/trucks	Excess Concrete – Wastage Discharge of the contaminated water due to blow out of static line or overflowing of slurry	Waste to landfill Pollution to sewer system Pollution to stormwater system.	C	4	8	Refer to Contaminated Land Management Sub-plan. • All drains and water ways bunted/protected and spill kit to be in close vicinity of plant. • Supervisors to ensure concrete waste is collected and disposed of into provided bins. • If using bins provided by the contractor, ensure that the bins are lined first to prevent the concrete waste drying hard against the bottom of the bin.	Subcontractor MPX	Ongoing

	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
							• Concrete slurry traps will be used to collect waste concrete generated on site Person in control to provide a specific designated area to store the contaminated water used to wash the tools • Discharge of contaminated water due to blowout of static line. • Check certification of static line monthly, before pour complete pre checklist of pipeline and clips. • Blow out to be completed within covered slurry bins to eliminate concrete splatter entering marine environment. • Concrete washout areas are generally not designed for the collection of excess concrete. Excess concrete waste should be returned to the local batching plant for treatment and re-use, or placed in a site receptacle designated for concrete and masonry, and allowed to set. • To minimise the amount of washout water generated, excess concrete should be scraped off the equipment before it is washed and placed in a site receptacle designated for concrete and masonry • Concrete Trucks are not allowed to wash out on site.		
5.5	Use and storage of hazardous materials i.e., fuels, water proofing membranes etc.	Spills Fumes Ignition Source	Ground contamination / pollution of stormwater Risk of igniting volatile substances	C	4	8	Refer to the Chemicals Management Sub-plan. • All chemicals and dangerous goods used on site will require a safety data sheet. Clearly labelled containers. • All Subcontractors will provide a current (within 5 years of the date of issue) SDS to the principal Contractor for all products and substances to be used for the work activity. SDS approved by MPX prior to bringing hazardous substances on site including risk assessment. • Establish spill kits on site and make readily available. Methodology for cleaning up spills is detailed in the SDS. • All storage and handling of chemicals is to be in accordance with the SDS and legislative requirements for each product being used on the Project • All employees involved in the use of products classified as hazardous and dangerous, will be provided with information and training via tool box talk /prestart. • All liquids i.e. fuels are to be securely locked away at the end of each day. Ensure containers are stored in a bund. • All drains are to be protected with silt socks and or geo-fabric in order to maintain water quality parameters.	Subcontractor MPX	Ongoing

	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
							• Ensure use of hazardous materials takes place on hard stand surfaces and not on soil or sand where chemical can cause contamination.		
5.6	Concrete Floor Grinding	Concrete dust, slurry	Air pollution	C	4	8	• Vacuum attachment to be used when using concrete floor grinding.	Subcontractor	Ongoing
5.7	Blockwork	Wash out and discharge of water/slurry from cleaning of mixer. Waste water from brick. block	Pollution to local environment.	D	4	17	Refer to Soil and Water Management Plan • Used water should be kept in a container and reused in the mixer. Excess mortar should be left to dry into cake like substance and then disposed of into co-mingled waste bin on site. • Nearby drains are to be protected and any filter runoff water to be collected by an industrial waste bin on site. • A wet cutting block saw with a bunded area to collect any water run-off will be used. This water will then be recycled and used for mortar mixing to remove the risk of contamination. • Block/brick saw is to be bunded and water to be recycled such that it contains all water and slurry discharged • If possible use purpose made blocks to reduce cutting.	Subcontractor	Ongoing
5.8	Use of crane, fork lift, mobile scissor lifts, concrete pump, trucks, formwork	Discharge of contaminated water	Stormwater pollution	C	3	13	Refer to Water Quality Management Sub-plan and Dewatering Management Plan. • Preparation of appropriately bunded storage area for refuelling authorised vehicles only onsite; • To reduce the impact of a spill, minimum volumes of fuel will be kept onsite; • Ensure sub-contractor label's waste oil and store in a bunded area on-site for collection by a licensed disposal contractor; • Prepare an emergency response plan. • Shut down machinery when not in use; • Service records for all machinery;	Subcontractor MPX	Ongoing

	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
5.9	Everyday Housekeeping	Contamination of Ventilation Systems	Poor indoor air quality	D	2	21	1. Minimize dust: Methods of minimizing dust from cut- off saws, drywall sanders, etc. shall be used. This means using dust collection systems on these tools and emptying them into receptacles located outside the building. Use damp rags, mops or vacuum cleaners to clean up dust as necessary within the job site. 2. Minimize dirt: Sweeping compounds shall be used to keep floors clean of dirt and dust. Floors shall be swept daily in the work areas or more frequently if required. 3. Keep work area clean and dry: If water leaks occur, promptly mop areas dry. 4. Seal the containers containing VOCs: Containers of fuel, paints, finishes, and solvents shall be kept tightly sealed when not in use. These containers shall be stored outside the building and remain outside the building to the greatest extent possible.	Subcontractor MPX	Ongoing
5.10	Painting	Generation of contaminated water	Pollution to sewer system Pollution to stormwater system	D	3	17	Refer to Contaminated Land Management Sub-plan. • Paint contractor to provide an Environmental Work Method Statement. • Apply for a Trade Waste Permit before discharge to sewer • Paint Contractor to remove all paint washout by a liquid waste removalist if a Trade Waste Permit is not in place. • Store paints and chemicals in a bunded area where they can be contained if spills occur • For solvent based paints, return solvent to a solvent recycling depot • Store paints and chemicals in a bunded area where they can be contained if spills occur • Keep Safety Data Sheets (SDSs) on site at all times • Keep clearly marked booms and/or absorbent material on site to contain spills if they occur • If a spill occurs, stop the source, contain it, clean up in accordance with the SDSs and notify relevant authorities • Do not undertake paint spraying activates in adverse weather conditions.	Subcontractor / MPX	TBC

	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
5.11	Plaster boarding, block laying, rendering, waterproofing, concreting	Generation of contaminated water	Water pollution	B	2	14	Wet trades to use the triple rinse system, to be installed and maintained by plumbing sub-contractor.	Subcontractor MPX	TBC
5.12	Use of crane, fork lift, mobile scissor lifts, concrete pump, trucks.	Generation of Dust and fumes	Air pollution	C	3	13	Refer to Construction Air Quality Management Plan. • Keep floor areas clean from dust and mud; • Keep site entrance and exit free of mud and dirt; • Wet down areas before cleaning the site.	Subcontractor MPX	TBC
5.13	All construction activities on-site	Erosion and Sediment into stormwater	Contamination of turbid water to storm water Contamination of storm water.	C	3	13	Refer to Erosion and Sediment Control Plan • Install sediment fences around upper parts of the site and other areas where sediment has the potential to move before commencing landscaping; • Install sediment fences around the toe of stockpiles where material from the stockpile has the potential to move; • If cutting pavement ensure all necessary environmental controls are in place to prevent contaminated water runoff into stormwater drains; • If required organise street sweeping. • Drain protection to be in place at all times ensure correct geo-fabric is in place to allow water to bypass it. • All construction plant and equipment with access to site will be properly maintained. • All vehicle wheels shall be cleaned before leaving the site.	Subcontractor MPX	Ongoing

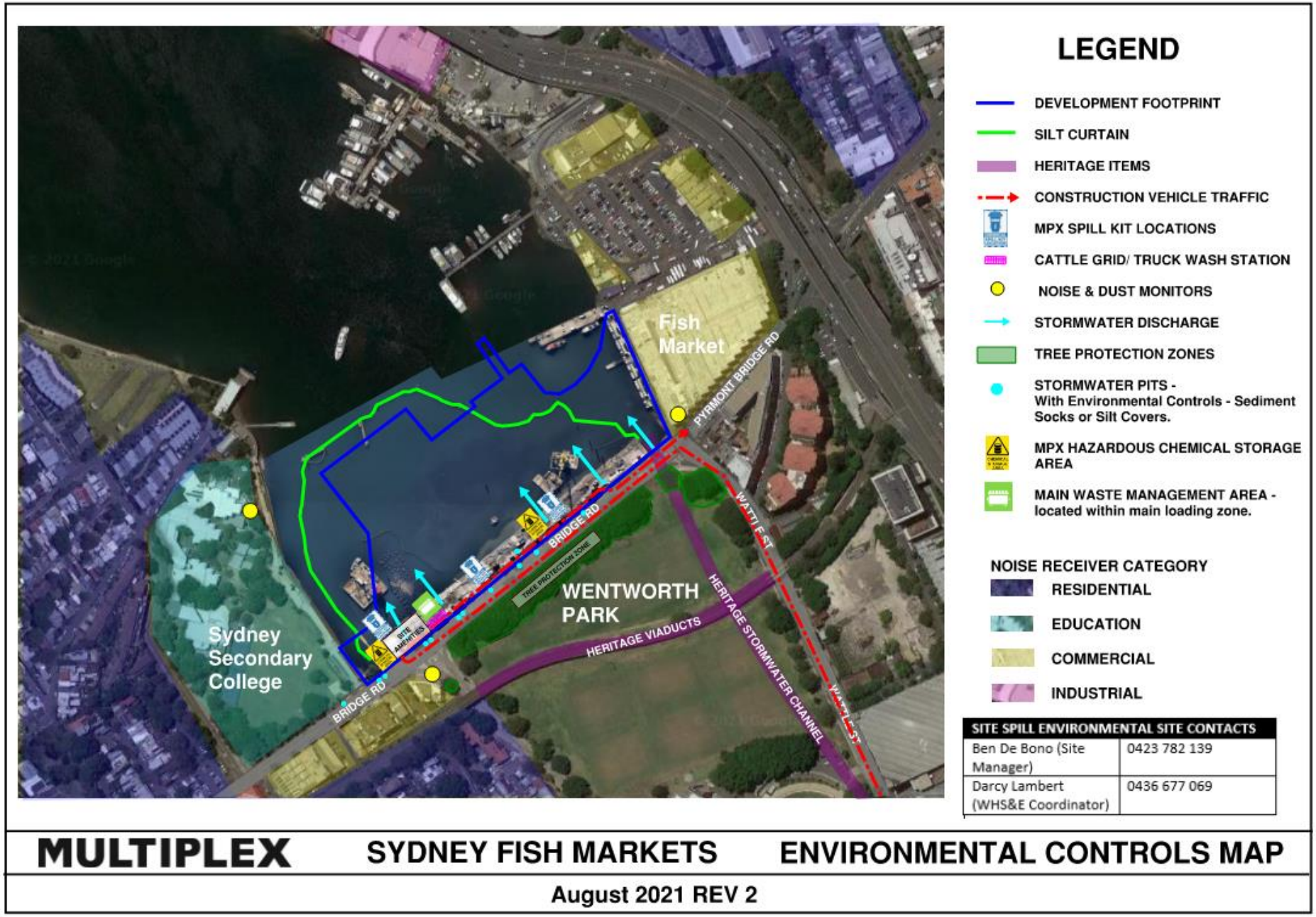
	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
5.14	Installation of Finishes	Generation of Dust and fumes	Poor indoor air quality	D	2	21	During installation of carpet, paints, furnishings, and other VOC-emitting products, provide supplemental (spot) ventilation for at least 72 hours after work is completed. Preferred HVAC system operation uses supply air fans and ducts only; exhaust provided through windows. Use exhaust fans to pull exhaust air from deep interior locations. Stair towers and other paths to exterior can be useful during this process. • Require VOC-safe masks for workers installing VOC-emitting products (interior and exterior) defined as products that emit 150 gpl or more UNLESS local jurisdiction's requirements are stricter, in which case the strictest requirements shall be followed for use of VOC-safe masks.	Subcontractor MPX	Ongoing
5.15	Cleaning during construction and prior to occupancy	Generation of Dust and fumes	Poor indoor air quality	E	2	23	Refer to Chemicals Management Plan •Use low-toxic cleaning supplies for surfaces, equipment, and worker's personal use. Options include several soybean-based solvents and cleaning options and citrus-based cleaners. • SDS will be kept for all hazardous or dangerous goods. • Spill kits available near storage areas.	Subcontractor MPX	Ongoing
5.16	Installation of Dry Wall Finishes	Generation of Dust and fumes	Poor indoor air quality	D	2	21	Use wet sanding for gypsum board assemblies. Exception: Dry sanding allowed subject to Architect's approval of the following measures: 1. Full isolation of space undergoing finishing. 2. Plastic protection sheeting is installed to provide air sealing during sanding. 3. Closure of all air system devices and ductwork. 4Sequencing of construction precludes the possibility of contamination of other spaces with gypsum dust. 5. Worker respiratory protection is provided.	Subcontractor MPX	Ongoing
5.17	Installation and storage of materials	Introduction of air pollutants	Poor indoor air quality during construction and during occupancy.	D	2	21	1. Protect material stored on-site or installed absorptive materials from moisture damage: All absorptive building materials (including but not limited to carpet, drywall, ceiling tiles, and furnishings) shall be stored in a dry location and kept dry at all times. 2. Do not use moisture-damaged materials: Any porous or absorptive building materials that have been exposed to moisture shall be thoroughly dried before	Subcontractor MPX	Ongoing

	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
							being installed. Any porous material that has remained wet longer than 48 hours, or shows any sign of mould shall be discarded and replaced. 3. Mitigate moisture intrusion: If it begins to rain or groundwater is coming into the building please notify the relevant area supervisor immediately and relocate, cover, or protect all absorptive materials. 4. Use low-emitting products: No adhesive, sealant, caulking, primer, paint or other wet product substitution from the specifications is allowed unless authorized by Architect. All products used shall comply with volatile organic compound (VOC) requirements of the Green Star and relevant legislation exposure standards. 5. Do not introduce pollutants into work areas: 6. Once stud framing and drywall begin as well as the installation of the mechanical equipment, access to the building interior shall be limited to reduce the likeliness of contaminants entering the building. 7. Allow materials to off-gas prior to installation: Plastic, fabric, laminates, furnishings, millwork and assembled materials that are packaged or rolled-up5shall be opened up and ventilated for a minimum of four days outside of the building. If feasible, Sub-contractors shall off-gas VOC laden products off-site.		
5.18	Sequencing of installation	Introduction of air pollutants	Poor indoor air quality during construction and during occupancy.	D	2	21	Sequencing Work 1. Porous materials (drywall, carpet, ceiling tiles, etc.) should be installed after building is fully closed in. 2. Carpeting and furnishings shall not be installed until after interior paints and finishes have fully cured.	Subcontractor MPX	Ongoing

	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
5.19	All construction activities on-site	Sediment into stormwater from construction activities	Contamination of storm water	C	3	9	Refer to Soil and Water Management Plan • Place geo tech fabric over drains, Geo Tech sock on the large stormwater drains. • Check and maintain geo-tech socks and fabric around the site.	Subcontractor MPX	Ongoing
5.20	All Construction activities on site	Waste Generation	Waste to landfill	E	4	16	Refer to Waste Management Sub-plan. • Prepare a Waste Management Plan for the site. • Employ the principles of Avoid, Reuse and Recycle waste. • Allocate storage areas for the onsite recycling, • Return pallets and reels to the suppliers. • Provide bins for office recycling including paper, cardboard, glass, toner cartridges • Use licensed contractors to remove construction waste. • All rubbish and food scraps are too placed in the appropriate lidded waste bin which will be serviced regularly. • Monthly waste segregation reports to be issued to MPX, MPX to include in Client Monthly report.	Subcontractor MPX	Ongoing
		Cutting & Sanding Activities	Air pollution				• Operators: Fit dust catchers to equipment where available. (E.g. sanding machines, concrete saws, grinders. • All sweeping and / or dust should be put into a bag then a skip to prevent dust plumes when empting skips into larger receptacles. • All equipment shall be efficient, operated appropriately, and maintained in good order. • When wet cutting material, water should be recycled and carried out if possible in well ventilated areas away from egress points. Slurry water to be filtered from entering drain points with sand bags or other environmental controls.	Subcontractor MPX	Ongoing.

	Activity	Hazard/Aspect	Impact	Likelihood	Consequence	Risk Rating	Control Measures	Responsibility	Close Out Date
		Mould Growth	Mould growth on construction materials/finishes and in site amenities	E	4	16	Step 1: Inspect structures and surfaces for any visible mould growth. Step 2: Contact mould specialist if any mould is found Step 3: Follow instructions and recommendations given by specialists, to eliminate and manage mould growth. Step 4: Monitor surfaces over the coming weeks to ensure no mould returns In compliance with the SDS for these respective products the appropriate PPE must be worn (gloves, goggles/ safety glasses and P2 facemask)	Subcontractor MPX	Ongoing
5.21	Landscaping	Sediment into stormwater from landscaping activities	Water pollution	C	3	13	Refer to Flora and Fauna Management Sub-plan, Soil and Water Management Plan and the Construction Air Quality Management Plan. • Ensure sediment control measures are in place until all vegetation is established • Regularly check all sediment control structures to ensure they are working effectively • Do not disturb the nature strip between the site and the roadway • Do not locate stockpiles within 2 metres of hazard areas such as spoon drains or areas of high flow Damp down stockpiles • Cover stockpiles as needed to minimise dust Use landscaping materials that are free from weeds and weed seeds • Retain top soil and reuse in project landscaping.	Subcontractor MPX	Ongoing

Appendix 4: Environmental Control Map



Appendix 5: Construction Noise and Vibration Management Plan

NEW SYDNEY FISH MARKETS

Construction Noise and Vibration Management Plan

Prepared for:

Multiplex Constructions Pty Ltd
Level 22
135 King Street
SYDNEY NSW 2000

SLR Ref: 610.30264.00000-R01
Version No: -v1.3
May 2022

PREPARED BY

SLR Consulting Australia Pty Ltd
ABN 29 001 584 612
Tenancy 202 Submarine School, Sub Base Platypus, 120 High Street
North Sydney NSW 2060 Australia

T: +61 2 9427 8100
E: sydney@slrconsulting.com www.slrconsulting.com

BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Multiplex Constructions Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised	Revision Changes
610.30264-R01-v1.3	16 May 2022	Kieran Murphy	Mark Irish	Mark Irish	See **Section 3**
610.30264-R01-v1.3	16 May 2022	Kieran Murphy	Mark Irish	Mark Irish	See above.
610.30264-R01-v1.2	10 November 2021	Kieran Murphy	Mark Irish	Mark Irish	See above.
610.30264-R01-v1.1	16 July 2021	Kieran Murphy	Mark Irish	Mark Irish	-

CONTENTS

DOCUMENT REFERENCES

TABLES

Table 1 Locations of Conditions of Consent B79 within Report 4
Table 2 Noise Catchment Areas (NCA) 8
Table 3 Construction Work Scenarios 8
Table 4 Equipment Sound Power Levels Per Construction Scenario 11
Table 5 Construction Hours 12
Table 6 Recommended EPA General Noise Management Levels Affected by Construction works 13
Table 7 Receiver NMLs for Construction 14
Table 8 Preferred and Maximum Vibration Dose Values for Intermittent Vibration 15
Table 9 Transient Vibration Guide Values – Minimal Risk of Cosmetic Damage 15
Table 10 Predicted Construction Noise Levels During Standard Construction Hours (LAeq, dBA) 17
Table 11 Predicted Construction Noise Levels Outside Standard Construction Hours (LAeq, dBA) 17
Table 12 Predicted Sleep Disturbance at Residential NCAs 18
Table 13 Recommended Standard Mitigation and Management Measures 19
Table 14 Impact Piling Mitigation Measures 22
Table 15 Recommended Triggers for Additional Mitigation Measures – Airborne Noise 26
Table 16 Recommended Minimum Working Distances from Vibration Intensive Equipment 29
Table 17 Nominated Site Control Vibration Criteria (ie Operator Warning and Halt Levels) 32

FIGURES

Figure 1 Site Location and Noise Sensitive Receivers 7
Figure 2 Construction Areas 10
Figure 3 Stage 1 Demolition - 2.4m Hoarding Layout 23
Figure 4 Stage 1 Main Building Hoarding Layout 25
Figure 5 Noise Monitoring locations 31

APPENDICES

Appendix A Acoustic Terminology
Appendix B CNVMP Grid Noise Maps
Appendix C Attended Mobile Plant Measurements
Appendix D In-situ Façade Noise Performance Testing
Appendix E Modification of Development Consent
Appendix F Construction Noise and Vibration Assessment for SSD 8925 Mod 7 Proposal

1 Introduction

1.1 Background

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Multiplex to undertake a Construction Noise and Vibration Management Plan (CNVMP) for the SSD-8925 Condition of Consent (CoC) B79 for the New Sydney Fish Market. 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 Local Government Area (LGA).

The CNVMP addresses the potential noise and vibration impacts associated with the construction of the site and outlines mitigation and management measures to be employed.

The locations of relevant items with the report are provided in **Table 1**.

Table 1 Locations of Conditions of Consent B79 within Report

CoC B79	Description	Location within Report
A	Project Description	**Section 4**
B	Construction Stages	**Section 4.1**
C	Project Description	**Section 4**
D	N/A – no identified non-project related construction activities	**N/A**
E	Piling	**Section 4**
F	Construction Stages	**Section 4.1**
G & H	Standard Mitigation Measures & Vibration Mitigation Measures	**Section 0 and Section 8**
I & J	Noise and Vibration Monitoring	**Section 9**

1.2 Relevant Documentation and Guidelines

The CNVMP references the following documents and guidelines:

- Development Consent SSDA 8925 (June 2020)
- *Interim Construction Noise Guideline* (ICNG), Department of Environment and Climate Change, 2009
- *Assessing Vibration: a Technical Guideline* (DEC), Department of Environment and Conservation, 2006
- DIN Standard 4150: Part 3 1999 *Structural Vibration in Buildings – Effects on Structures*, 1999
- British Standard 7385: Part 2 1993 *Evaluation and Measurement of Vibration in Buildings*, 1993
- *Road Noise Policy (RNP)*, Department of Environment and Climate Change, 2011
- Construction Noise and Vibration Strategy (CNVS), Transport for NSW, 2018

1.3 Terminology

Specific acoustic terminology is used in this report. An explanation of common terms is included in **Appendix A**.

2 Objectives

The Development Consent Conditions from SSD-8925 Schedule 2 Condition B79 states that:

*Prior to commencement of works, a **Construction Noise and Vibration Management Plan (CNVMP)** prepared by a suitably qualified person must be prepared in consultation with, and address the relevant requirements of, Council, and the EPA. The CNVMP **shall** address (but not be limited to):*

a) Identification of each work area, site compound and access route (both private and public),

b) Identification of the specific activities that will be carried out and associated noise sources at the premises and access routes,

c) Identification of all potentially affected sensitive receivers using the construction noise objectives identified in accordance with the EPA's interim Construction Noise Guideline, vibration objectives as identified in accordance with the document Assessing Vibration: A Technical Guideline (DEC 2006), and the road traffic noise objectives as identified in accordance with the NSW Road Noise Policy (DECCW 2011),

d) Identification of non-project related constriction activities in the area that may be,

e) identify the noise management levels for the project,

f) identify the construction methodology and equipment to be used and the key sources of noise and vibration,

g) details of all reasonable and feasible management and mitigation measures to be implemented to minimise construction noise and vibration,

h) be consistent with and incorporate all relevant recommendations and noise and vibration mitigation measures outlined in the Noise and Vibration Assessment, prepared by SLR, dated April 2019,

i) ensure all potentially impacted sensitive receivers are informed by letterbox drops prior to the commencement of construction of the nature of works to be carried out, the expected noise levels arid duration, as well as contact details for a construction community liaison officer, and

j) include a suitable proactive construction noise and vibration monitoring program which aims to ensure the construction noise and vibration criteria in this consent are not exceeded.

3 Report Revision Changes

SLR notes that the following report is revision 1.1 of the CNVMP. For ease and transparency the changes made to the Revision 1.0 report along with the locations where said changes can be found within the following:

Item #	Description	Location
1	Site Location, Noise Sensitive Receivers R4.1 and R4.2 switched.	**Figure 1**
2	Stage 1 construction scenario added as extra works Multiplex have been engaged to complete before main building construction commences	**Table 3**
3	Construction activity expected time frames	**Table 3**
4	Updated Sound Power Levels Utilised for the 3D SoundPLAN model for noise level predictions at nearby residences. On site measurements were conducted to verify on site noise levels from specific equipment being utilised as part of construction	**Appendix C**
5	Addition of the existing Sydney Fish Market into the noise sensitive receivers (NCA 2)	**Table 7 & Figure 1**
6	Revised predictions based on revised noise levels of select plant	**Table 10 & Table 11**
7	Additional mitigation of barriers around the Glebe Foreshore, along Pyrmont Bridge Road and existing Sydney Fish Market	**Figure 3 & Figure 4**
8	Revised Noise monitoring locations for long term real-time noise monitors. The Figure has been revised to show the actual monitoring locations. Location 1 was installed further north than originally noted due to access and security requirements. Location 2 was installed at the Kauri Foreshore Hotel	**Figure 5**
9	Updated Grid Noise Maps including grid noise maps for scenarios with mitigation applied.	**Appendix B**
10	Attended Mobile Plant measurements summary to verify noise levels from specific mobile plant being utilised in the construction program	**Appendix C**
11	In situ receiver Façade Noise Performance Testing was completed for the school hall and demountable classrooms closest to the Glebe Foreshore	**Appendix D**
12	SSD 8925 Mod 5 highlights the changes to construction hours of noise intensive construction activities and respite periods during the 2021 HSC examination period.	**Appendix E**
13	Noise and Vibration Assessment for SSD 8925 Mod 7 proposal	**Appendix F**
14	Outside of Working hours Project Specific Mitigation for the 11kV Feeder construction works	**Section 7.3.1**

4 Project Description

Figure 1 shows the proposed work zone and nearest sensitive receivers that may be affects by the works. The CNVMP report has defined all potentially noise sensitive receivers near the proposed construction zone which are summarised in **Figure 1**.

Figure 1 Site Location and Noise Sensitive Receivers

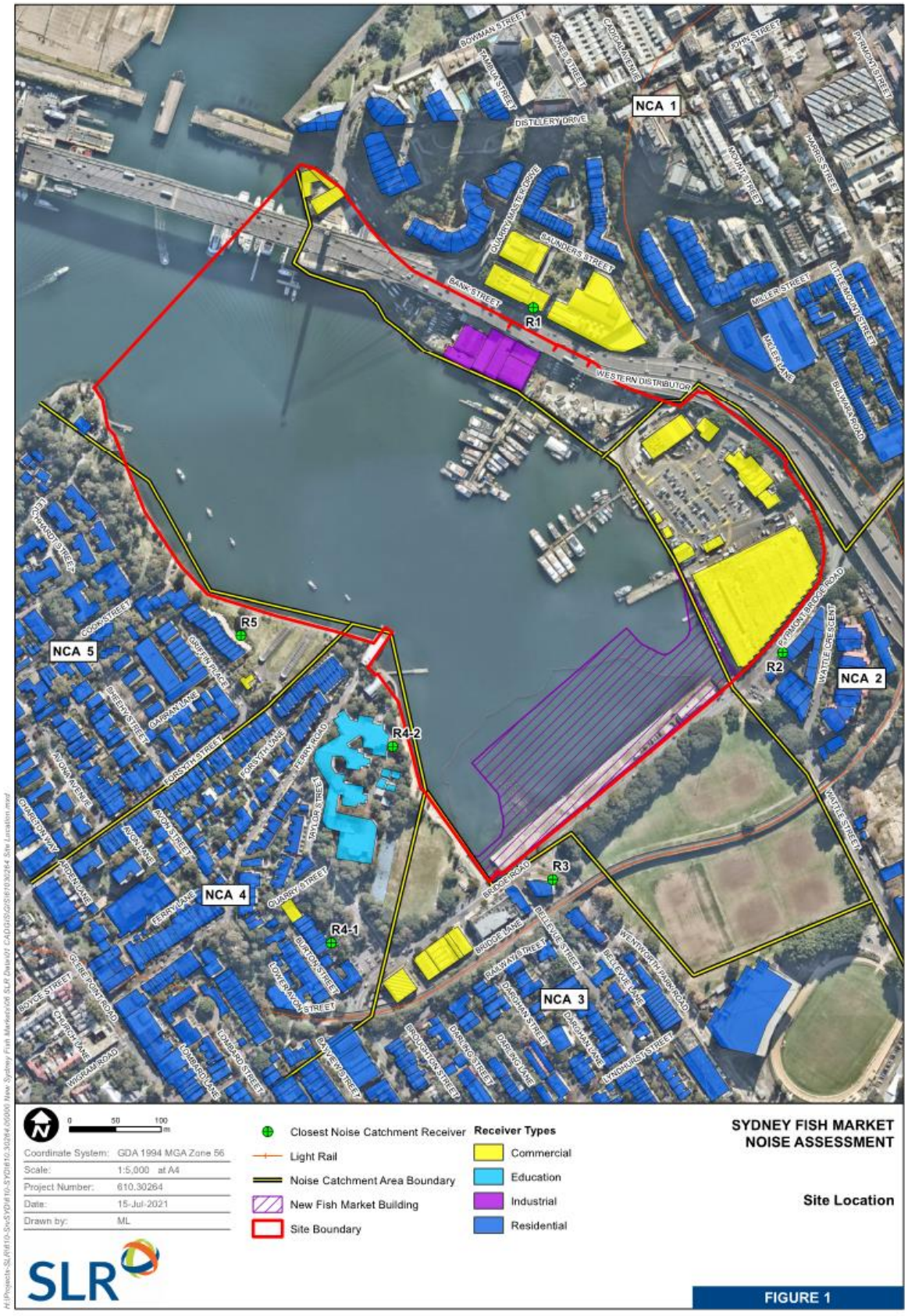


Table 2 Noise Catchment Areas (NCA)

NCA	Address of Worst-Care Representative Receiver	Property Description	Approx. Distance to Works (m)
NCA1	31-35 Bank Street, Pyrmont	Commercial	300
NCA2	217/1 Wattle Crescent, Glebe	Residential	55
	Existing Sydney Fish Market	Commercial	40
NCA3	84 Wentworth Park Road, Glebe	Residential	55
NCA4	1A Burton Street, Glebe	Residential	185
	Sydney Secondary College, Glebe	Educational	75
NCA5	13 Griffin Place, Glebe	Residential	255

4.1 Construction Stages

The proposed construction work scenarios with high noise impacts identified for this CNVMP are detailed in **Table 3**. Exact timeframes are not known at this stage, but Multiplex have identified that some activities will occur concurrently.

Table 3 Construction Work Scenarios

Activity	Scenario	Activities	Timing
Pre-construction works *June 2021 – February 2022*	Stage 1	Removal of existing wooden structural piles. Removal and reinforcement of sea wall	Standard hours
	1A	Cofferdam installation (press-in piling method) Set up for marine piling Set up for land piling	Standard hours
	1B	Cofferdam installation (press-in piling method) Hammering marine piles Hammering land piles	High noise impact hours[1]
	2A	Cofferdam installation (press-in piling method) Set up marine piles Auger method land piling	Standard hours
	2B	Cofferdam installation (press-in piling method) Hammering marine piles Auger method land piling	High noise impact hours[1]
Main building construction *March 2022 – Jan 2023*	3A	Construction of the main building including tower cranes, concrete trucks, power tools etc. Set up marine piles	Standard hours
	3B	Construction of the main building including tower cranes, concrete trucks, power tools etc. Hammering marine piles	High noise impact hours[1]
	3C	Construction of the main building including tower cranes, concrete trucks, power tools etc. Cofferdam removal	Standard hours

Activity	Scenario	Activities	Timing
Road Works Stage 2 *July 2022 – July 2023*	4A	Road overlay construction and new full road construction	Standard hours
	4B	Road overlay construction and new full road construction	Standard hours
Road Works Stage 3 *July 2023 – Jan 2024*	5	Road Completions works	Outside of standard hours (night works)
HV utilities cable to Camperdown *June 2022 – March 2023*	6A	Trenching excavation works and laying of HV conduit	Outside of standard hours (night works)
	6B	Asphalt laying works covering the previously trenched road	Outside of standard hours (night works)

Note 1: High noise impact hours relate directly to SSD-8925 Condition of Consent C7 (refer **Table 5**)

See **Figure 2** for the construction areas with an aerial map overlay.

Figure 2 Construction Areas



Table 4 Equipment Sound Power Levels Per Construction Scenario

Equipment	Sound Power Level (dBA)	Construction Stage
Sheet Piling (Press in)	97	1A, 1B, 2A, 2B, 3C
Auger Piling Rig	105	2A, 2B
Impact Piling Rig (Junttan HHX-300)	138[1]	1B, 2B
Impact Piling Rig (Junttan HHK-10S)	117	1B, 2B, 3B
Setting Up Impact Piling Rig (Vibratory attachment pitching piles)	120[1]	1A, 2A, 3A
Extracting existing wooden piles (vibratory attachment)	119	Stage 1
Concrete Saw	120	1A, 1B, 2A, 2B, 3A, 3B, 3C, 6A, 6B, Stage 1
Angle Grinder	114	3A, 3B, 3C
Bobcat	105	3A, 3B, 3C
Trucks	109	1A, 1B, 2A, 2B, 3A, 3B, 3C
Hand Drilling	94	1A, 1B, 2A, 2B, 3A, 3B, 3C
Electric Saw	112	1A, 1B, 2A, 2B, 3A, 3B, 3C
Impact Drill	105	1A, 1B, 2A, 2B, 3A, 3B, 3C
Asphalt Paver	112	4A, 4B, 5, 6A, 6B
Roller	106	4A, 4B, 5, 6A, 6B
Jackhammer	117	4A, 4B, 5, 6A, 6B
Concrete Trucks	112	1A, 1B, 2A, 2B, 3A, 3B, 3C, 4A, 4B, 5, 6A, 6B
Mobile Crane	102	1A, 1B, 2A, 2B, 3A, 3B, 3C
Concrete Tower Boom	99	2A, 2B, 3A, 3B
Concrete Pump	110	1A, 1B, 2A, 2B, 3A, 3B
Concrete Vibrator	110	1A, 1B, 2A, 2B, 3A, 3B, 3C, 4A, 4B, 5, 6A, 6B
Air Compressor	95	1A, 1B, 2A, 2B, 3A, 3B, 3C
Nail Gun	101	1A, 1B, 2A, 2B, 3A, 3B, 3C
Rattle Gun	110	1A, 1B, 2A, 2B, 3A, 3B, 3C
Tower Crane	108	3A, 3B, 3C
Profiler	110	4A, 4B, 5, 6A, 6B
Excavator /w rock breaker	127	4A, 4B, 5, 6A, 6B, Stage 1
Road Trucks	104	4A, 4B, 5, 6A, 6B
Small Excavator	107	4A, 4B, 5, 6A, 6B, Stage 1

Equipment	Sound Power Level (dBA)	Construction Stage
Water Cart	101	4A, 4B, 5, 6A, 6B
Generator	89	4A, 4B, 5, 6A, 6B
Backhoe	96	4A, 4B, 5, 6A, 6B
Vibratory roller 4t	102	4A, 4B, 5, 6A, 6B
Hot bitumen equipment	104	4A, 4B, 5, 6A, 6B
Lighting generator	94	4A, 4B, 5, 6A, 6B
Suction Truck	99	4A, 4B, 5, 6A, 6B

Note 1: Sound powers are time weighted (i.e. expected equipment level per 15 minute period).

5 Noise and Vibration Guidelines

This section summarises the construction noise and vibration standards and guidelines that will be used to develop the applicable noise and vibration criteria. It should be noted that all construction noise and vibration criteria is derived from SSD-8925 Consent Conditions and SLR's SSDA 2019 Noise Impact Assessment referenced within this approval.

5.1 SSD-8925 Consent Conditions

5.1.1 Hours of Construction

For the construction of the New Sydney Fish Market the SSD-8925 development consent conditions have adopted construction hours within the ICNG standard construction hours. Additionally, SSD-8925 stipulates that certain activities may only be conducted during certain periods of the approved construction hours. The approved construction hours are reproduced below in **Table 5.**

Table 5 Construction Hours

Day	Activity Type	Approved Construction Hours
Monday to Friday	Standard Construction Activities	7 am to 5:30 pm
	Rock breaking, rock hammering, sheet piling, pile driving, and similar activities	9 am to 12 pm 1 pm to 5 pm
Saturdays	Standard Construction Activities	8 am to 1 pm
	Rock breaking, rock hammering, sheet piling, pile driving, and similar activities	9 am to 1 pm
Sundays or Public Holidays	All activities	No construction

Any work to be conducted outside these hours must be approved by council, certifier, planning secretary and the community must be notified in accordance with SSD-8925. These works may also require additional mitigation measures discussed further in **Section 0**.

Appendix E highlights approval for the modification (SSD89-8925 Mod 5) to construction hours of noise intensive construction activities and respite periods during the 2021 HSC examination period.

5.1.2 Interim Construction Noise Guideline – NSW Environment Protection Authority

5.1.2.1 Recommended Sound Levels

The ICNG recommends that the $L_{Aeq(15minute)}$ noise levels arising from a construction project measured within the curtilage of an occupied noise-sensitive premises (i.e. at boundary or within 30 m of the residence, whichever is the lesser) should not exceed the levels indicated in **Table 6**.

Table 6 Recommended EPA General Noise Management Levels Affected by Construction works

Period of Noise Exposure	$L_{Aeq(15minute)}$ Construction Noise Management Levels
Recommended Standard Hours	Noise affected[1] RBL[2] + 10 dBA
	Highly noise affected[3] 75 dBA
Outside Recommended Standard Hours	Noise affected[1] RBL[2] + 5 dBA

Note 1: The noise affected level represents the point above which there may be some community reaction to noise.

Note 2: The RBL noise level is representative of the "average minimum background sound level" (in the absence of the sources under consideration), or simply the background level.

Note 3: The highly noise affected level represents the point above which there may be strong community reaction to noise.

5.1.2.2 Sleep Disturbance

The ICNG states that where works are planned to extend over more than two consecutive nights, the potential for sleep disturbance should be considered. Guidance regarding the potential for sleep disturbance at sensitive receivers is provided within the RNP.

The RNP suggests a $L_{A1(1minute)}$ screening level of 15 dB above the prevailing background (L_{A90}) noise level. The RNP also notes that maximum internal noise levels below 50-55 dBA are unlikely to awaken people from sleep.

Assuming windows are open for ventilation purposes, and that the outdoor-to-indoor transmission loss is 10 dB, an "awakening reaction" noise level of 60 to 65 dBA has also been applied.

5.2 Construction Noise Criteria Summary

In accordance with the above and SLR's 2019 SSDA Acoustic Report, the NMLs derived for the project are detailed in **Table 7**.

Table 7 Receiver NMLs for Construction

NCA	Receiver Category	Standard Construction[1] (RBL+10dB)	Highly Noise Affected	Out of Hours (RBL+5dB)				Sleep Disturbance Screening (RBL+15dB)	
		Daytime	Daytime	Daytime	Evening	Night-time	Morning	Night-time	Morning
NCA1	Commercial	70	n/a	70[2]	70[2]	70[2]	70[2]	n/a[3]	n/a[3]
NCA2	Residential	72	75	67	62	55	57	65	67
	Commercial	70	n/a	70[2]	70[2]	70[2]	70[2]	n/a[3]	n/a[3]
NCA3	Residential	72	75	67	62	55	57	65	67
NCA4	Residential	64	75	59	55	47	49	57	59
	Educational	72[4]	n/a	65[2,4]	65[2,4]	65[2,4]	65[2,4]	n/a[3]	n/a[3]
NCA5	Residential	60	75	55	55[5]	51	53	61	63

Note 1: The standard construction hours are as per SSD-8925 consent condition C7 (See **Table 5**)

Note 2: Criteria is only applicable when receiver is in use.

Note 3: Sleep disturbance criteria does not apply to this receiver type.

Note 4: An external criterion of 72 dBA has been set for Sydney Secondary College. The ICNG sets an internal level of 45 dBA and 27 dB external to internal transmission loss is measured (for further detail see **Appendix D**).

Note 5: These values have been lowered to be no greater than the applicable OOH daytime NML, based on the approach for determining RBLs in the NPfI.

5.3 Construction Vibration Guidelines

The effects of vibration on buildings can be divided into the following main assessment categories:

- Those in which the occupants or users of the building are inconvenienced or possibly disturbed ('tactile vibration')
- Those where a building's contents may be affected (for example, the operation of vibration sensitive equipment such as microscopes in hospitals)
- Vibration affecting the buildings and structures in terms of their susceptibility to damage ('structural damage').

5.3.1 Human Comfort Vibration

The Department of Environment and Conservation's (DEC) *Assessing Vibration: a technical guideline* (2006) provides guideline values for continuous, transient and intermittent events that are based on a Vibration Dose Value (VDV) rather than a continuous vibration level. The VDV is dependent upon the level and duration of the vibration event, as well as the number of events occurring during the daytime or night-time period.

The VDVs recommended in the guideline for vibration that is intermittent nature are presented in **Table 8**.

Table 8 Preferred and Maximum Vibration Dose Values for Intermittent Vibration

Building Type	Vibration Dose Value ($m/s^{1.75}$)	
	Preferred	Maximum
Residential Daytime	0.20	0.40
Residential Night-time	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80

Note: Daytime is 7:00 am to 10:00 pm and night-time is 10:00 pm to 7:00 am.

5.3.2 Effects on Building Contents

People can perceive floor vibration at levels well below those likely to cause damage to building contents or affect the operation of typical equipment found in most buildings that is not particularly vibration sensitive. For most receivers, the controlling vibration criterion is the human comfort criterion, and it is therefore not normally required to set separate criteria in relation to the effect of construction vibration on typical building contents.

Where appropriate, objectives for the satisfactory operation of vibration senstive critical instruments or manufacturing processes should be sourced from manufacturer's data and/or other published objectives.

5.3.3 Structural Damage Vibration

Structural damage vibration limits are based on Australian Standard AS 2187: Part 2-2006 *Explosives - Storage and Use - Part 2: Use of Explosives* and British Standard BS 7385 Part 2-1993 *Evaluation and measurement for vibration in buildings Part 2*. These standards provide frequency-dependent vibration limits related to cosmetic damage, noting that cosmetic damage is very minor in nature, is readily repairable and does not affect the structural integrity of the building.

The recommended vibration limits from BS 7385 for transient vibration for minimal risk of cosmetic damage to residential and industrial buildings are shown in **Table 9**. The vibration guide values are at the base of the building.

Table 9 Transient Vibration Guide Values – Minimal Risk of Cosmetic Damage

Line	Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
		4 Hz to 15 Hz	15 Hz and Above
1	Reinforced or framed structures. Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures. Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

5.3.4 General Vibration Screening Criterion

The guide values in **Table 9** relate predominantly to transient vibration which does not give rise to resonant responses in structures and low-rise buildings.

Where the dynamic loading caused by continuous vibration may give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values may need to be reduced by up to 50%.

Rock breaking / hammering activities are considered to have the potential to cause dynamic loading in some structures (eg residences) and it is therefore appropriate to reduce the transient values by 50%.

For construction activities involving intermittent vibration sources such as rock breakers, the predominant vibration energy occurs at frequencies greater than 4 Hz (and usually in the 10 Hz to 100 Hz range). On this basis, a conservative vibration damage screening level per receiver type is given below:

- Reinforced or framed structures: **25.0 mm/s**
- Unreinforced or light framed structures: **7.5 mm/s**.

At locations where the predicted and/or measured vibration levels are greater than shown above (peak component particle velocity) monitoring should be performed during construction. At these locations a more detailed analysis of the building structure, vibration source, dominant frequencies and dynamic characteristics of the structure would be undertaken to determine the applicable safe vibration level.

5.3.5 Heritage

Heritage buildings should be considered on a case by case basis. A heritage listed structure should not (unless it is structurally unsound) be assumed to be more sensitive to vibration resulting in application of the 7.5 mm/s screening criterion. Where a historic building is deemed to be sensitive to damage from vibration (following inspection), a more conservative superficial cosmetic damage criterion based on DIN 4150 should be applied.

6 Construction Noise and Vibration Assessment

6.1 Predicted Noise Levels

Predicted Construction noise levels for each NCA listed in **Table 2** are contained in the CNVMP and are reproduced in **Table 10** and **Table 11**. Note that these noise levels are for the most highly-impacted receiver within each Noise Catchment Area. Full noise maps showing impacts across every NCA for each modelled construction scenario are shown in **Appendix B**.

Table 10 Predicted Construction Noise Levels During Standard Construction Hours (L_{Aeq}, dBA)

NCA	NML Standard Construction Hours	Noise Level for most highly impacted receiver within NCA for each construction scenario (refer Table 3)										
		Stage – 1[4]	1A	1B[3]	2A	2B[3]	3A	3B[3]	3C	4A	4B	5
NCA1	70 (commercial)	63	67	77 - 69	67	78	66	65	63	65	65	53
NCA2	72	70	69 - 73	73	64	72	67	67	64	79 - 86	78 - 84	69
	70 (commercial)	72	74 - 78	87	79	84	70	69	74	81 - 75	81	61
NCA3	72	66	78	87	74 - 75	87	74	73 - 74	72	79 - 99	77 - 91	83
NCA4	64	67	72	80 - 75	69 - 70	80 - 84	67 - 68	68 - 69	65	68 - 63	68 - 70	57
	72[1] (educational)	74	77 - 79	86 - 84	75 - 78	87 - 93	74 - 76	75 - 79	72	74	73 - 74	62
NCA5	60	49	61 - 61	75 - 71	60 - 60	78 - 80	64	62	57	61	61 - 62	47

Note 1: Educational NML Criteria is only applicable when receiver is in use.

Note 2: Green shaded cells indicated predicted noise levels exceed the daytime NMLs at this NCA.

Note 3: These activities are only to occur during "high impact" (rock breaking, etc) standard hours as per SSDA Condition C7 (refer **Table 5**)

Note 4: Stage 1 predictions are calculated with 2.4m hoarding around the perimeter of the site and up along the Glebe foreshore (see **Figure 3**)

Table 11 Predicted Construction Noise Levels Outside Standard Construction Hours (L_{Aeq}, dBA)

NCA ID	Period	NML	Construction Stage		
			5	6A	6B
NCA1	Evening	70	53	-[3]	-[3]
	Night	70	53	-[3]	-[3]
NCA2	Evening	62	69	-[3]	-[3]
	Night	55	69	-[3]	-[3]
NCA3	Evening	62	82	-[3]	-[3]
	Night	55	82	-[3]	-[3]

NCA ID	Period	NML	Construction Stage		
			5	6A	6B
NCA4	Evening	55	57	-[3]	-[3]
	Night	47	57	-[3]	-[3]
	Evening	65[1]	62	-[3]	-[3]
	Night	65[1]	62	-[3]	-[3]
NCA5	Evening	55	47	-[3]	-[3]
	Night	51	47	-[3]	-[3]

Note 1: Educational NML Criteria is only applicable when receiver is in use.

Note 2: Green shaded cells indicated predicted noise levels exceed the Evening and Night NMLs at this receiver.

Note 3: See Appendix B and C of SLR's 11kV CNVMP.

6.1.1 Sleep Disturbance Noise Levels

Residential receivers that are predicted to be exposed to noise levels that may cause an awakening reaction are shown in **Table 12**.

Table 12 Predicted Sleep Disturbance at Residential NCAs

NCA ID	Construction Scenario ($L_{A1(1minute)}$ External Noise Level dBA)		
	5	6A	6B
NCA2	Yes	-[1]	-[1]
NCA3	Yes	-[1]	-[1]

Note 1: See Appendix B and C of SLR's 11kV CNVMP.

7 Mitigation

The ICNG acknowledges that due to the nature of construction works it is inevitable that there will be impacts where construction is near to sensitive receivers. Examples of potential mitigation and management measures which could be applied to the project to minimise the impacts are provided below.

7.1 Standard Mitigation

The Roads and Maritime *Construction Noise and Vibration Guideline* (CNVG) contains a number of standard measures for mitigating and managing construction impacts on development projects. Whilst it is acknowledged that this project is not a road project, the mitigation measures are considered suitable for consideration for all forms of construction works.

The measures are shown in **Table 13** and should be applied where feasible and reasonable to minimise the impacts from the works as far as practicable.

Table 13 Recommended Standard Mitigation and Management Measures

Action Required	Applies To	Details
Management Measures		
Implementation of any project specific mitigation measures required.	Airborne noise	Implementation of any project specific mitigation measures required.
Implement community consultation or notification measures.	Airborne noise Ground-borne noise & vibration	Notification detailing work activities, dates and hours, impacts and mitigation measures, indication of work schedule over the night time period, any operational noise benefits from the works (where applicable) and contact telephone number. Notification should be a minimum of 7 calendar days prior to the start of works. For projects other than maintenance works more advanced consultation or notification may be required. Website (If required) Contact telephone number for community Email distribution list (if required) Community drop in session (if required by approval conditions).
Site inductions	Airborne noise Ground-borne noise & vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: • all project specific and relevant standard noise and vibration mitigation measures • relevant licence and approval conditions • permissible hours of work • any limitations on high noise generating activities • location of nearest sensitive receivers • construction employee parking areas • designated loading/unloading areas and procedures • site opening/closing times (including deliveries) • environmental incident procedures.
Behavioural practices	Airborne noise	No swearing or unnecessary shouting or loud stereos/radios on site. No dropping of materials from height, throwing of metal items and slamming of doors.
Verification	Airborne noise Ground-borne noise & vibration	Where specified under Appendix C of the CNVG a noise verification program is to be carried out for the duration of the works in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions.
Attended vibration measurements	Ground-borne vibration	Where required attended vibration measurements should be undertaken at the commencement of vibration generating activities to confirm that vibration levels are within the acceptable range to prevent cosmetic building damage.
Update Construction Environmental Management Plans	Airborne noise Ground-borne noise & vibration	The CEMP must be regularly updated to account for changes in noise and vibration management issues and strategies.
Building condition surveys	Vibration Blasting	Undertake building dilapidation surveys on all buildings located within the buffer zone prior to commencement of activities with the potential to cause property damage
Source Controls		
Construction hours and scheduling.	Airborne noise Ground-borne noise & vibration	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels should be scheduled during less sensitive time periods.

Action Required	Applies To	Details
Construction respite period during normal hours and out-of-hours work	Ground-borne noise & vibration Airborne noise	Respite Offers should be considered made where there are high noise and vibration generating activities near receivers. As a guide work should be carried out in continuous blocks that do not exceed 3 hours each, with a minimum respite period of one hour between each block. The actual duration of each block of work and respite should be flexible to accommodate the usage of and amenity at nearby receivers.
Equipment selection.	Airborne noise Ground-borne noise & vibration	Use quieter and less vibration emitting construction methods where feasible and reasonable. For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration benefits. Ensure plant including the silencer is well maintained.
Plant noise levels.	Airborne-noise	Noise generating equipment will be regularly checked and effectively maintained, including checking of hatches/enclosures regularly to ensure that seals are in good condition and doors close properly against seals
Use and siting of plant.	Airborne-noise	The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. Plant used intermittently to be throttled down or shut down. Noise-emitting plant to be directed away from sensitive receivers. Only have necessary equipment on site.
Plan worksites and activities to minimise noise and vibration.	Airborne noise Ground-borne vibration	Locate compounds away from sensitive receivers and discourage access from local roads. Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site. Where additional activities or plant may only result in a marginal noise increase and speed up works, consider limiting duration of impact by concentrating noisy activities at one location and move to another as quickly as possible. Very noise activities should be scheduled for normal working hours. If the work cannot be undertaken during the day, it should be completed before 11:00 pm. Where practicable, work should be scheduled to avoid major student examination periods when students are studying for examinations such as before or during Higher School Certificate and at the end of higher education semesters. If programmed night work is postponed the work should be re-programmed and the approaches in this guideline apply again.
Reduced equipment power	Airborne noise Ground-borne vibration	Use only the necessary size and power
Non-tonal and ambient sensitive reversing alarms	Airborne noise	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work. Consider the use of ambient sensitive alarms that adjust output relative to the ambient noise level.

Action Required	Applies To	Details
Minimise disturbance arising from delivery of goods to construction sites.	Airborne noise	Compounds and worksites will be designed to promote one-way traffic and minimise the need for vehicle reversing. Where practicable, work compounds, parking areas, and equipment and material stockpiles will be positioned away from noise-sensitive locations and take advantage of existing screening from local topography. Select site access points and roads as far as possible away from sensitive receivers. Dedicated loading/unloading areas to be shielded if close to sensitive receivers. Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible. Avoid or minimise these out of hours movements where possible.
Engine compression brakes	Construction vehicles	Limit the use of engine compression brakes at night and in residential areas. Ensure vehicles are fitted with a maintained Original Equipment Manufacturer exhaust silencer or a silencer that complies with the National Transport Commission's 'In-service test procedure' and standard.
Path Controls		
Shield stationary noise sources such as pumps, compressors, fans etc.	Airborne noise	Stationary noise sources should be enclosed or shielded where feasible and reasonable whilst ensuring that the occupational health and safety of workers is maintained. Appendix D of AS 2436:2010 lists materials suitable for shielding.
Shield sensitive receivers from noisy activities.	Airborne noise	Where practicable, work compounds, parking areas, and equipment and material stockpiles will be positioned away from noise-sensitive locations and take advantage of existing screening from local topography.
Receptor Control		
Structural surveys and vibration monitoring	Ground-borne vibration	Pre-construction surveys of the structural integrity of vibration sensitive buildings may be warranted. At locations where there are high-risk receptors, vibration monitoring should be conducted during the activities causing vibration.

7.2 Main Works Project Specific Mitigation

A number of identified noise sensitive receivers within the NCAs are predicted to experience high noise levels due to specific equipment being utilised throughout the construction period. The principle cause of the exceedances are impact piling activities.

From discussions with Multiplex and the piling contractor "SMC Marine Pty Ltd", a number of potential mitigation measures for piling activities have been identified in **Table 14**.

Table 14 Impact Piling Mitigation Measures

Location	Mitigation Measure	Potential Reduction	Feasible?	Reasonable?	Discussion
Marine Impact Piling Rig	Replace large impact piling rig with smaller / quieter equipment	-15 dBA	No	N/A (unfeasible)	Not Adopted. Smaller piling rigs and auger / screw piling methods were investigated but found not to be capable of structurally securing piles to the required depth. Large hammer required to embed piles at least 2m in to rock and achieved adequate compression and tension capacities.
Marine Impact Piling Rig	Employ full Junttan Noise Control package	-10 dBA	Yes	No Unreasonable program impacts	Not Adopted. Not considered reasonable to employ as due to number of changes in piling equipment for each pile, overall program for piling would double from 8 months to 16 months. This would not only have large project impacts but also prolong the impact duration to surrounding receivers significantly.
Marine Impact Piling Rig	Employ Junttan Noise Control Jacket	Up to -5 dBA	Yes	Yes	Adopted. Considered feasible and reasonable. This will reduce noise impacts from this major noise source by up to 5 dB compared to those shown in **Table 4.**
Land Impact Piling Rig	Where possible employ auger piling	-12 dBA	Yes	Yes	Adopted. Considered feasible and reasonable. Auger piling to be used where possible. This is included in predictions in **Table 4.**

It is noted that many of the noise level exceedances have limited mitigation measures that can be applied due to the type of activities occurring through the construction period.

SLR recommend the implementation of 2.4m high hoarding around the perimeter of the construction site and along the Glebe Foreshore as a mitigation measure during Stage 1 demolition construction works. See **Figure 3** for location in comparison to the construction site.

Figure 3 Stage 1 Demolition - 2.4m Hoarding Layout



SLR recommend the implementation of 2.4m high hoarding around the perimeter of the construction site along the Glebe Foreshore as a mitigation measure during Stage 1 main building construction works. See **Figure 4** for location in comparison to the construction site.

Figure 4 Stage 1 Main Building Hoarding Layout



SLR recommends consideration of the Transport of NSW 2018 Construction Noise and Vibration Strategy (CNVS), which provides further guidance on appropriate noise mitigation options depending on the level of exceedance predicted (refer **Table 15**).

Table 15 Recommended Triggers for Additional Mitigation Measures – Airborne Noise

Time Period	dB(A) above RBL	dB(A) above NML	Addition Mitigation Measures Type[1]
Standard Hours: Mon - Fri (7am – 5:30pm), Sat (8am – 1pm), Sun/Pub Holiday (Nil)			
Noticeable	5 to 10	0	-
Clearly Audible	10 to 20	< 10	-
Moderately Intrusive	20 to 30	10 to 20	PN, V
High Intrusive	> 30	> 20	PN, V
75dB(A) or greater	-	-	PN, V, SN
OOHW Period 1: Mon – Fri (5:30pm – 10pm), Sat (7am – 8am & 1pm – 10pm), Sun/Pub Holiday (8am – 6pm)[2]			
Noticeable	5 to 10	< 5	-
Clearly Audible	10 to 20	5 to 15	PN
Moderately Intrusive	20 to 30	15 to 25	PN, V, SN, RO
High Intrusive	> 30	> 25	PN, V, SN, RO, RP, DR
OOHW Period 2: Mon – Saturday (10pm – 12am & 12am – 7am), Sun/Pub Holiday (12am – 7am & 6pm – 12am)			
Noticeable	5 to 10	< 5	PN
Clearly Audible	10 to 20	5 to 15	PN, V
Moderately Intrusive	20 to 30	15 to 25	PN, V, SN, RP, DR
High Intrusive	> 30	> 25	PN, V, SN, AA, RP, DR

Note 1: PN = Project notification
V = Verification monitoring
RP = Respite period
AA = Alternative accommodation
SN = Specific notification, individual briefings, or phone call
DR = Duration reduction
RO = Project specific respite offer

Note 2 Respite periods and duration reduction are not applicable when works are carried out during OOHW Period 1 Day only (i.e Saturday 6:00 am –7:00 am & 1:00 pm-6:00 pm, Sundays / Public Holidays 8:00 am-6:00 pm).

In terms of duration, the most significant exceedances in the NML are those highlighted in **Table 10** of standard hours works. To manage these impacts, in line with the framework in **Table 15**, the following measures are recommended to be employed:

- Verification monitoring:
    - Monitoring is required under the development consent condition B79 (J), which addresses this measure. See **Section 9** for further details.
    - SLR has conducted in-situ attended noise and vibration monitoring of the following:
        - Noise and vibration measurements to verify noise level emissions from select mobile equipment. See **Appendix C** for further details.
        - Façade noise reduction testing at the school demountable classrooms and the school hall. See **Appendix D** for further details.
- Project Notification:

  - Notification is also required under development consent condition B79 (I). SLR recommends that a single letterbox drop to all receivers within the impacted NCA's is to occur at the beginning of the project outlining the expected impacts – with information to an online portal which may contain any updates as the project progresses. This Project Notification should also include information that further Specific Notifications may follow to residents most impacted prior to certain works.

- Specific Notification:
  - SLR recommend that specific notification is deemed to be appropriate where during standard construction hours the predicted noise at noise sensitive receivers exceed 75 dB(A), as per the framework in **Table 15**. Notification need only be made to receivers predicted to be exceeding the 75 dB(A) noise level, not the entire NCA. Notification should be made prior to the commencement of each activity which include information on the type of work and what time of day it will be occurring (including any respite periods in line with DA approved hours) as well as the expected duration / programmed completion for the work.

For the predicted out-of-hours impacts in **Table 11**, management and mitigation measures outlined as per the framework in **Table 15** should be employed. Noting that in particular where Utilities Relocation works are in close (<10m) proximity to residents, impacts may fall in to the "Moderately Intrusive" or "Highly Intrusive" categories so management measures such as the following may be employed:

- Duration Reduction: reducing the overall period of impacts or consecutive nights in a single location by moving work areas to offer regular respite nights.
- Project specific respite offer (such as pre-purchased movie tickets, other activities, etc): unlikely to be employed as impacts in a single area are not expected to be long-duration and such offer unlikely to form any effective respite to residents.
- Alternative Accommodation: Where impacts cannot be reduced, duration reductions and other respite are not feasible, this measure may be considered on a case-by-case basis. However, again where impacts are short in duration, this management measure may not be considered appropriate.

7.3 Outside of Working Hours (OOHW) Project Specific Mitigation

In addition to the standard and project specific mitigation measures outlined in **Section 7.1** and **Section 7.2** above, a range of project specific mitigation measures have been developed below for Out of Hours Work (OOHW) to help address additional impacts of specific work activities.

7.3.1 11kV Feeder Construction

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Multiplex to undertake a Construction Noise Management Plan (CNVMP) for the proposed 11 kV feeder works, SLR Report Reference "610.30264.00500-R01-v1.0 HV Feeder Works Construction Noise and Vibration Management Plan" (11kV Feeder CNVMP) which form part of the broader New Sydney Fish Market development. These works are planned to start at just north of the intersection of Great Western Highway and Bridge and progress north-east towards the corner of Wentworth Park Road and Bridge Road.

The CNVMP addresses the potential noise impacts associated with these construction works and outlines mitigation and management measures to be employed.

The nearest receivers to the project in all noise catchment areas are predicted to be subject to 'Highly Intrusive' worst-case noise impacts, particularly when noisy equipment such as rock breakers or concrete saws are in use near to receivers. There would often be periods when works are in distant parts of the construction area which would result in construction noise levels being much lower than the worst-case levels predicted. There would also be times when no equipment is in use and no impacts occur.

Certain works would require lane closures and would be required to occur outside Standard Construction Hours to minimise potential traffic disruption. The impacts during these evening and night-time works are predicted to be increased due to more stringent criteria.

The Interim Construction Noise Guideline (ICNG) acknowledges that due to the nature of construction work, noise and vibration impacts may be inevitable where construction activities are near to sensitive receivers. Accordingly, the project shall implement a noise mitigation strategy, as detailed in the CNVMP, to help minimise impacts to these receivers.

This strategy will centre around appropriate 'standard' and 'additional' mitigation measures as defined in the Construction Noise and Vibration Guideline (CNVS). Further, the provision of respite forms a key component of this strategy, by limiting works within an impacted zone to 2 consecutive nights per week.

The assessment in **Section 3.3**, **Section 4.1.1** in SLRs 11kV Feeder CNVMP indicates that construction of the 11kV Feeder is expected to exceed the sleep disturbance screening criterion and highly intrusive criterion at multiple receivers. SLR have deemed it reasonable and feasible to adopt the CNVS sleep disturbance mitigation to assist in mitigating the impact on these receivers while the 11kV Feeder is under construction. Therefore, SLR recommend the following project specific mitigation for the 11kV Feeder construction:

- When works within an impacted zone are undertaken for 2 consecutive nights, night works for the next two nights of that week shall:
    - occur a minimum of 250m from that previous work location for Scenario 2 works.
    - occur a minimum of 400m from that previous work location for Scenario 1 & 3 works.
- When works within an impacted zone are undertaken for 2 consecutive nights, high impact works shall cease by 12am (midnight). High impact works include jackhammers, rock-breakers, road saw-cutters.
- Implementation of various mitigation measures as defined in the Construction Noise and Vibration Guideline (CNVS), including specific notification, project notification, verification monitoring, duration reduction and project specific respite offers. It is noted that given the high density of residential receivers, alternative accommodation would not be a reasonable or feasible mitigation measure for the 11kV Feeder Construction works.

The area of the works between Blackwattle Bay and Camperdown has a high density of residential receivers, therefore it is deemed that alternative accommodation would not be a reasonable and feasible mitigation measure for the 11kV Feeder Construction works. The provision of respite periods by rotating works sequentially across different construction zones is considered a reasonable and feasible approach to mitigate impacts for individual receiver locations.

8 Vibration Mitigation Measures

8.1.1 Minimum Working Distances for Vibration Intensive Works

Minimum working distances for typical vibration intensive construction equipment are provided in the CNVG and are summarized in **Table 16**. The minimum working distances are for both cosmetic damage (from BS 7358) and human comfort (from the NSW EPA Vibration Guideline) and are based on empirical data which suggests that where works are further from receivers than the quoted minimum distances then impacts are not considered likely.

Table 16 Recommended Minimum Working Distances from Vibration Intensive Equipment

Plant Item	Rating / Description	Minimum Distance	
		Cosmetic Damage (BS 7385)	Human Response (NSW EPA Guideline)
Vibratory Roller	< 50 kN (Typically 1-2t)	5 m	15 m to 20 m
	< 100 kN (Typically 2-4t)	6 m	20 m
	< 200 kN (Typically 4-6t)	12 m	40 m
	< 300 kN (Typically 7-13t)	15 m	100 m
	> 300 kN (Typically 13-18t)	20 m	100 m
	> 300 kN (Typically > 18t)	25 m	100 m
Small Hydraulic Hammer	300 kg - 5 to 12t excavator	2 m	7 m
Medium Hydraulic Hammer	900 kg - 12 to 18t excavator	7 m	23 m
Large Hydraulic Hammer	1600 kg - 18 to 34t excavator	22 m	60 m
Vibratory Pile Driver	Sheet piles	2 m to 20 m	20 to 100 m
Pile Boring	≤ 800 mm	2 m (nominal)	4 m
Jackhammer	Hand held	1 m (nominal)	2 m

The safe working distances for building damage should always be complied with. The distances are noted as being indicative and will vary depending on the particular item of plant and local geotechnical conditions. They apply to addressing the risk of cosmetic (e.g minor or easily reparable) damage of typical buildings under typical geotechnical conditions.

Where vibration intensive works are required to be undertaken within the specified safe working distances, vibration monitoring should be undertaken to ensure acceptable levels of vibration are satisfied.

In relation to human comfort, the safe working distances relate to continuous vibration. For most construction activities, vibration emissions are intermittent in nature and for this reason, higher vibration levels, occurring over shorter periods are allowed.

The following vibration mitigation measures will be implemented by the construction contractor:

- Relocate any vibration generating plant and equipment to areas within the site in order to lower the vibration impacts.

- Investigate the feasibility of rescheduling the hours of operation of major vibration generating plant and equipment to times when vibration levels are less likely to impact nearby vibration sensitive receivers.
- Minimise consecutive works in the same locality (if applicable).
- Schedule a minimum respite period of at least 30 minutes before activities commence which are to be undertaken for a continuous 4-hour period.

9 Noise and Vibration Monitoring

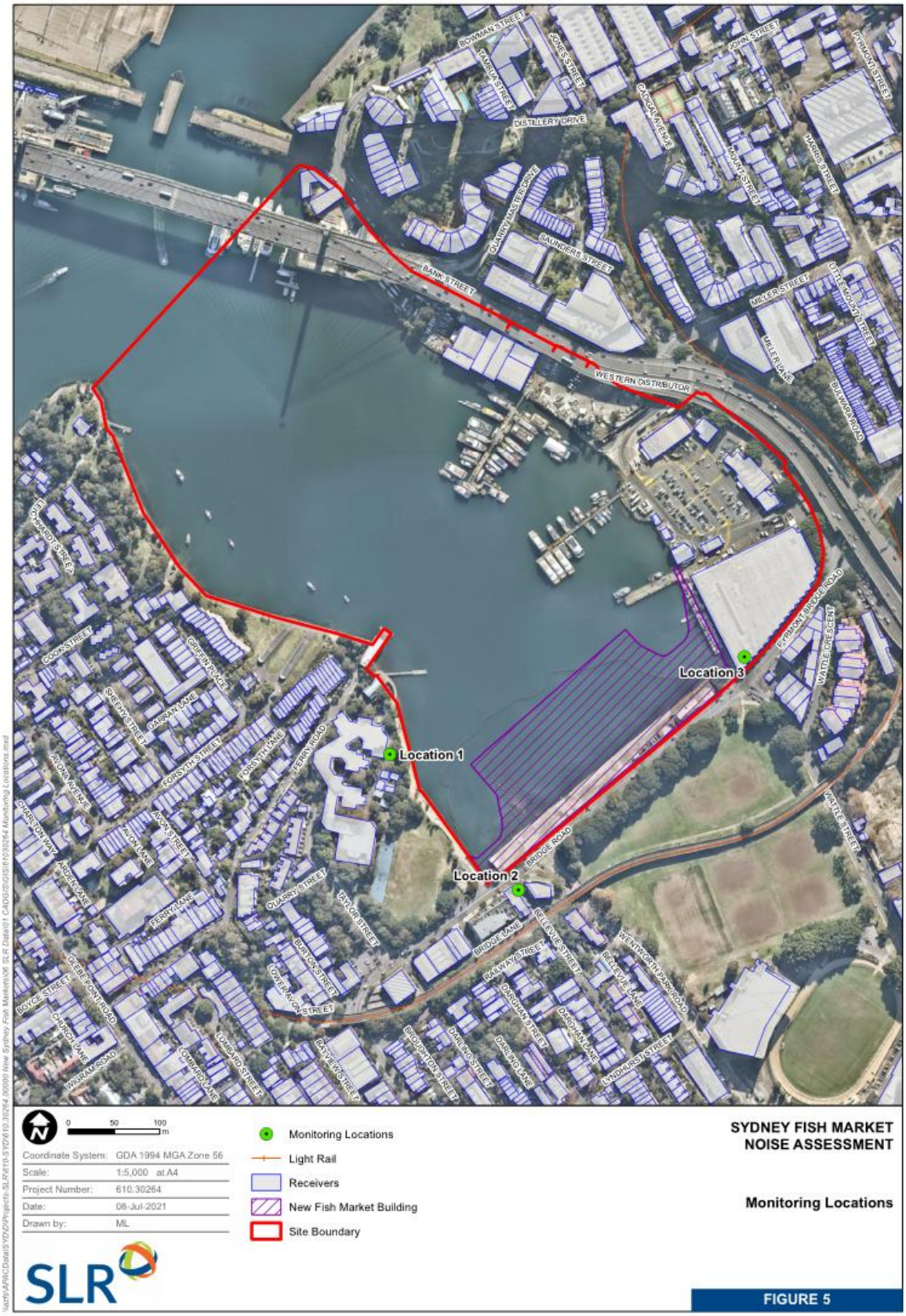
SLR has been engaged by Multiplex to undertake noise and vibration monitoring in an effort to assist in the control of construction noise and vibration impacts from the development. The proposed monitoring methodology is discussed in this section.

9.1 Monitoring Methodology

The broad approach to monitoring is recommended to be as follows:

- 3 x long-term real-time noise monitors to be established in the approximate locations shown in **Figure 5** for the 24 month duration of the project.
- Supplementary attended noise measurements when required such as on the commencement of any high-impact activities.
- Vibration monitoring to be undertaken on the commencement of any high-impact activities. Unattended vibration monitoring to be undertaken for the first 2 months of piling activity, and then the need for continued monitoring be re-assessed based on measured results.

Figure 5 Noise Monitoring locations



9.1.1 Noise Monitoring

Long term noise monitoring will be undertaken at locations representative of the three closest, potentially most affected residences using statistical noise loggers as approximately indicated in **Figure 5**. This equipment is to be real-time enabled with an online portal, allowing the project team to investigate the noise impacts of work either at as it happens or immediately afterward. Notifications (SMS / email) of exceedances in the established trigger levels will be enabled.

This monitoring would be supplemented by attended monitoring (where necessary) in order to differentiate between construction noise sources and other sources (such as road traffic) and also in order to observe and identify any abnormally noisy equipment or operations.

During attended monitoring, typical maximum noise levels associated with particular operations and/or plant items will be noted. Extraneous noise events such as road traffic noise will be excluded from the results or highlighted in accompanying notes.

Noise monitoring will be undertaken by SLR and reported Monthly. Equipment and methods will comply with AS 1055:2018. The statistical parameters to be measured will be the LAmin, LA90, LA10, LA1, LAmax and LAeq evaluated over consecutive 15 minute periods.

9.1.2 Vibration Monitoring

Structural vibration monitoring (where necessary) will be carried out for a period of two months at the beginning of the predicted impacts to determine the vibratory impacts of impact piling within close proximity of the piling works.

Vibration monitoring locations and durations be determined when a detailed impact piling program is developed prior to commencement. As part of the monitoring strategy, SLR recommend that the noise and vibration monitors installed have SMS capability so as to alert the Multiplex immediately of any/all criteria breaches.

A single geophone mounting plate would be installed within close proximity to the construction activities. The monitoring locations would be on a stiff part of the structures (at the foundations) on the side of the structures adjacent to the subject excavation works, in accordance with BS 7385: Part 2:1993.

Based on the foregoing information, the nominated site control vibration criteria are presented in **Table 17** together with the minimal risk of cosmetic damage criterion from BS 7385.

Table 17 Nominated Site Control Vibration Criteria (ie Operator Warning and Halt Levels)

Structure	Site Control Criteria	
	Operator Warning Level	**Operator Halt Level**
Nearest Potentially Affected	6 mm/s	8 mm/s

Exceedance of the “Operator Warning Level” does not require activity to cease but rather alerts the construction contractor to proceed with caution at reduced force or load.

An exceedance of the “Operator Halt Level” requires the construction contractor to implement an alternative excavation technique.

The vibration monitoring equipment will be downloaded on a weekly basis by SLR.

Weekly reports of the measured vibration levels and their likely impacts would be prepared by SLR and distributed by the Project Manager.

Attended vibration monitoring will, if required, be conducted by SLR. Attended vibration monitoring (structural damage and/or human comfort) will also be carried out in response to complaints or to structural damage criterion exceedances. This monitoring will provide direct feedback to the operators in order to allow appropriate modification of construction techniques.

9.2 Non-Compliance and Corrective Action

Where the noise and/or vibration monitoring identifies non-compliance with the relevant criteria, the construction contractor will plan and carry out corrective action.

The corrective action may involve supplementary monitoring in order to identify the source of the non-conformance and may involve modification of the construction techniques or programme to avoid any recurrence or minimise its adverse effects.

Corrective actions will be conducted in accordance with Multiplex's Project Management Plan and/or Construction Environmental Management Plan.

9.3 Community Consultation Communications Strategy

Community consultation will, if required, be undertaken via the construction contractor, including:

- Advising the community of work to be undertaken.
- Consultation with the community to avoid works during high sensitivity periods (e.g. Sydney Secondary College Blackwattle Bay School exam periods).
- Recording and managing any complaints.

These and other elements of the community consultation will be addressed under the relevant procedures for the subject works.

Community consultation will be conducted in accordance with Multiplex Community Communications Strategy.

9.4 Complaint Handling

The construction contractor will adopt the following protocol for handling complaints. This protocol is intended to ensure that the issues are addressed and that appropriate corrective action is identified and implemented as necessary:

- In accordance with the Multiplex Community Communications Strategy, complainants are to have access to a website address and a 1800 number which will be made available via the Department of Planning website in order to address their concerns and complaints with the ongoing works.
- The construction contractor will record all verbal, telephone and email complaints in writing and will forward all complaints to the Project Manager, together with details of the circumstance leading to the complaint and all subsequent actions.

- Complaints received by the Project Manager will, as an initial step, be referred to the construction contractor. The construction contractor will respond as described above.
- The Project Manager will investigate the complaint in order to determine whether a criterion exceedance has occurred or whether noise and/or vibration have occurred unnecessary.
- If excessive or unnecessary noise and/or vibration have been caused, corrective action will be planned and implemented by the construction contractor
- Complainants will be informed by the Project Manager that their complaints are being addressed, and (if appropriate) that corrective action is being taken.
- Follow up monitoring or other investigations will be carried out by the Project Manager and the construction contractor to confirm the effectiveness of the corrective action.
- Complainants will be informed of the implementation of the corrective action that has been taken to mitigate the adverse effects.
- Complaints will be handled in accordance with Multiplex Community Communications Strategy.

APPENDIX A

Acoustic Terminology

1. Sound Level or Noise Level

The terms 'sound' and 'noise' are almost interchangeable, except that 'noise' often refers to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure. The human ear responds to changes in sound pressure over a very wide range with the loudest sound pressure to which the human ear can respond being ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or LP are commonly used to represent Sound Pressure Level. The symbol LA represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2 x 10^{-5} Pa.

2. 'A' Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an 'A-weighting' filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4,000 Hz), and less sensitive at lower and higher frequencies. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dB or 2 dB in the level of a sound is difficult for most people to detect, whilst a 3 dB to 5 dB change corresponds to a small but noticeable change in loudness. A 10 dB change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels.

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
130	Threshold of pain	Intolerable
120	Heavy rock concert	Extremely noisy
110	Grinding on steel	
100	Loud car horn at 3 m	Very noisy
90	Construction site with pneumatic hammering	
80	Kerbside of busy street	Loud
70	Loud radio or television	
60	Department store	Moderate to quiet
50	General Office	
40	Inside private office	Quiet to very quiet
30	Inside bedroom	
20	Recording studio	Almost silent

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as 'linear', and the units are expressed as dB(lin) or dB.

3. Sound Power Level

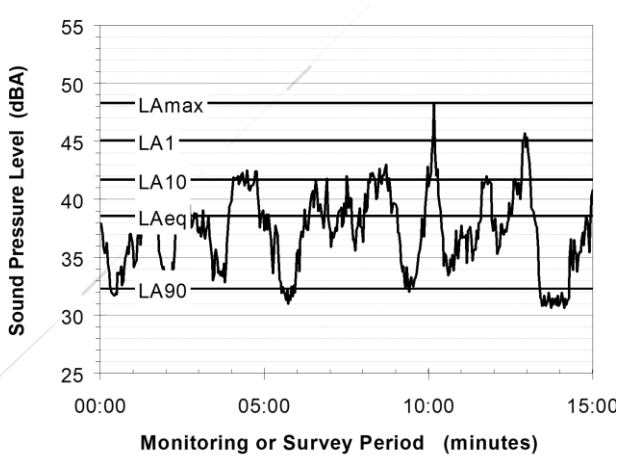
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or LW, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure is similar to the effect of an electric radiator, which is characterised by a power rating but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4. Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels LAN, where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time, LA10 the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

LA1 The noise level exceeded for 1% of the 15 minute interval.

LA10 The noise level exceeded for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

LA90 The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

LAeq The A-weighted equivalent noise level (basically, the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

5. Frequency Analysis

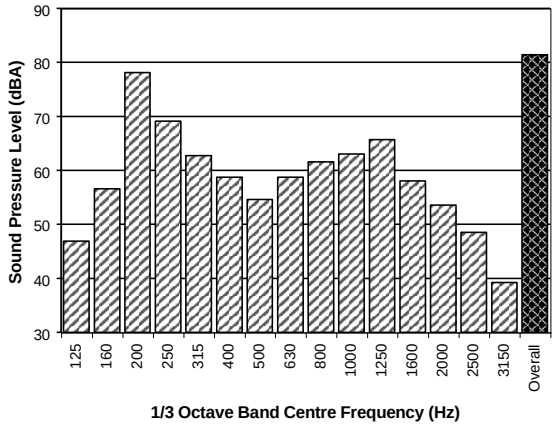
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (three bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



6. Annoying Noise (Special Audible Characteristics)

A louder noise will generally be more annoying to nearby receivers than a quieter one. However, noise is often also found to be more annoying and result in larger impacts where the following characteristics are apparent:

- **Tonality** - tonal noise contains one or more prominent tones (ie differences in distinct frequency components between adjoining octave or 1/3 octave bands), and is normally regarded as more annoying than 'broad band' noise.
- **Impulsiveness** - an impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.
- **Intermittency** - intermittent noise varies in level with the change in level being clearly audible. An example would include mechanical plant cycling on and off.
- **Low Frequency Noise** - low frequency noise contains significant energy in the lower frequency bands, which are typically taken to be in the 10 to 160 Hz region.

7. Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of 'peak' velocity or 'rms' velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as 'peak particle velocity', or PPV. The latter incorporates 'root mean squared' averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements (ie vertical, longitudinal and transverse).

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/Vo), where Vo is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used.

8. Human Perception of Vibration

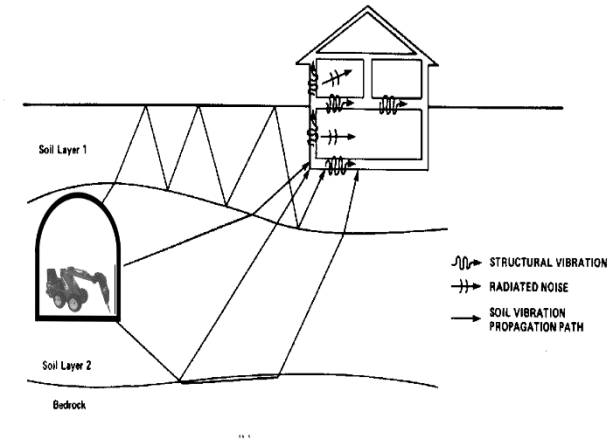
People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as 'normal' in a car, bus or train is considerably higher than what is perceived as 'normal' in a shop, office or dwelling.

9. Ground-borne Noise, Structure-borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed 'structure-borne noise', 'ground-borne noise' or 'regenerated noise'. This noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

Typical sources of ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

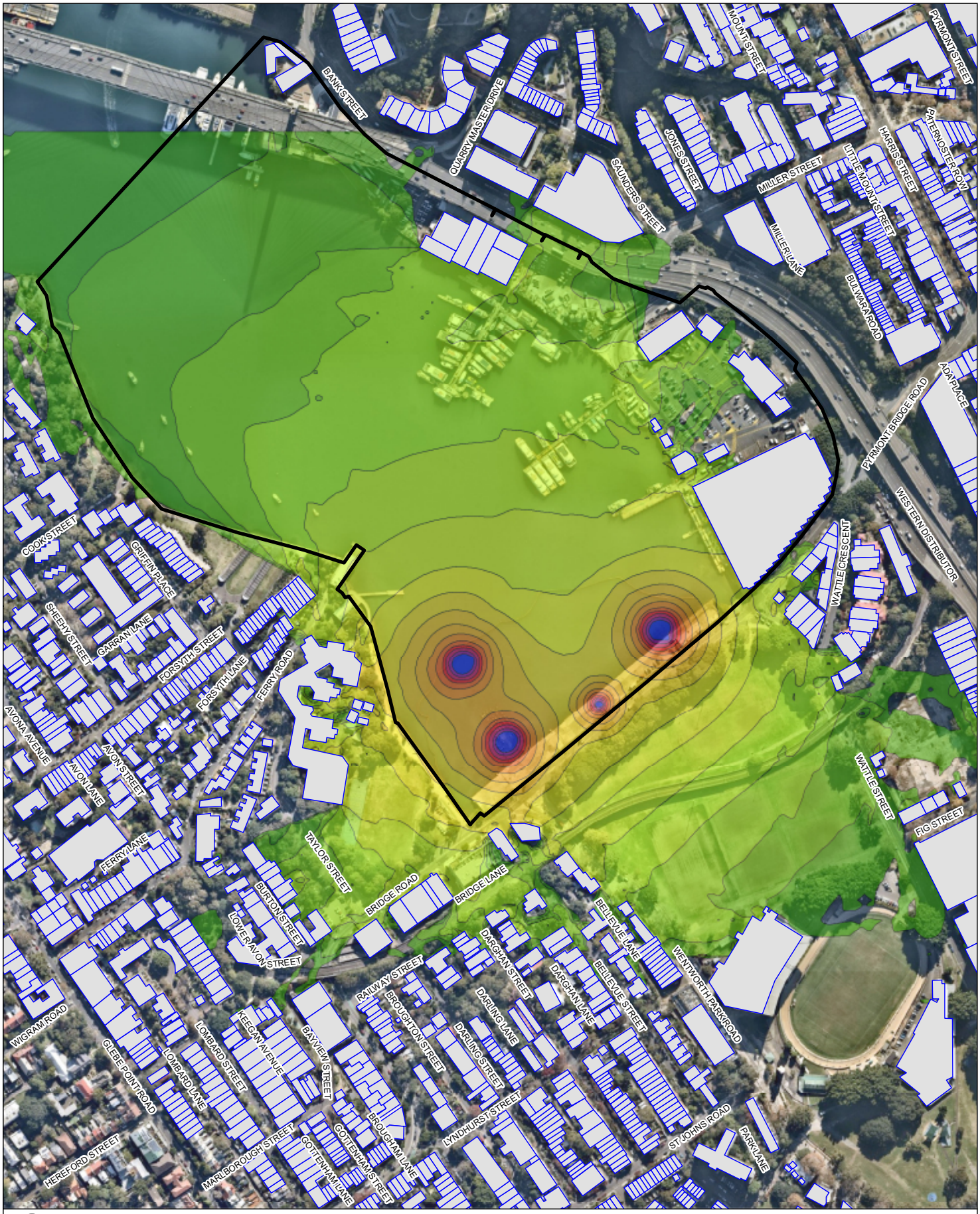
The following figure presents an example of the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



The term 'regenerated noise' is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise.

APPENDIX B

CNVMP Grid Noise Maps



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	08-Jul-2021
Drawn by:	ML

Receivers

Noise Level dB(A)

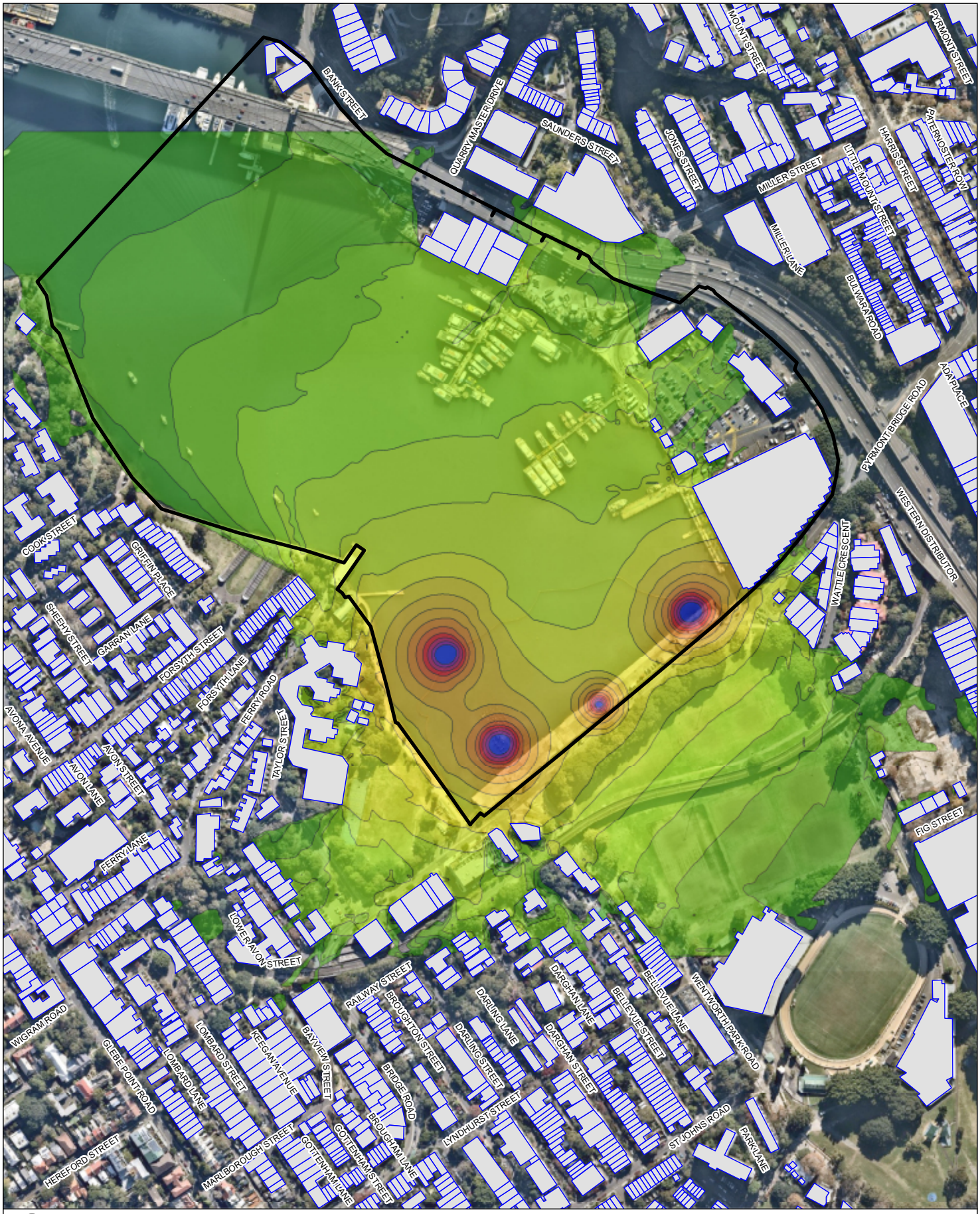
63	73	85
65	75	87
67	77	89
69	79	91
71	81	93
	83	

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 1A Typical (Set up Impact Piling)

FIGURE 6

H:\Projects-SLR\610-Srv\SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 1A Typical (Set up Impact Piling).mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	08-Jul-2021
Drawn by:	ML

Receivers

Noise Level dB(A)

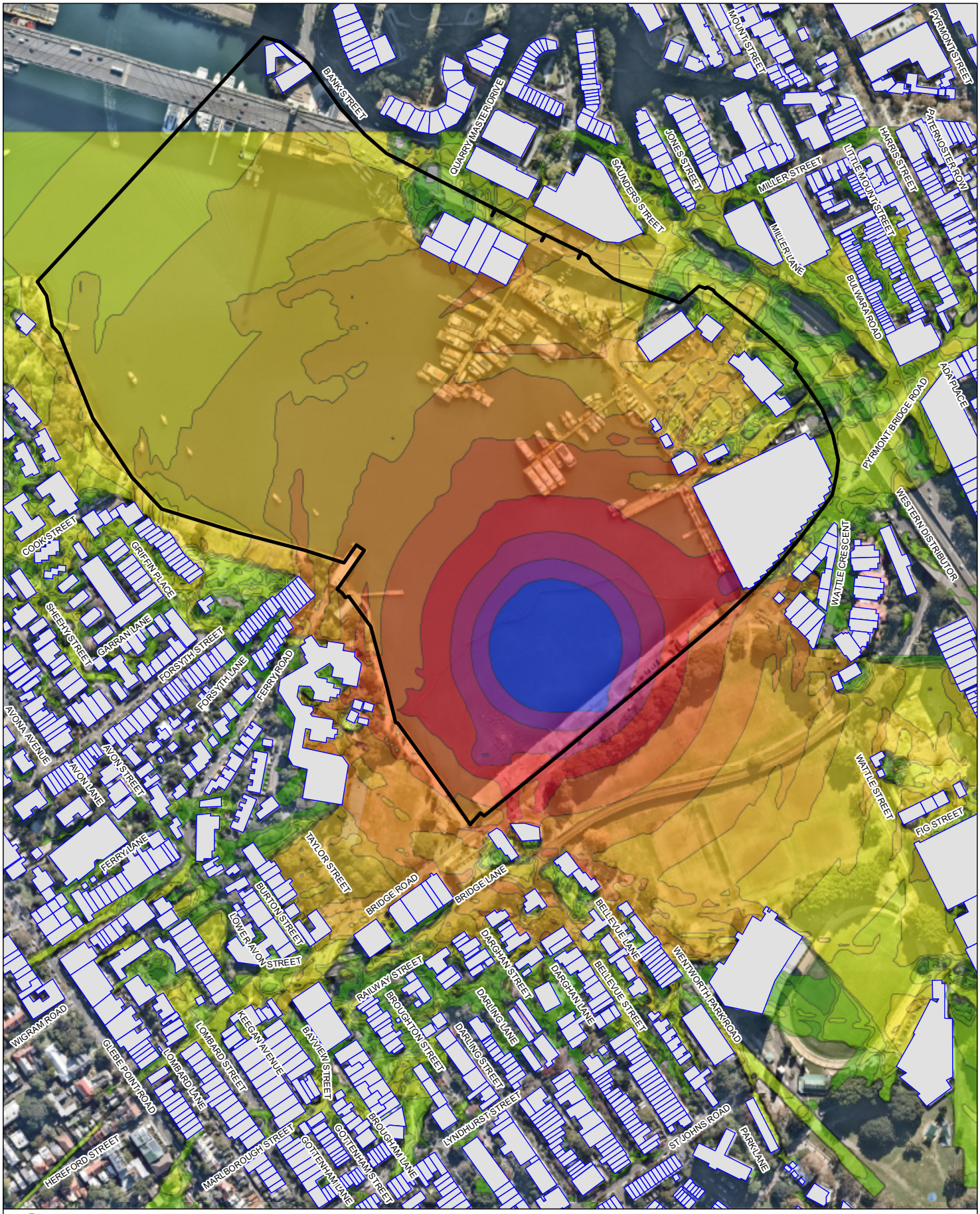
63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 1A Worst Case (Set up Impact Piling)

FIGURE 7

H:\Projects-SLR\610-Srv\SYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 1A Worst Case (Set up Impact Piling).mxd



0 50 100 m

Receivers

Noise Level dB(A)

63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	08-Jul-2021
Drawn by:	ML

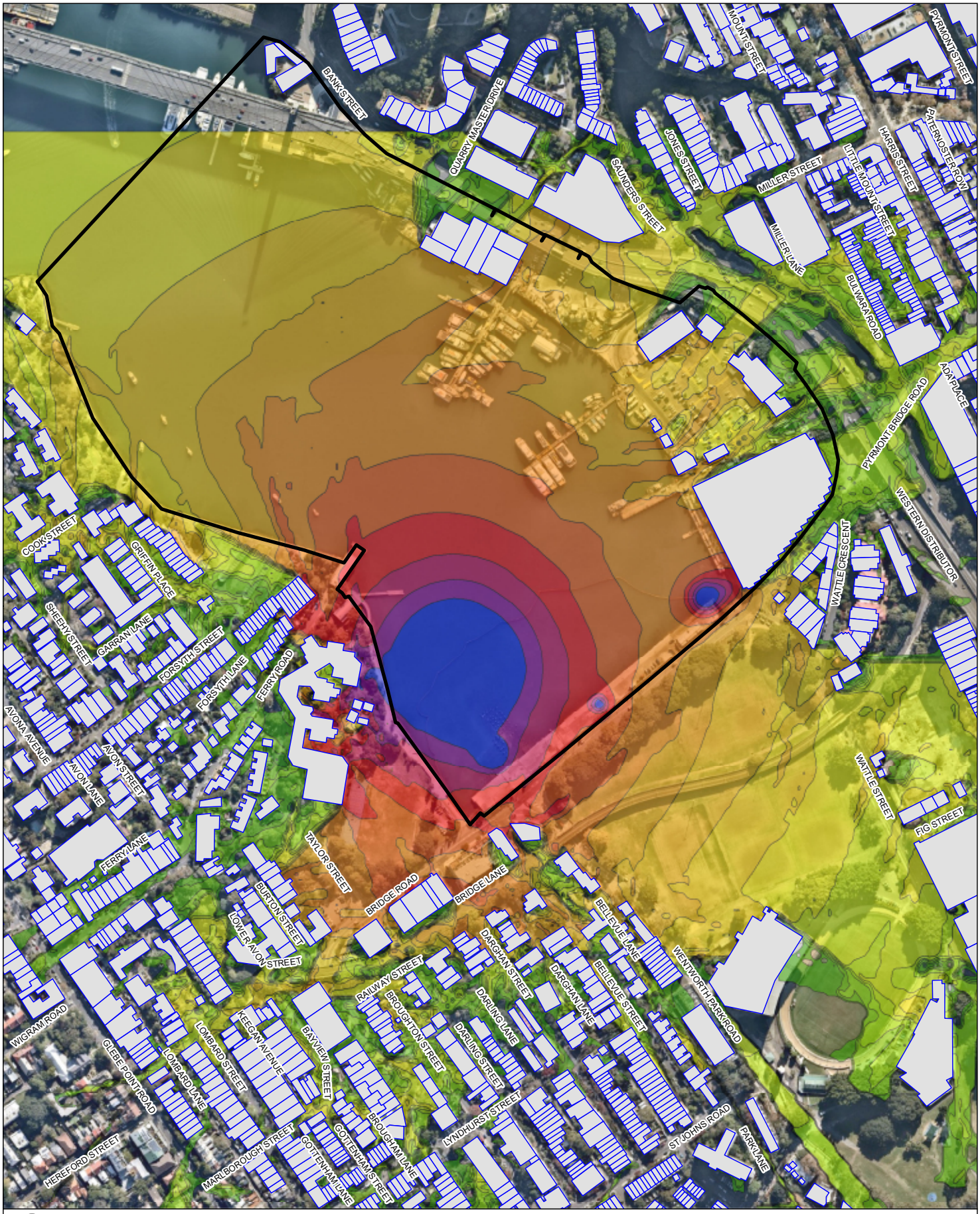
SLR

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 1B Typical (Impact Piling)

FIGURE 8

H:\Projects-SLR\610-Srv\SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 1B Typical (Impact Piling).mxd



0 50 100 m

Receivers

Noise Level dB(A)

63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	08-Jul-2021
Drawn by:	ML

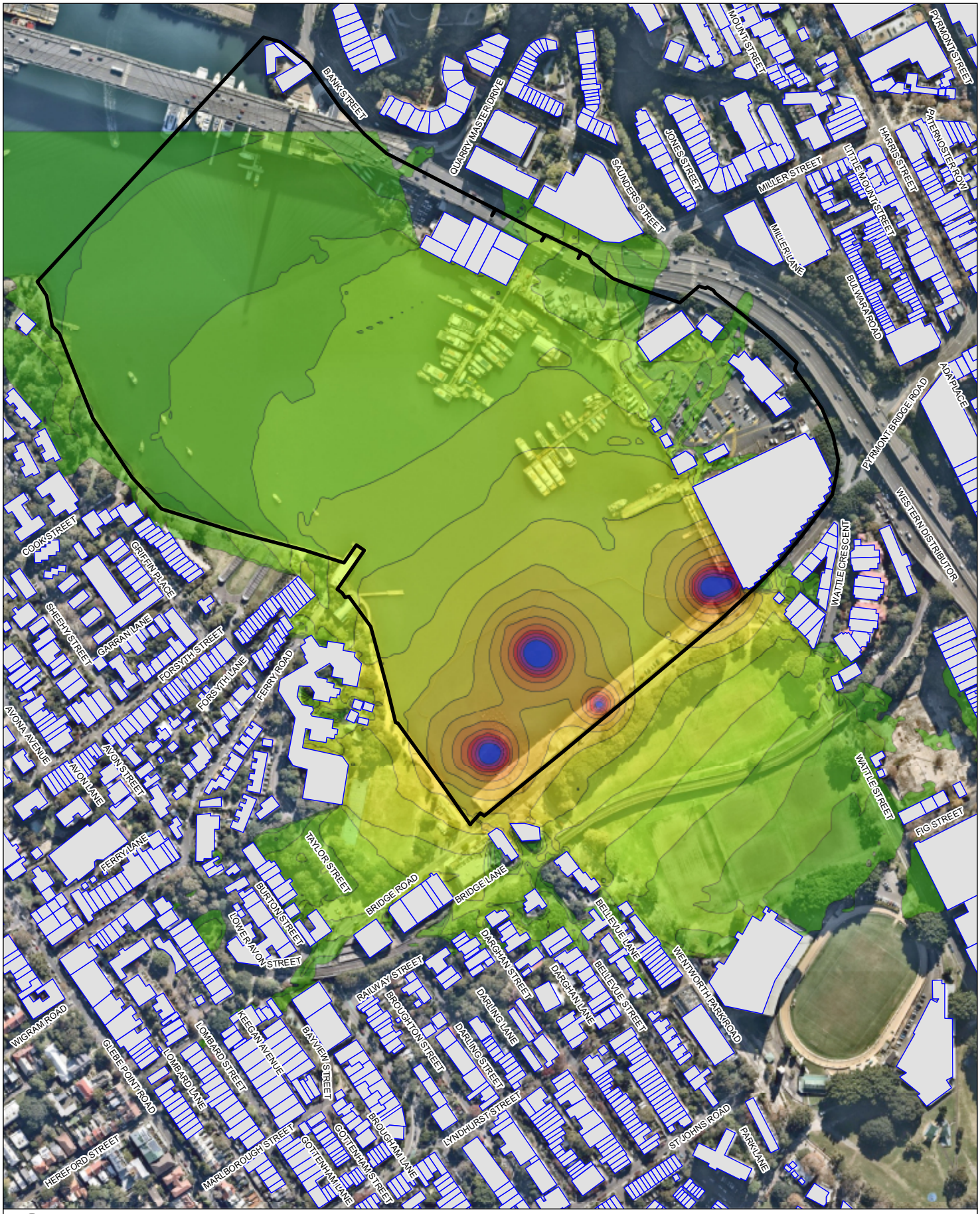
SLR

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 1B Worst Case (Impact Piling)

FIGURE 9

H:\Projects-SLR\610-Srv\SYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 1B Worst Case (Impact Piling).mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	08-Jul-2021
Drawn by:	ML

Receivers

Noise Level dB(A)

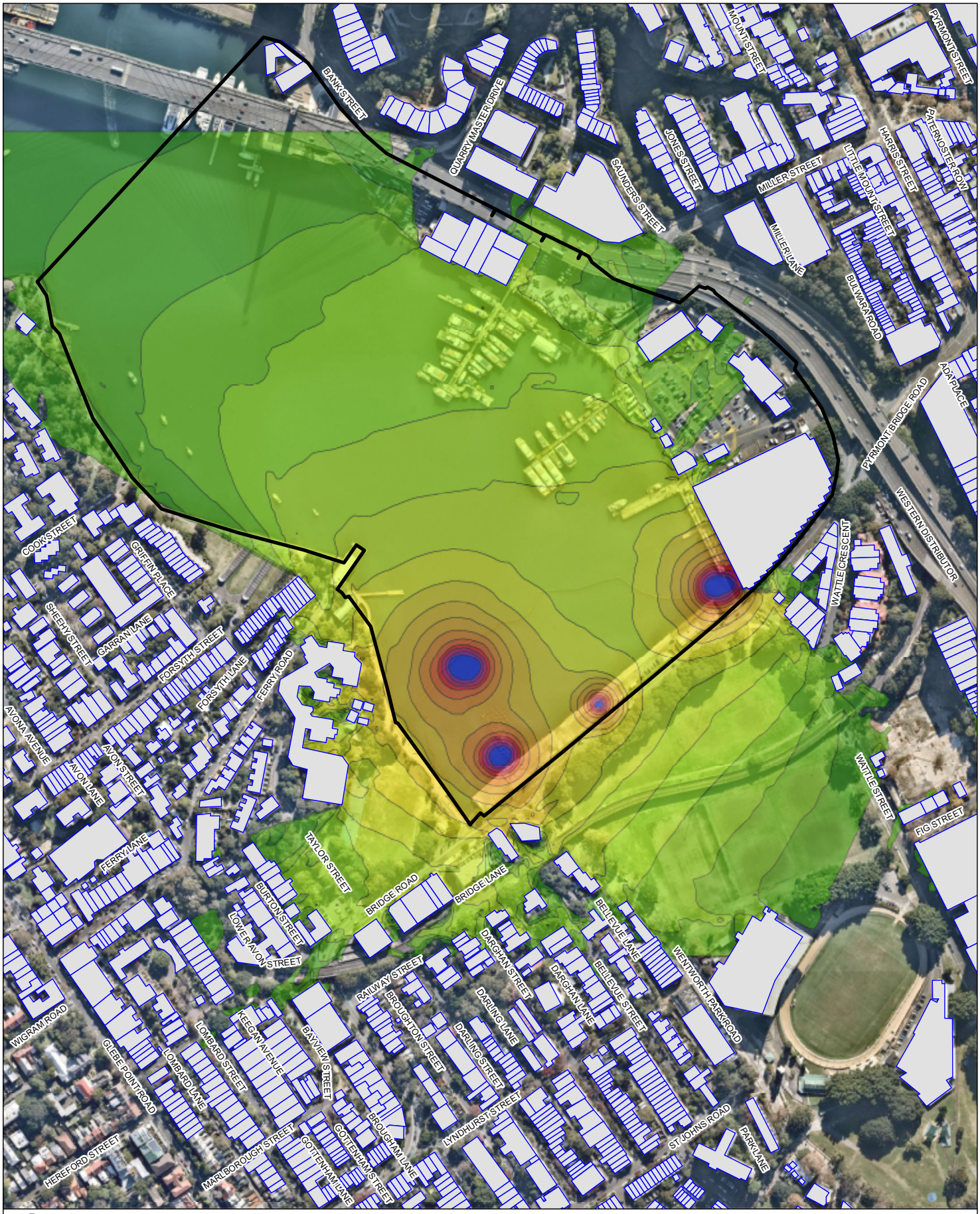
63	73	85	
65	75	87	
67	77	89	
69	79	91	
71	81	93	
	83		

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 2A Typical (Impact Piling)

FIGURE 10

H:\Projects-SLR\610-Srv\SYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 2A Typical (Impact Piling).mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	08-Jul-2021
Drawn by:	ML

Receivers

Noise Level dB(A)

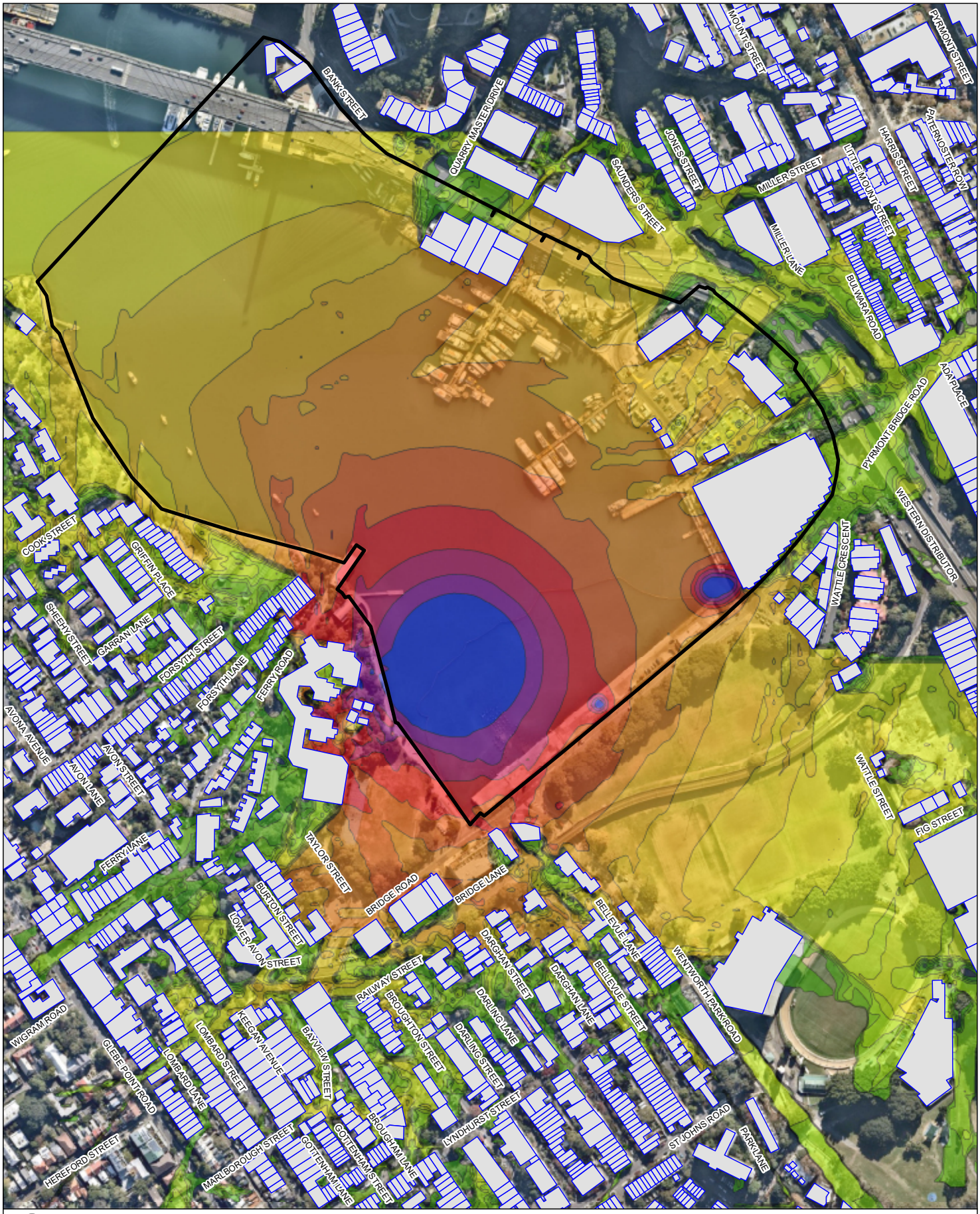
63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 2A Worst Case (Impact Piling)

FIGURE 11

H:\Projects-SLR\610-Srv\SYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 2A Worst Case (Impact Piling).mxd



0 50 100 m

Receivers

Noise Level dB(A)

63	71	79	87
65	73	81	89
67	75	83	91
69	77	85	93

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	08-Jul-2021
Drawn by:	ML

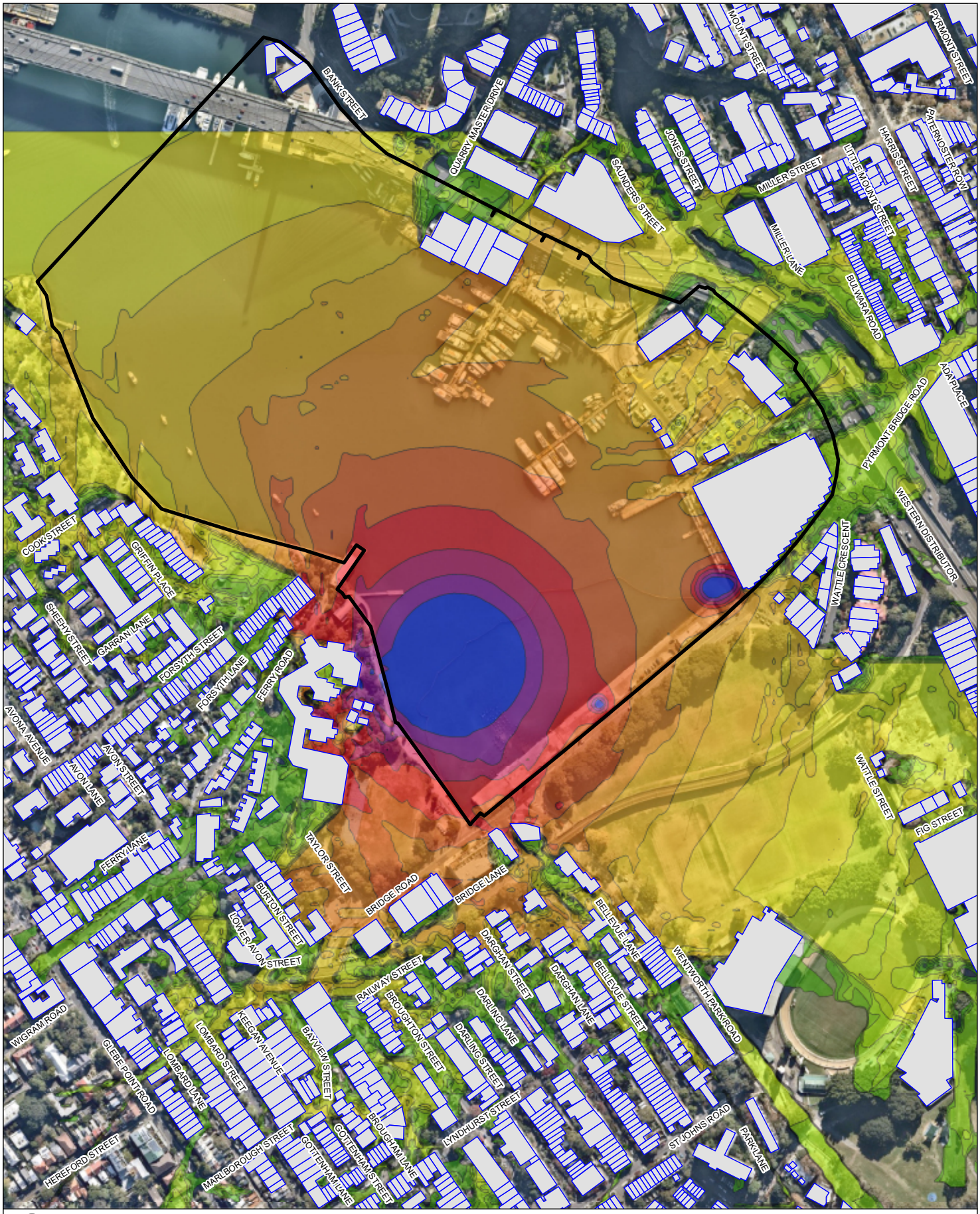
SLR

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 2B Typical (Impact Piling)

FIGURE 12

H:\Projects-SLR\610-Srv\SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 2B Typical (Impact Piling).mxd



0 50 100 m

Receivers

Noise Level dB(A)

63	71	79	87
65	73	81	89
67	75	83	91
69	77	85	93

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	08-Jul-2021
Drawn by:	ML

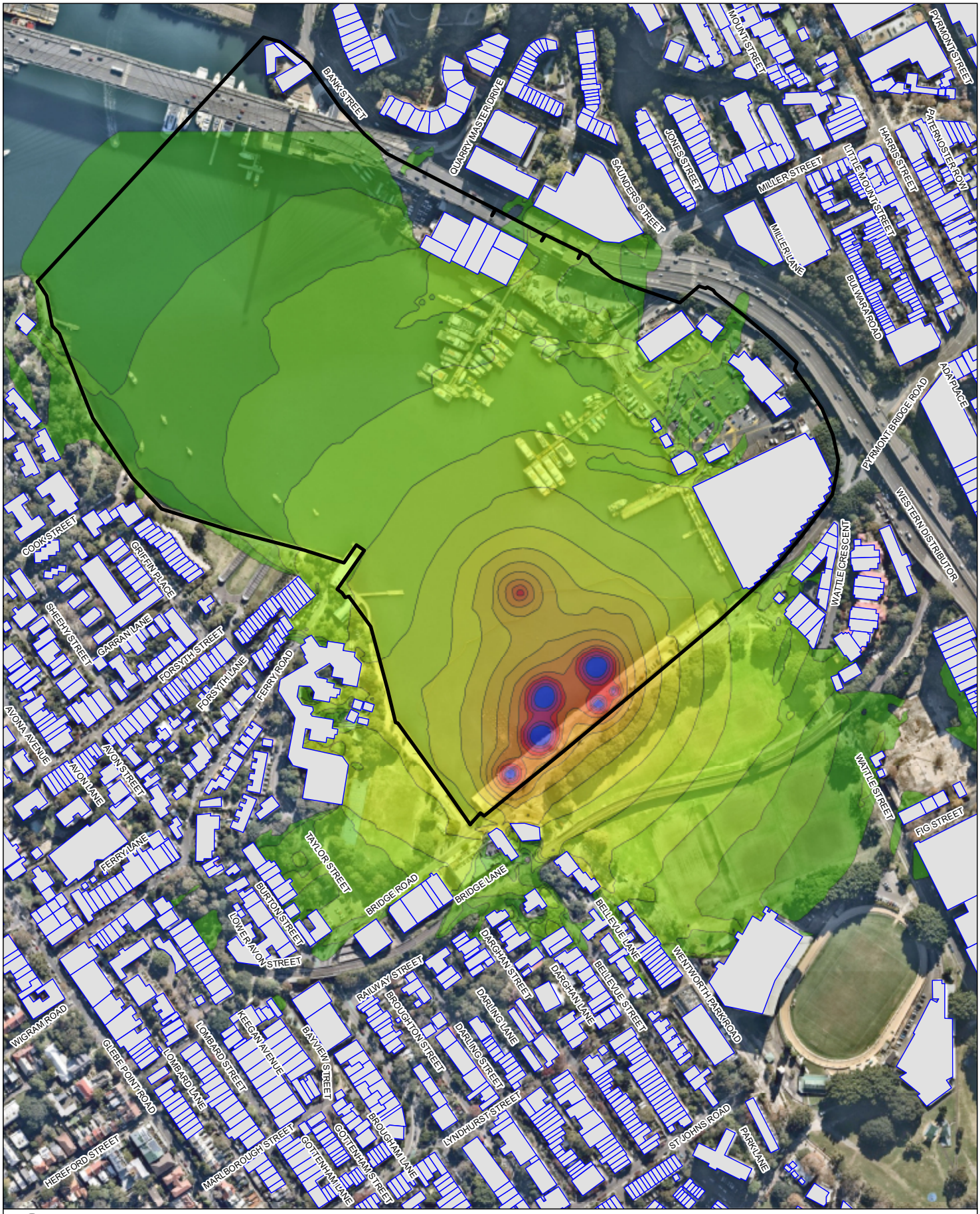
SLR

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 2B Worst Case (Impact Piling)

FIGURE 13

H:\Projects-SLR\610-Srv\SYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 2B Worst Case (Impact Piling).mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	08-Jul-2021
Drawn by:	ML

Receivers

Noise Level dB(A)

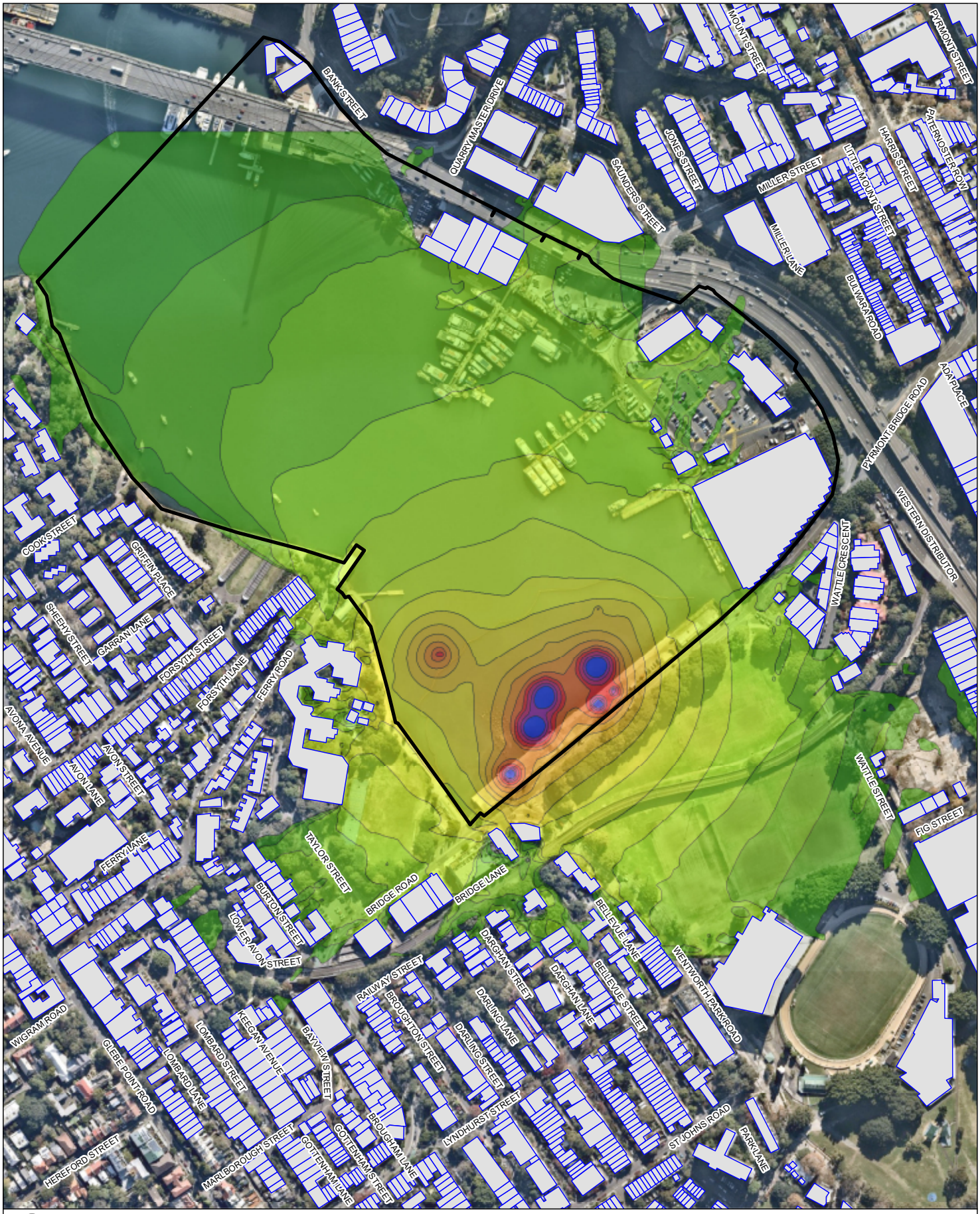
63	73	85
65	75	87
67	77	89
69	79	91
71	81	93
	83	

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 3A Typical (Impact Piling)

FIGURE 14

H:\Projects-SLR\610-Srv\SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 3A Typical (Impact Piling).mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	08-Jul-2021
Drawn by:	ML

Receivers

Noise Level dB(A)

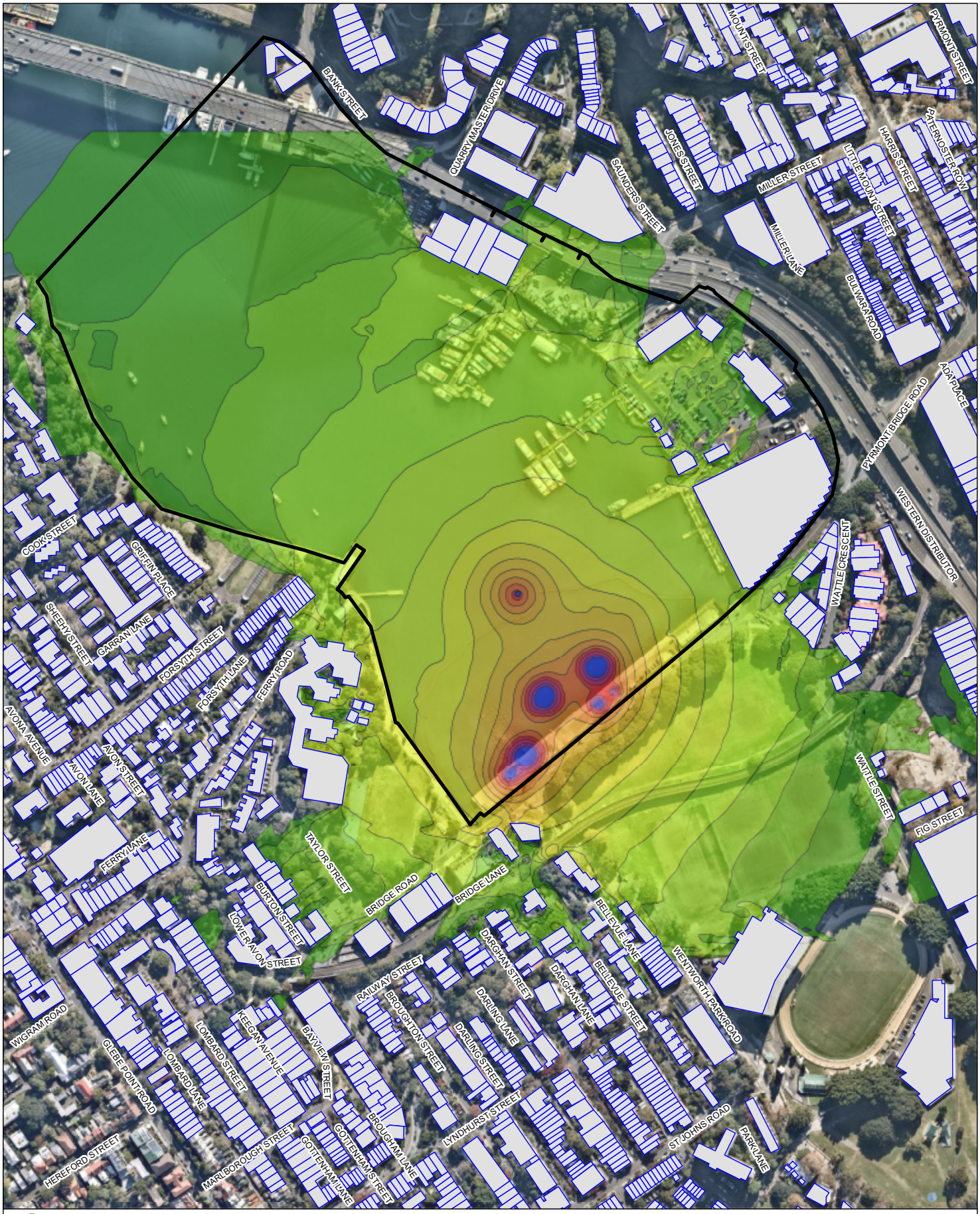
63
65
67
69
71
73
75
77
79
81
83
85
87
89
91
93

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 3A Worst Case (Impact Piling)

FIGURE 15

H:\Projects-SLR\610-Srv\SYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 3A Worst Case (Impact Piling).mxd



0 50 100 m

Receivers

Noise Level dB(A)

63	71	79	87
65	73	81	89
67	75	83	91
69	77	85	93

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	08-Jul-2021
Drawn by:	ML

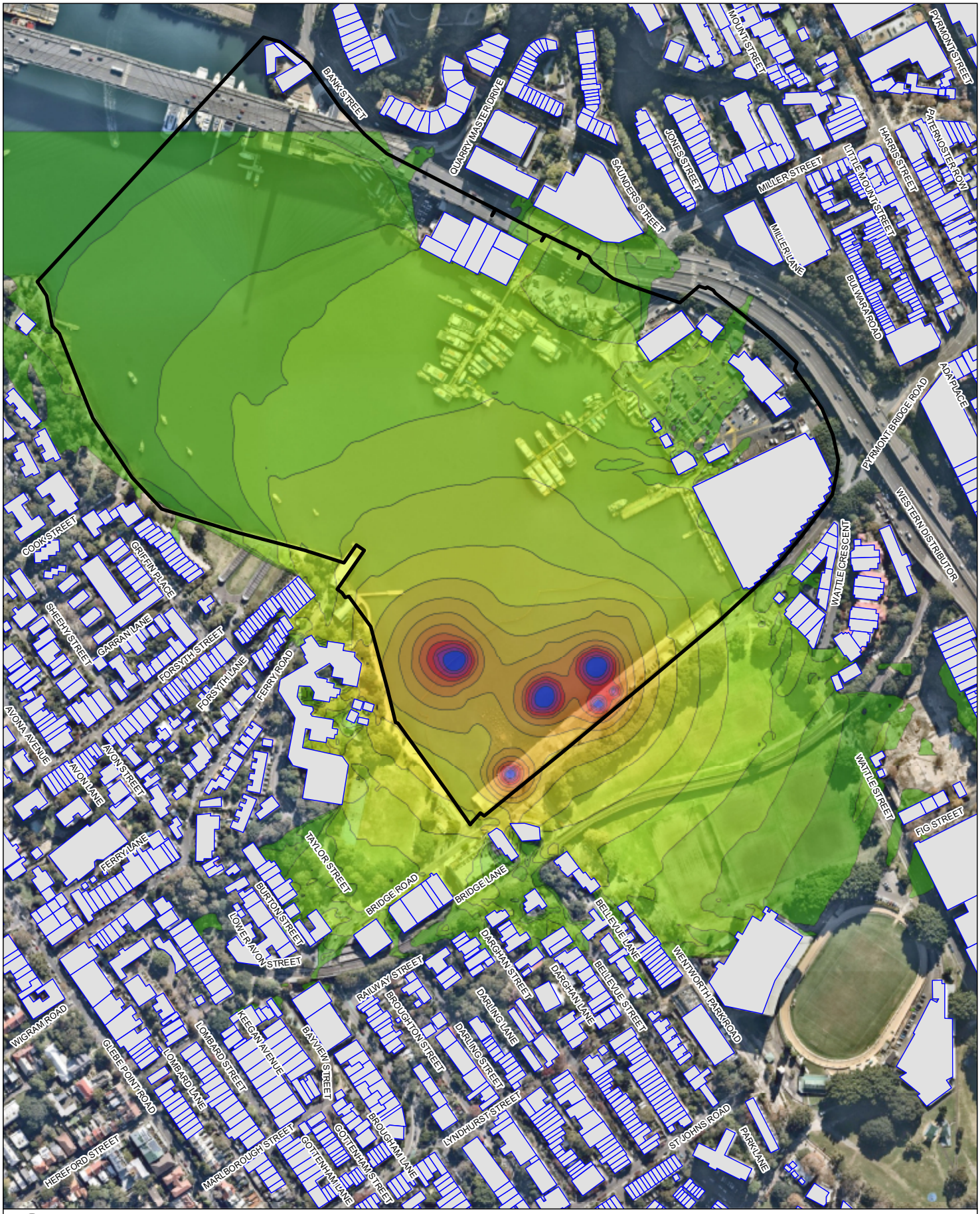
SLR

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 3B Typical (Impact Piling)

FIGURE 16

H:\Projects-SLR\610-Srv\SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 3B Typical (Impact Piling).mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	08-Jul-2021
Drawn by:	ML

Receivers

Noise Level dB(A)

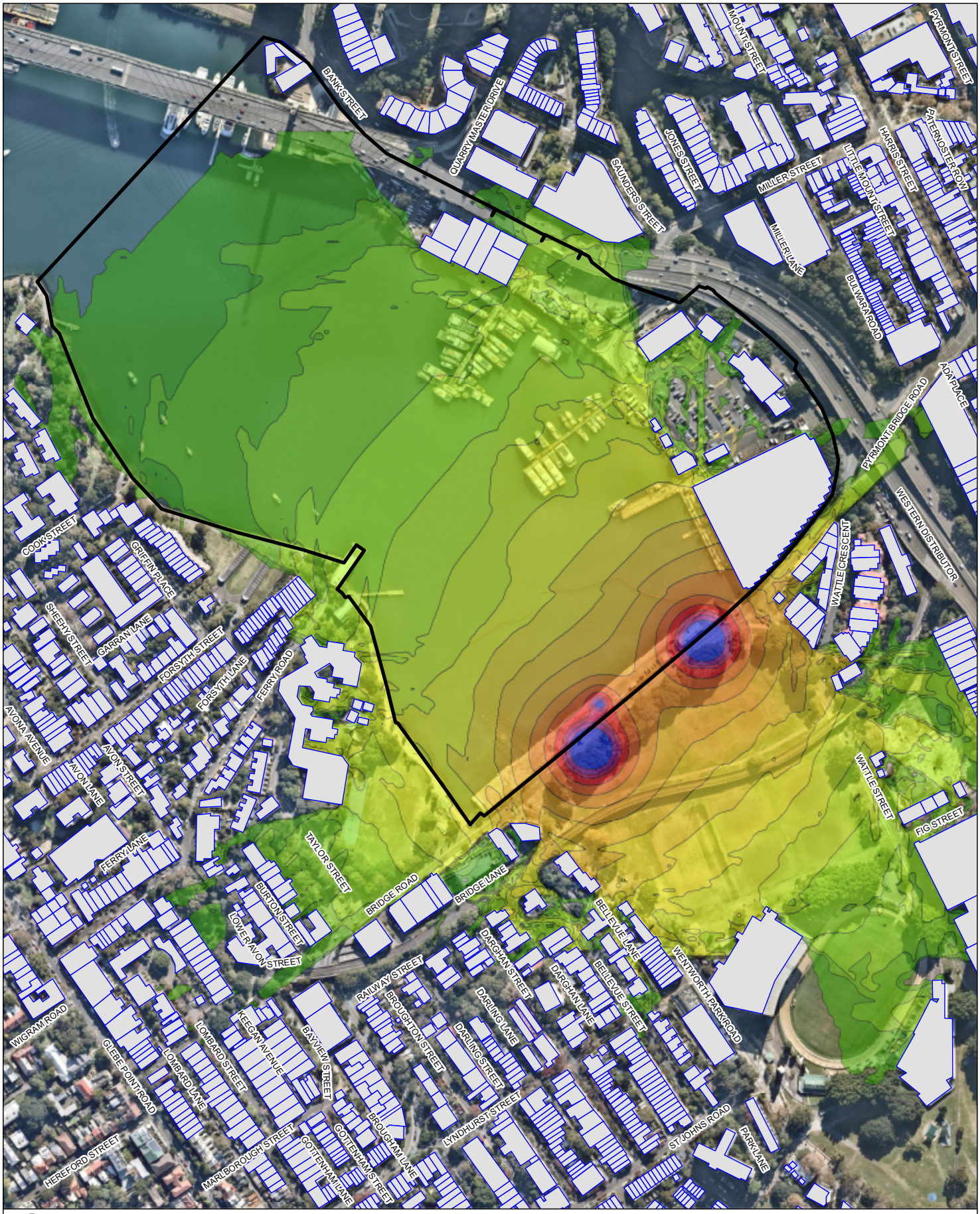
63	73	85	
65	75	87	
67	77	89	
69	79	91	
71	81	93	
	83		

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 3B Worst Case (Impact Piling)

FIGURE 17

H:\Projects-SLR\610-Srv\SYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 3B Worst Case (Impact Piling).mxd



0 50 100 m

Receivers

Noise Level dB(A)

63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	08-Jul-2021
Drawn by:	ML

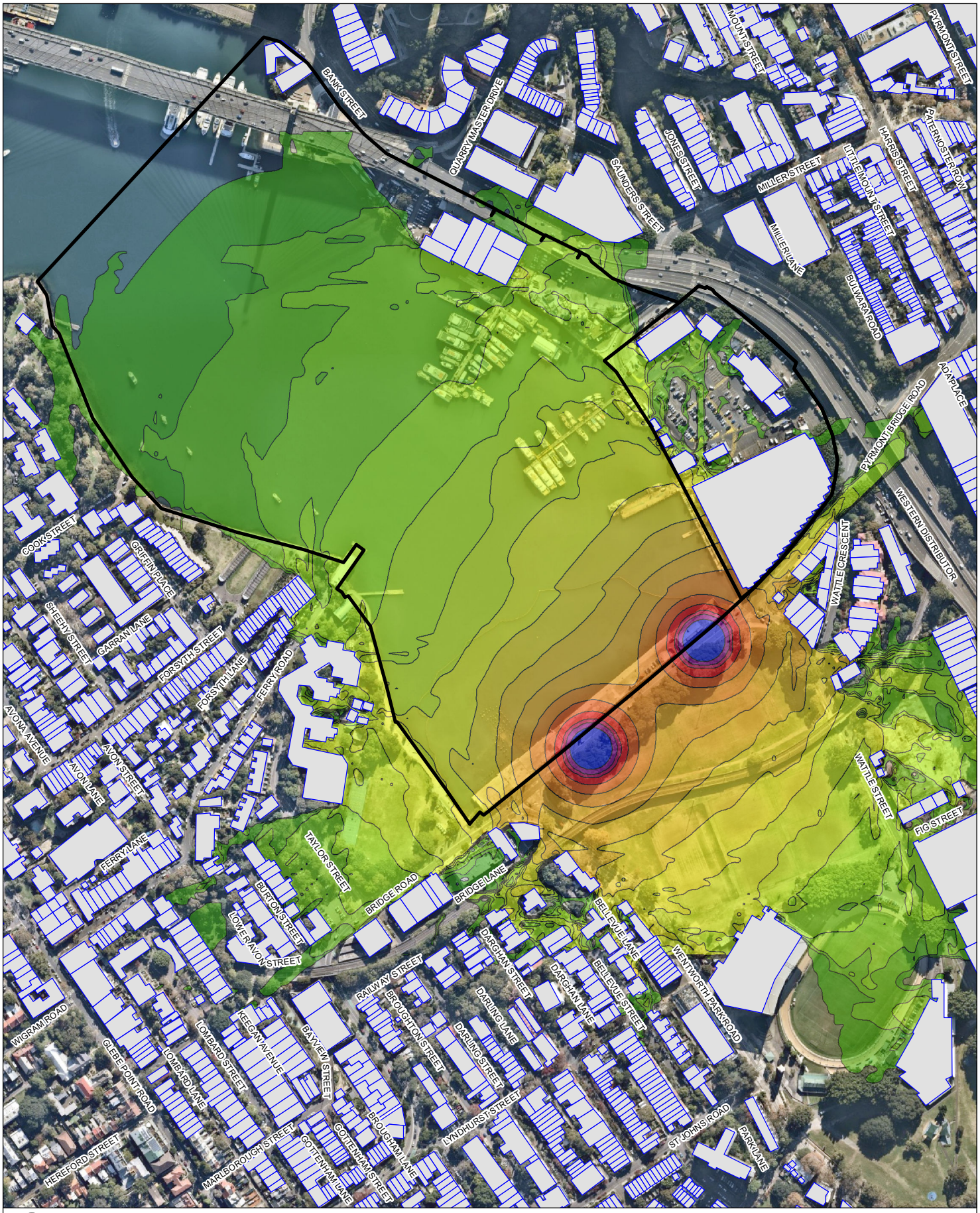
SLR

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 3C

FIGURE 18

H:\Projects-SLR\610-Srv\SYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 3C.mxd



0 50 100 m

Receivers

Noise Level dB(A)

63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	18-Aug-2021
Drawn by:	ML

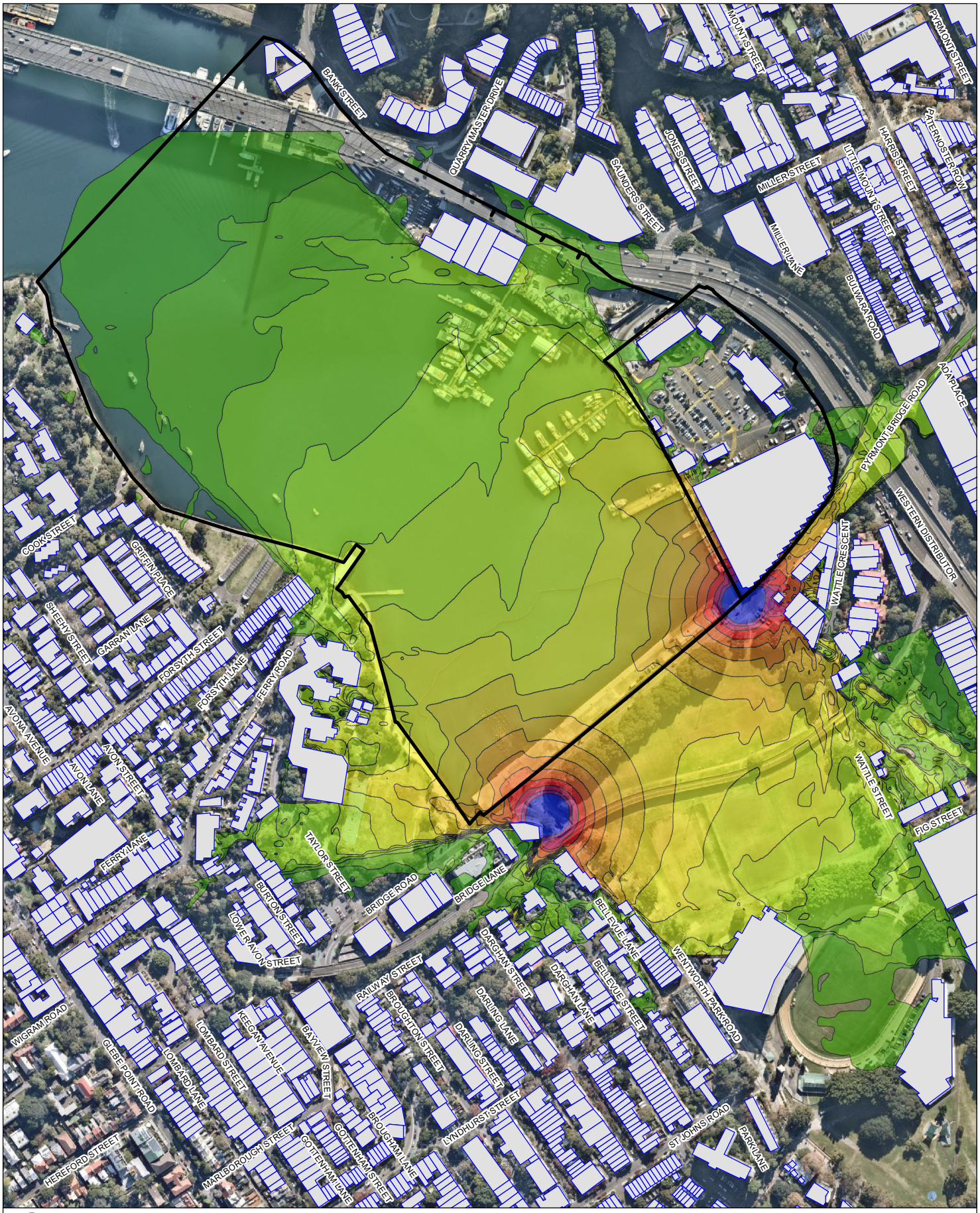
SLR

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 4A Typical

FIGURE 19

H:\Projects-SLR\610-SrvSYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610302264 Scenario 4A Typical.mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	18-Aug-2021
Drawn by:	ML

Receivers

Noise Level dB(A)

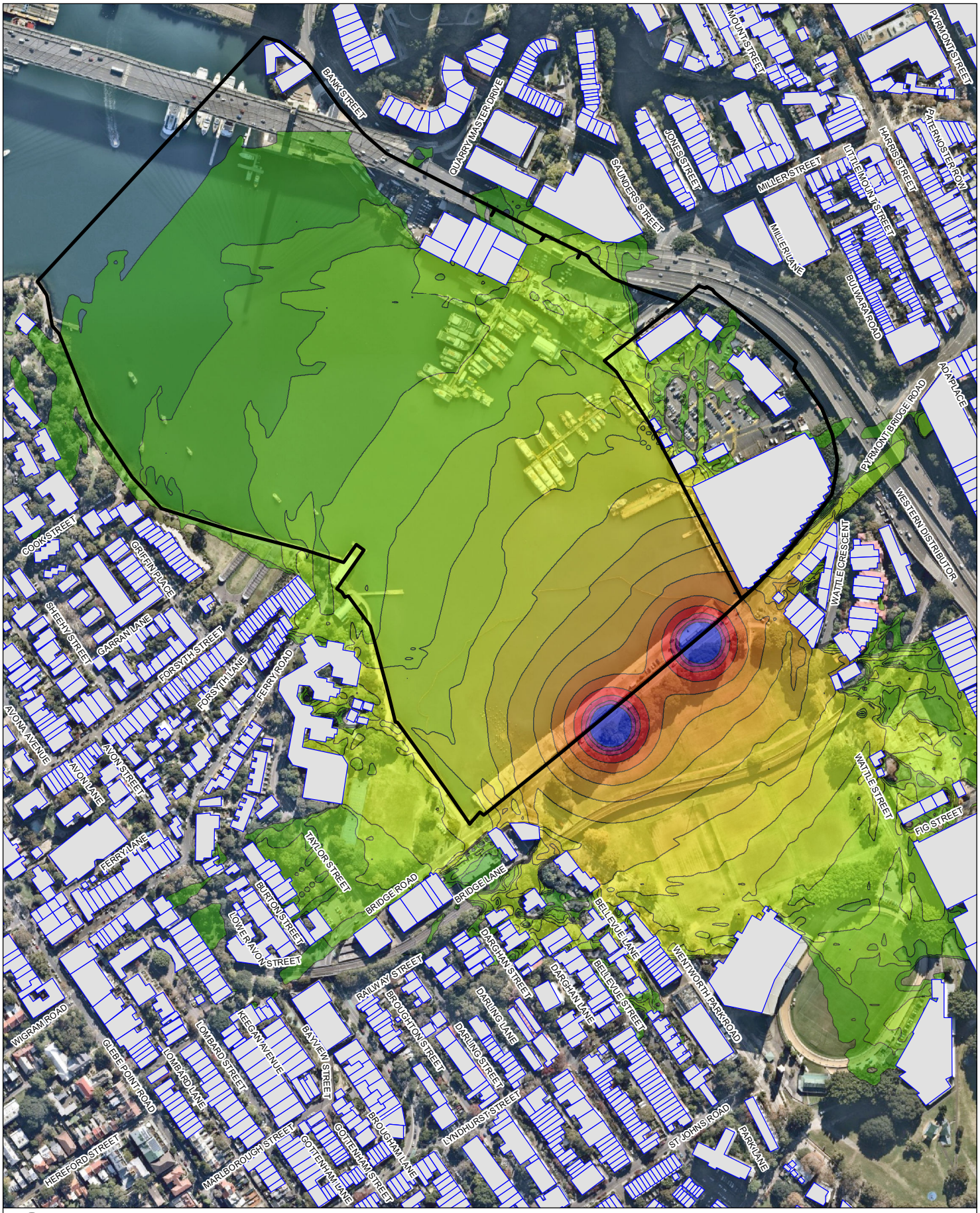
63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 4A Worst Case

FIGURE 20

H:\Projects-SLR\610-SrvSYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610302 64 Scenario 4A Worst Case.mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	18-Aug-2021
Drawn by:	ML

Receivers

Noise Level dB(A)

63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93

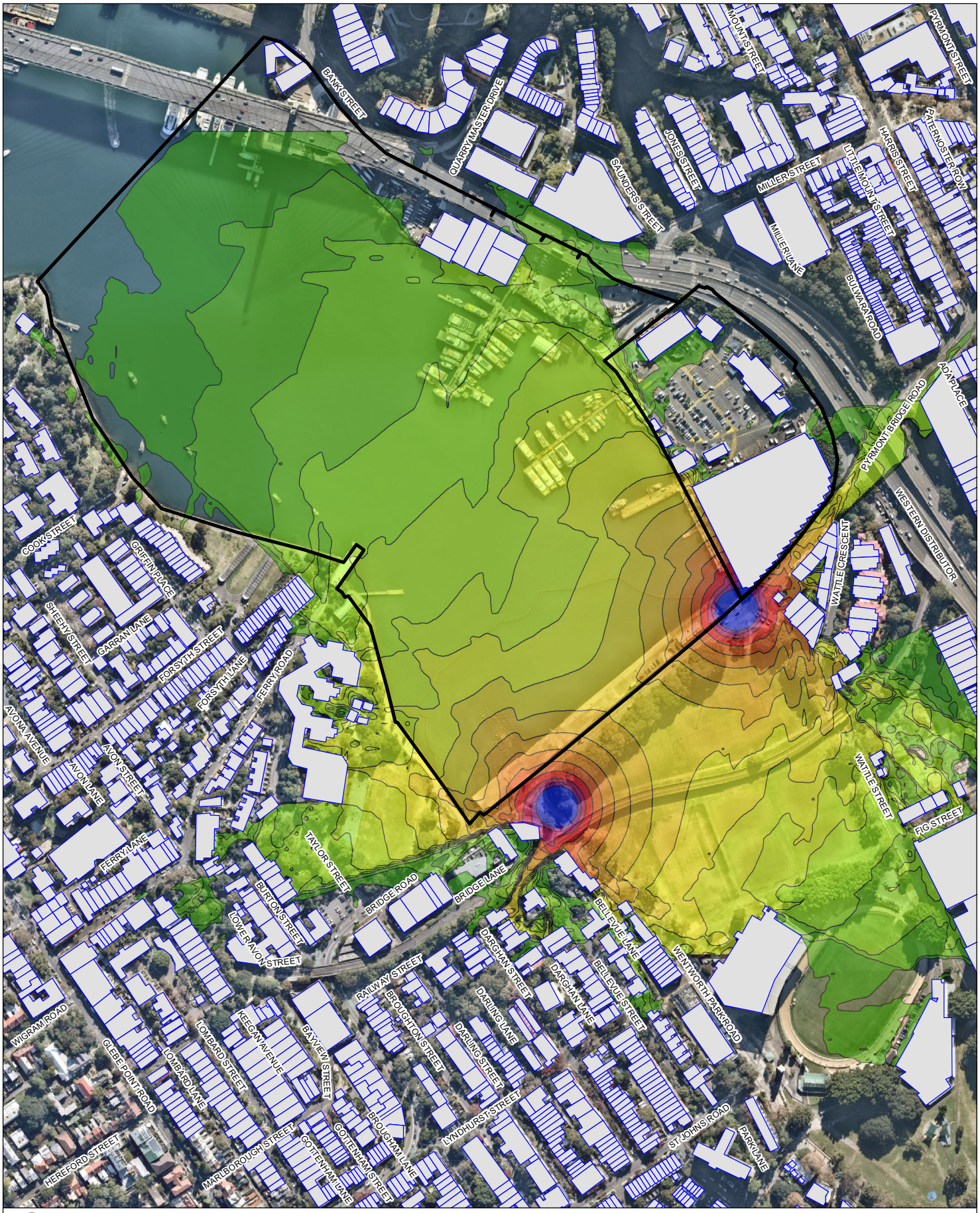
SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 4B Typical

SLR

FIGURE 21

H:\Projects-SLR\610-SrvSYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 4B Typical.mxd



0 50 100 m

Receivers

Noise Level dB(A)

63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	18-Aug-2021
Drawn by:	ML

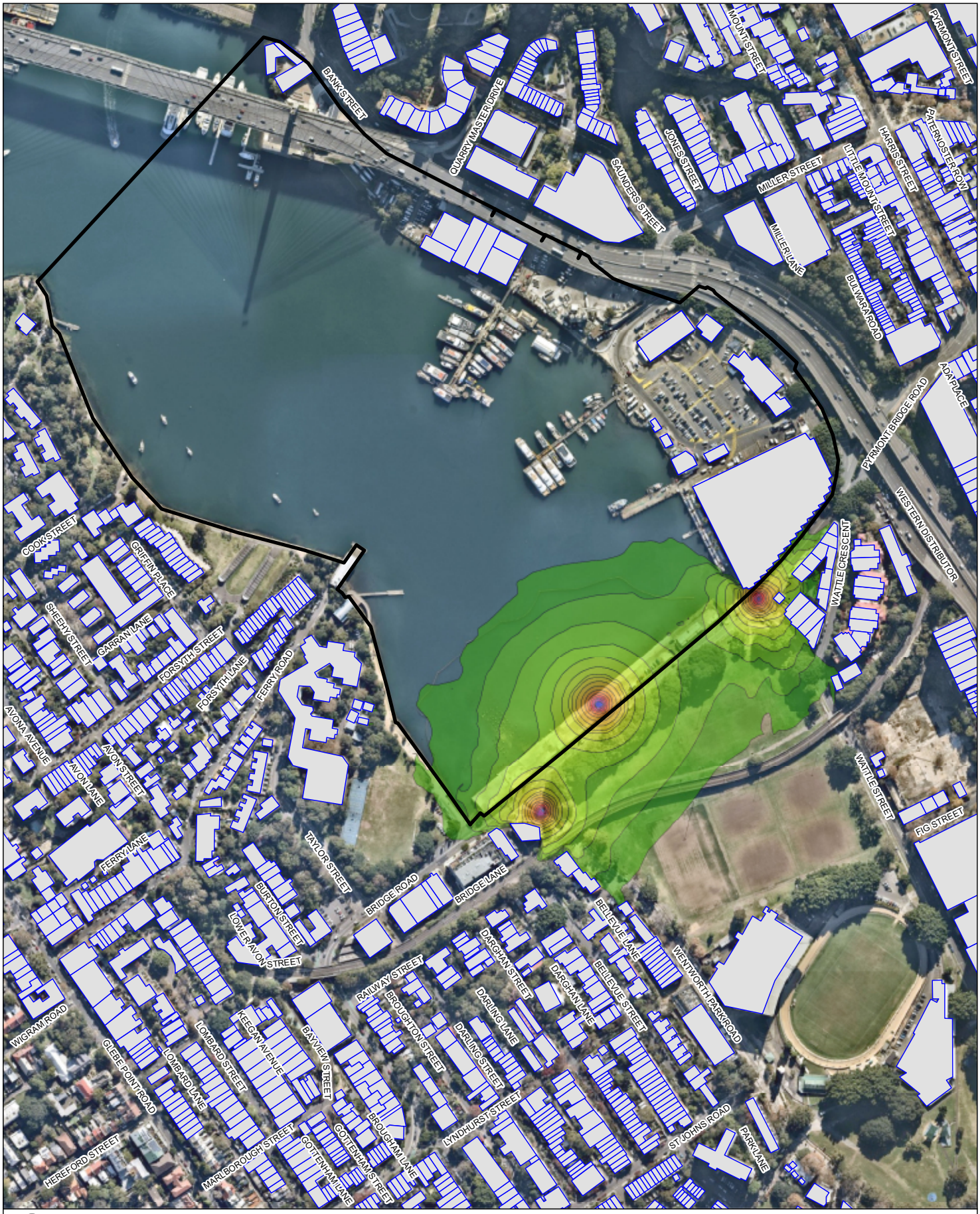
SLR

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 4B Worst Case

FIGURE 22

H:\Projects-SLR\610-SrvSYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610302264 Scenario 4B Worst Case.mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	08-Jul-2021
Drawn by:	ML

Receivers

Noise Level dB(A)

63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 5

FIGURE 23

H:\Projects-SLR\610-Srv\SYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 5.mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	08-Jul-2021
Drawn by:	ML

Receivers

Noise Level dB(A)

63	73	85
65	75	87
67	77	89
69	79	91
71	81	93
	83	

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 6A

FIGURE 24

H:\Projects-SLR\610-Srv\SYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 6A.mxd



0 50 100 m

Receivers

Noise Level dB(A)

63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	08-Jul-2021
Drawn by:	ML

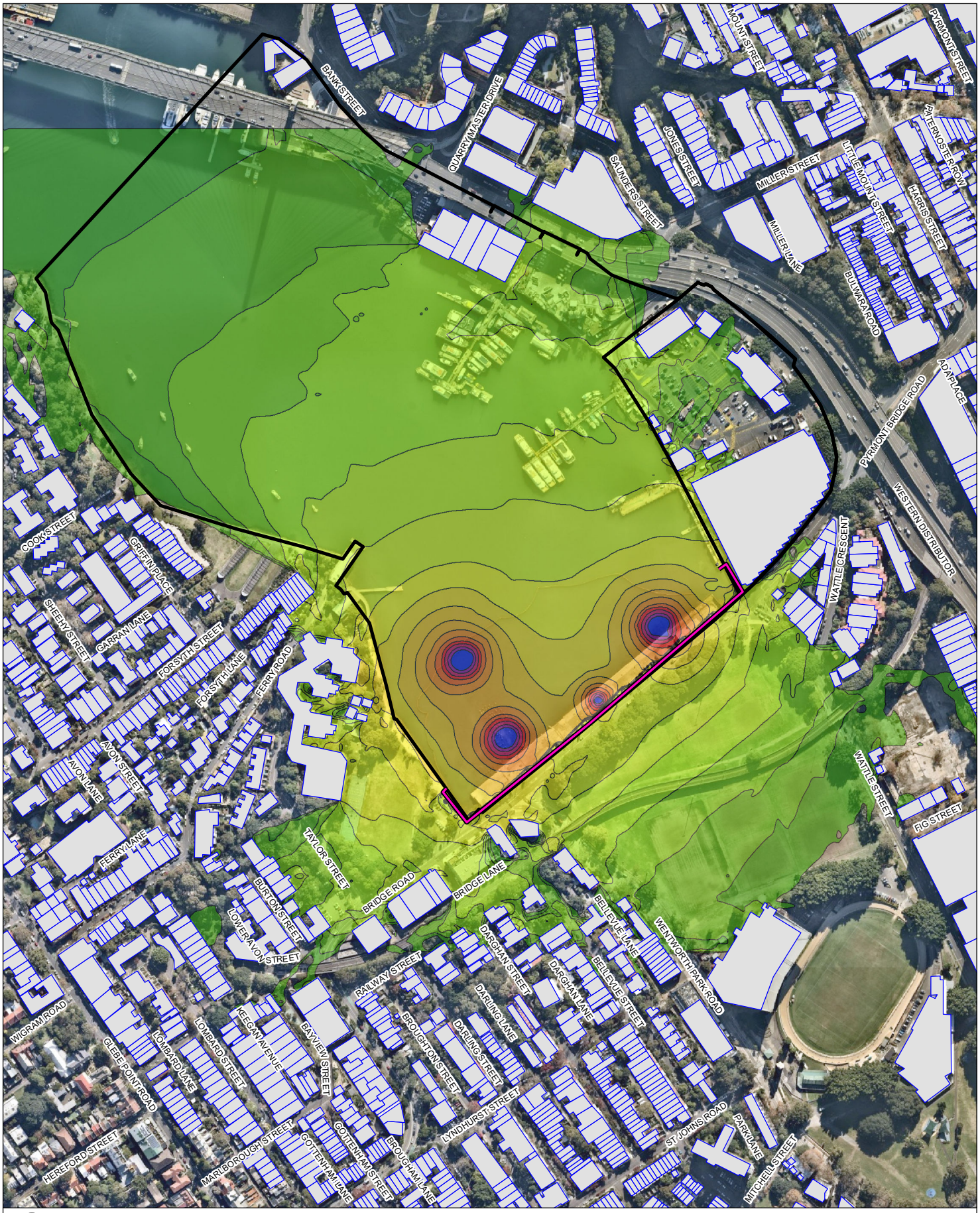
SLR

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 6B

FIGURE 25

H:\Projects-SLR\610-Srv\SYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 6B.mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	20-Aug-2021
Drawn by:	ML

2.4m Noise Barrier

Receivers

Noise Level dB(A)

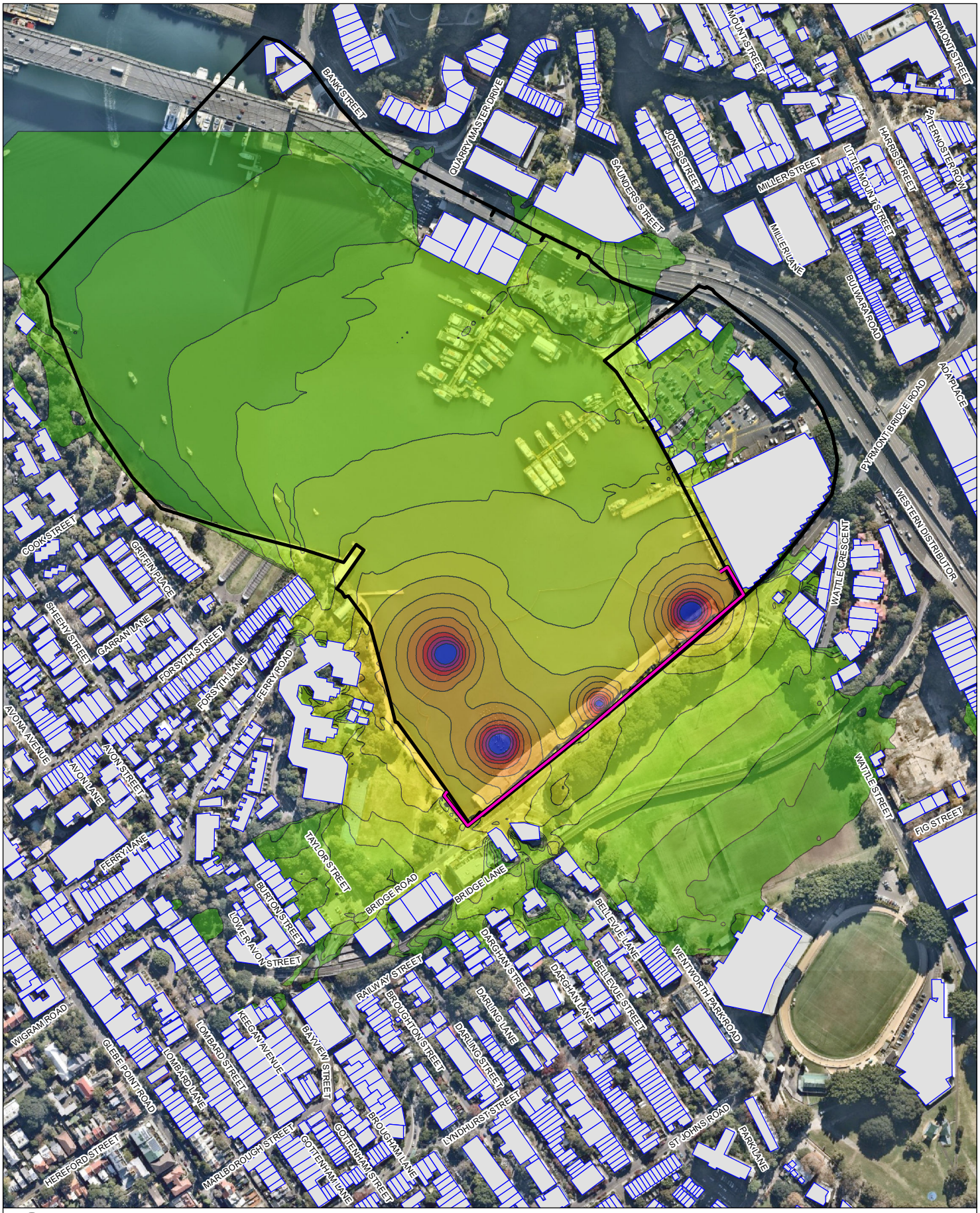
63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 1A Typical (Set up Impact Piling) with 2m Barrier

FIGURE 26

H:\Projects-SLR\610-SrvSYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 1A Typical (Set up Impact Piling) with 2m Barrier.mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	20-Aug-2021
Drawn by:	ML

2.4m Noise Barrier

Receivers

Noise Level dB(A)

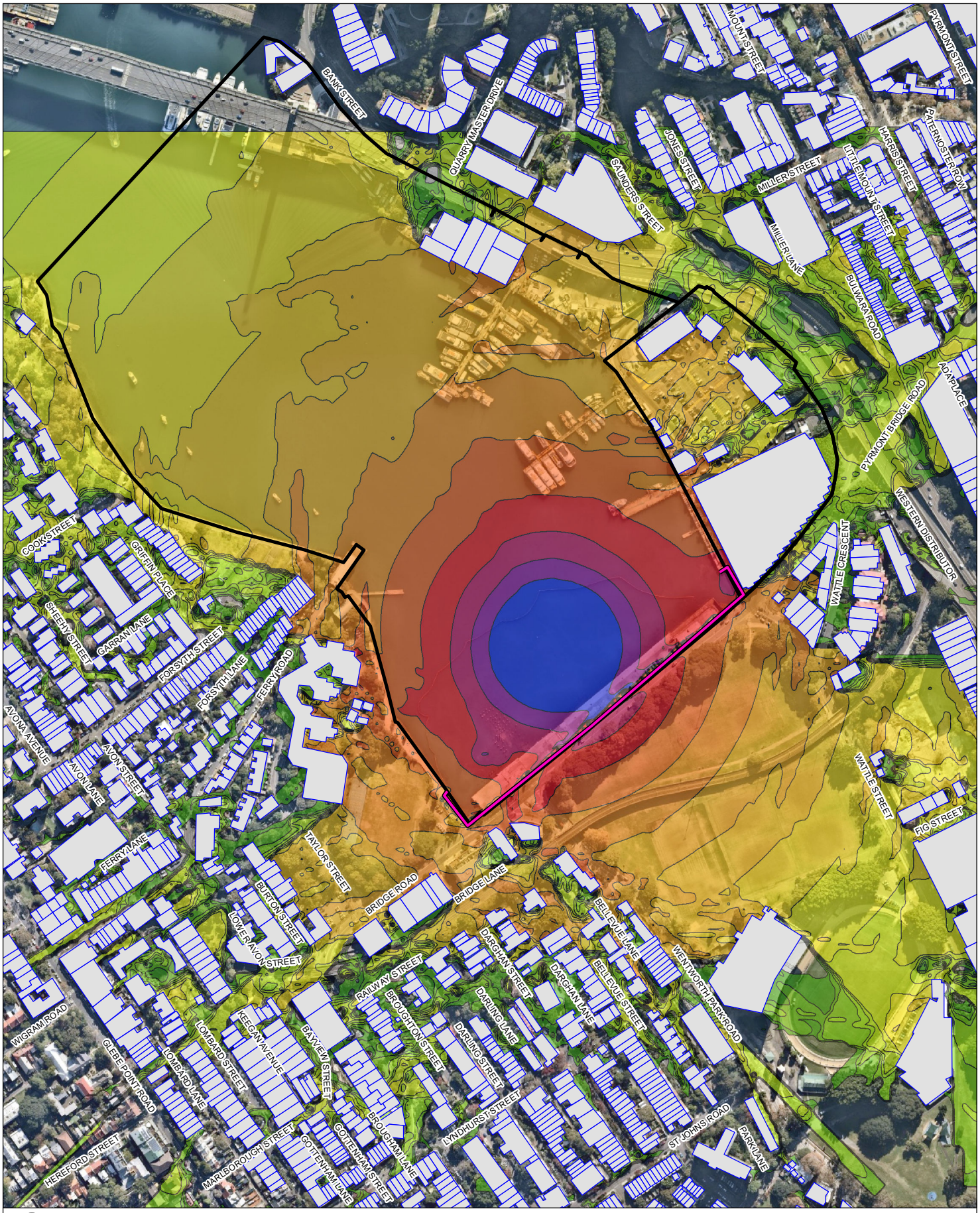
63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 1A Worst Case (Set up Impact Piling) with 2m Barrier

FIGURE 27

H:\Projects-SLR\610-SrvSYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 1A Worst Case (Set up Impact Piling) with 2m Barrier.mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	20-Aug-2021
Drawn by:	ML

2.4m Noise Barrier

Receivers

Noise Level dB(A)

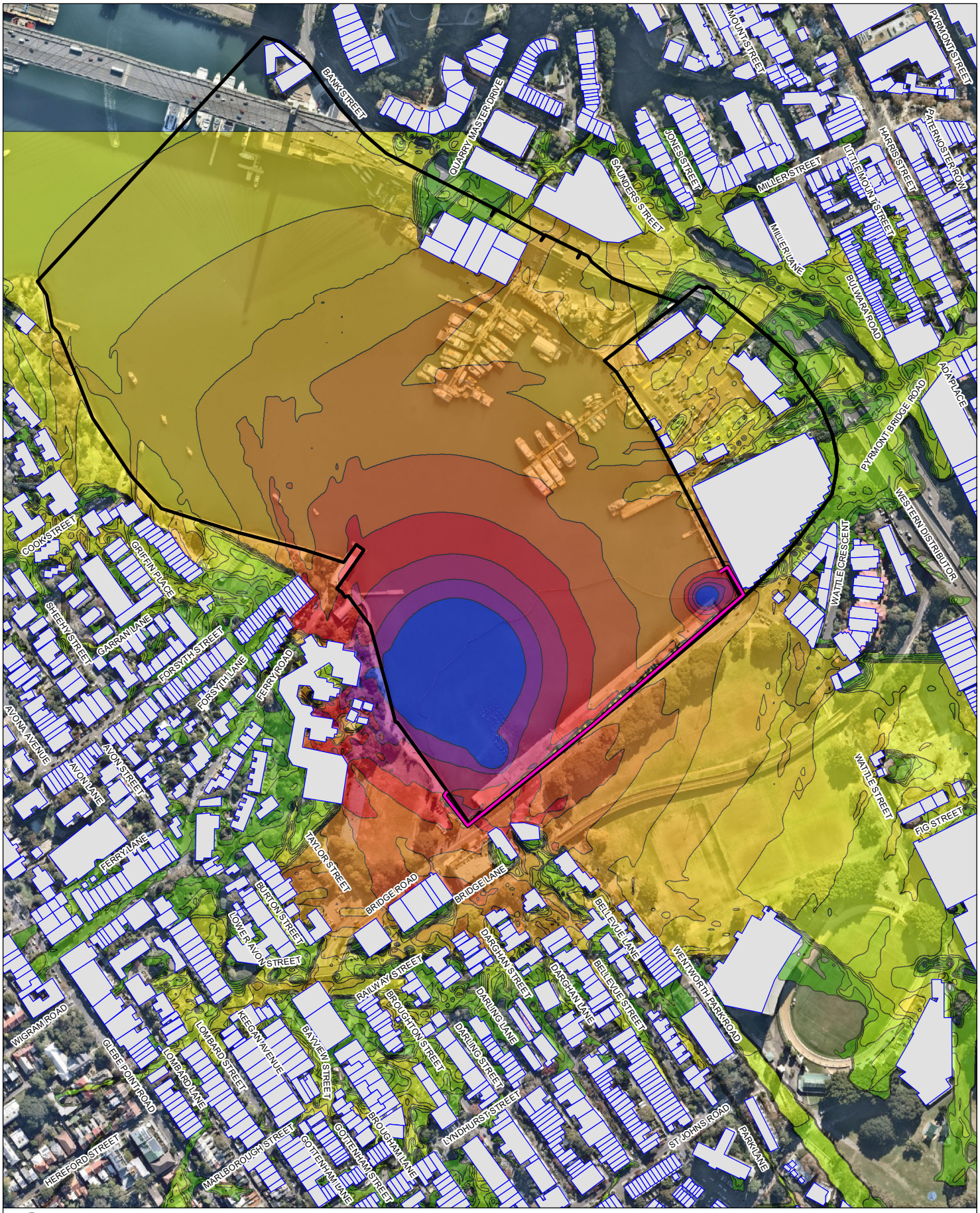
63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 1B Typical (Impact Piling) with 2m Barrier

FIGURE 28

H:\Projects-SLR\610-SrvSYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 1B Typical (Impact Piling) with 2m Barrier.mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	20-Aug-2021
Drawn by:	ML

2.4m Noise Barrier

Receivers

Noise Level dB(A)

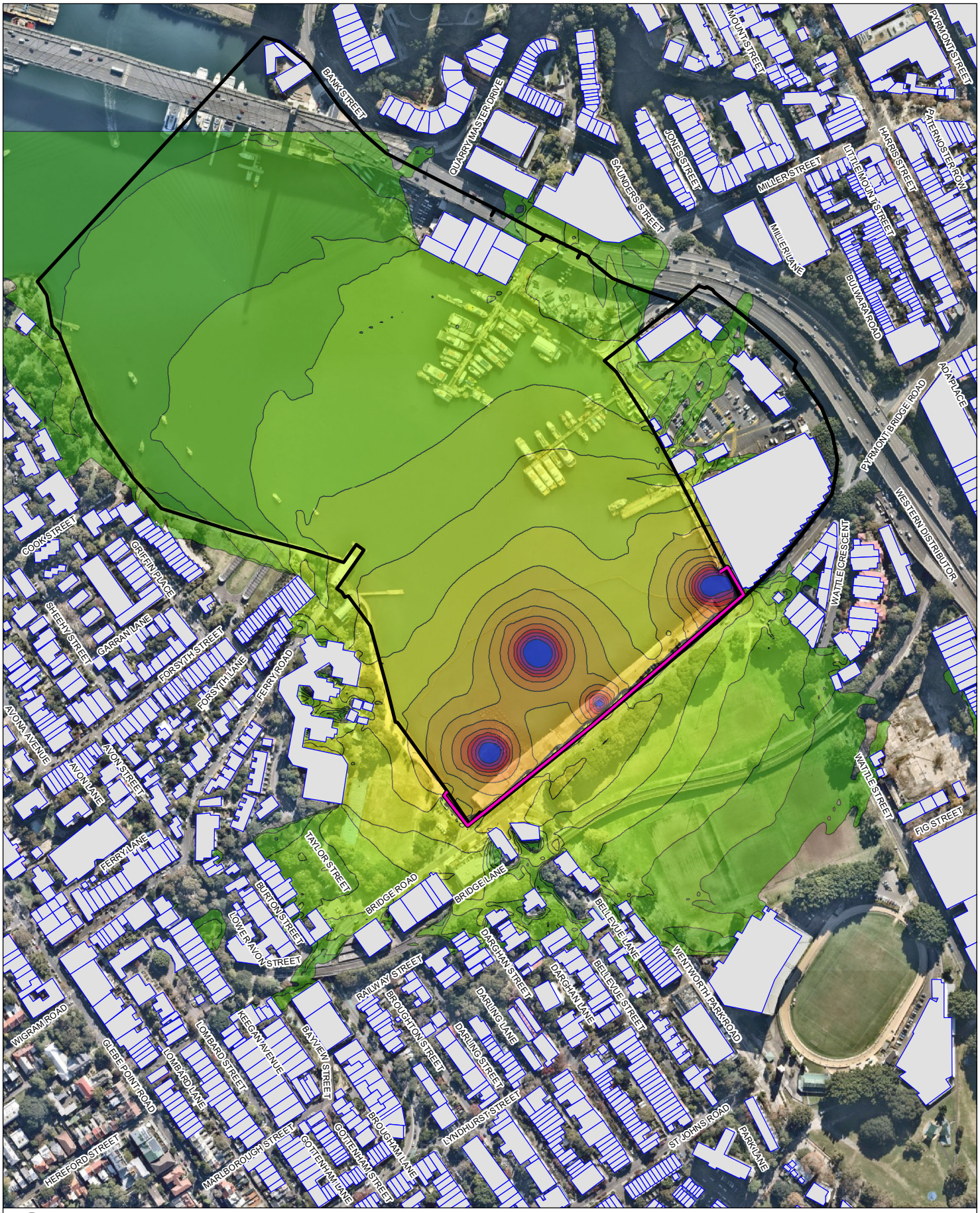
63	73	85
65	75	87
67	77	89
69	79	91
71	81	93
	83	

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 1B Worst Case (Impact Piling) with 2m Barrier

FIGURE 29

H:\Projects-SLR\610-SrvSYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 1B Worst Case (Impact Piling) with 2m Barrier.mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	20-Aug-2021
Drawn by:	ML

2.4m Noise Barrier

Receivers

Noise Level dB(A)

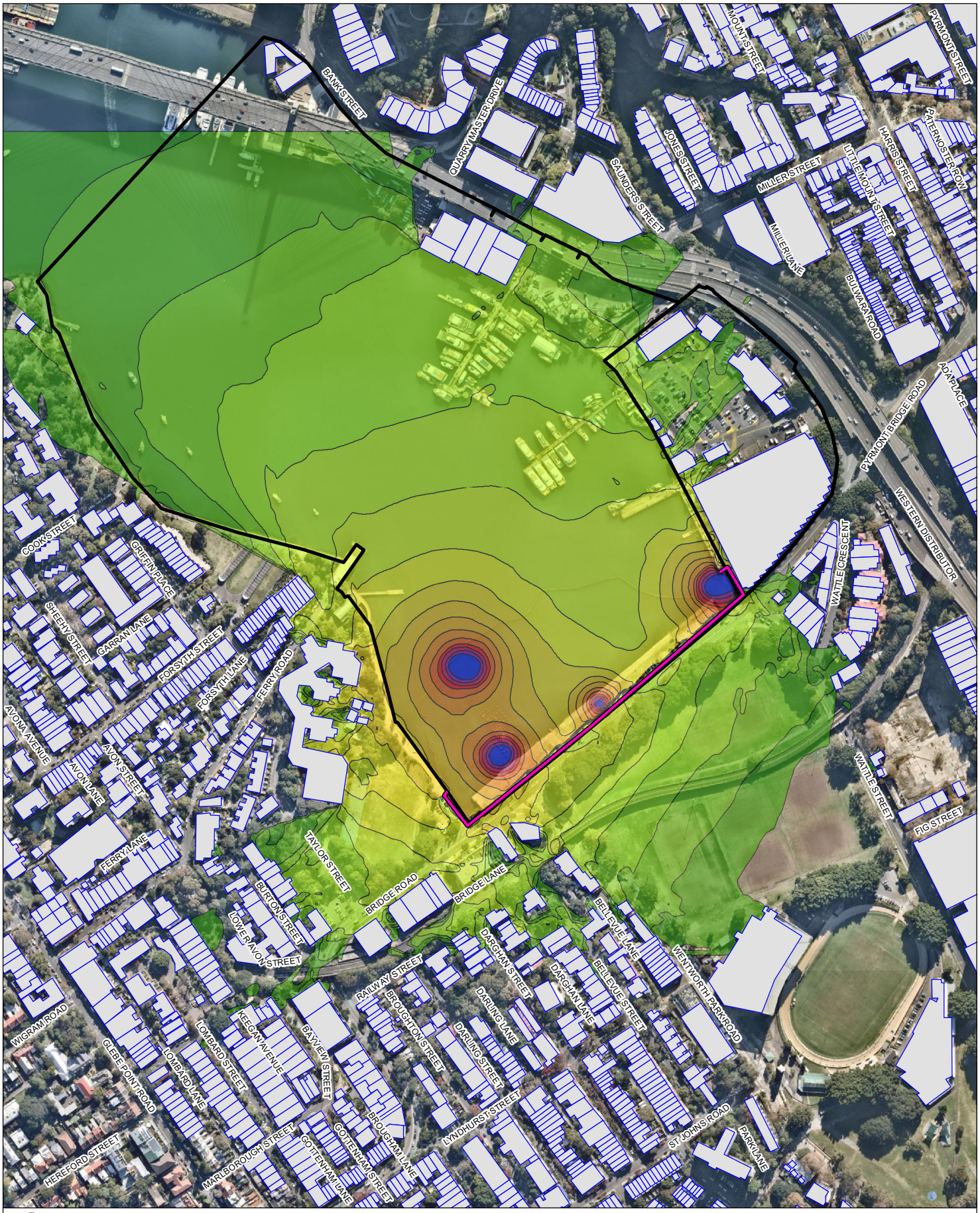
63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 2A Typical (Impact Piling) with 2m Barrier

FIGURE 30

H:\Projects-SLR\610-SrvSYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 2A Typical (Impact Piling) with 2m Barrier.mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	20-Aug-2021
Drawn by:	ML

2.4m Noise Barrier

Receivers

Noise Level dB(A)

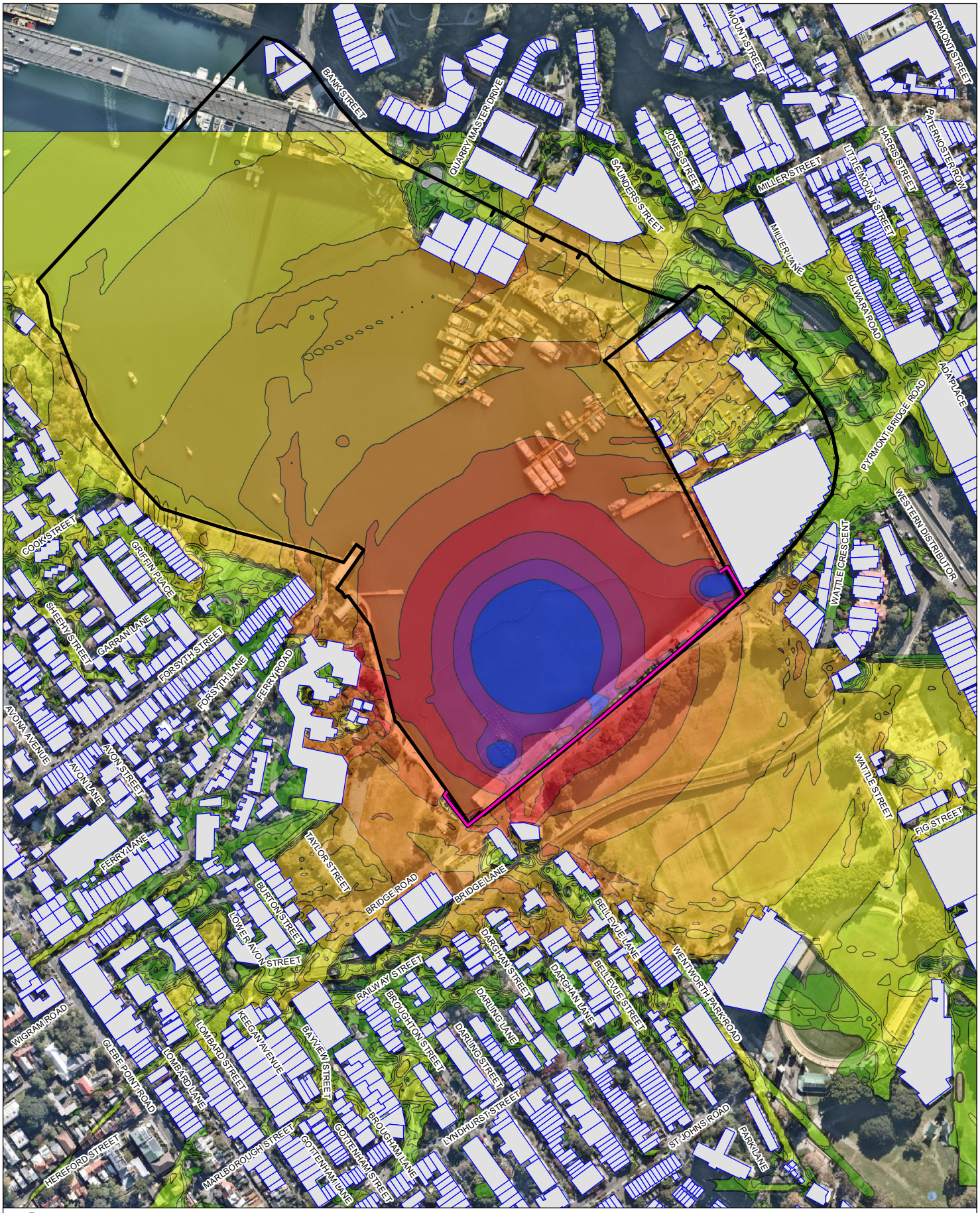
63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 2A Worst Case (Impact Piling) with 2m Barrier

FIGURE 31

H:\Projects-SLR\610-SrvSYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 2A Worst Case (Impact Piling) with 2m Barrier.mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	20-Aug-2021
Drawn by:	ML

2.4m Noise Barrier

Receivers

Noise Level dB(A)

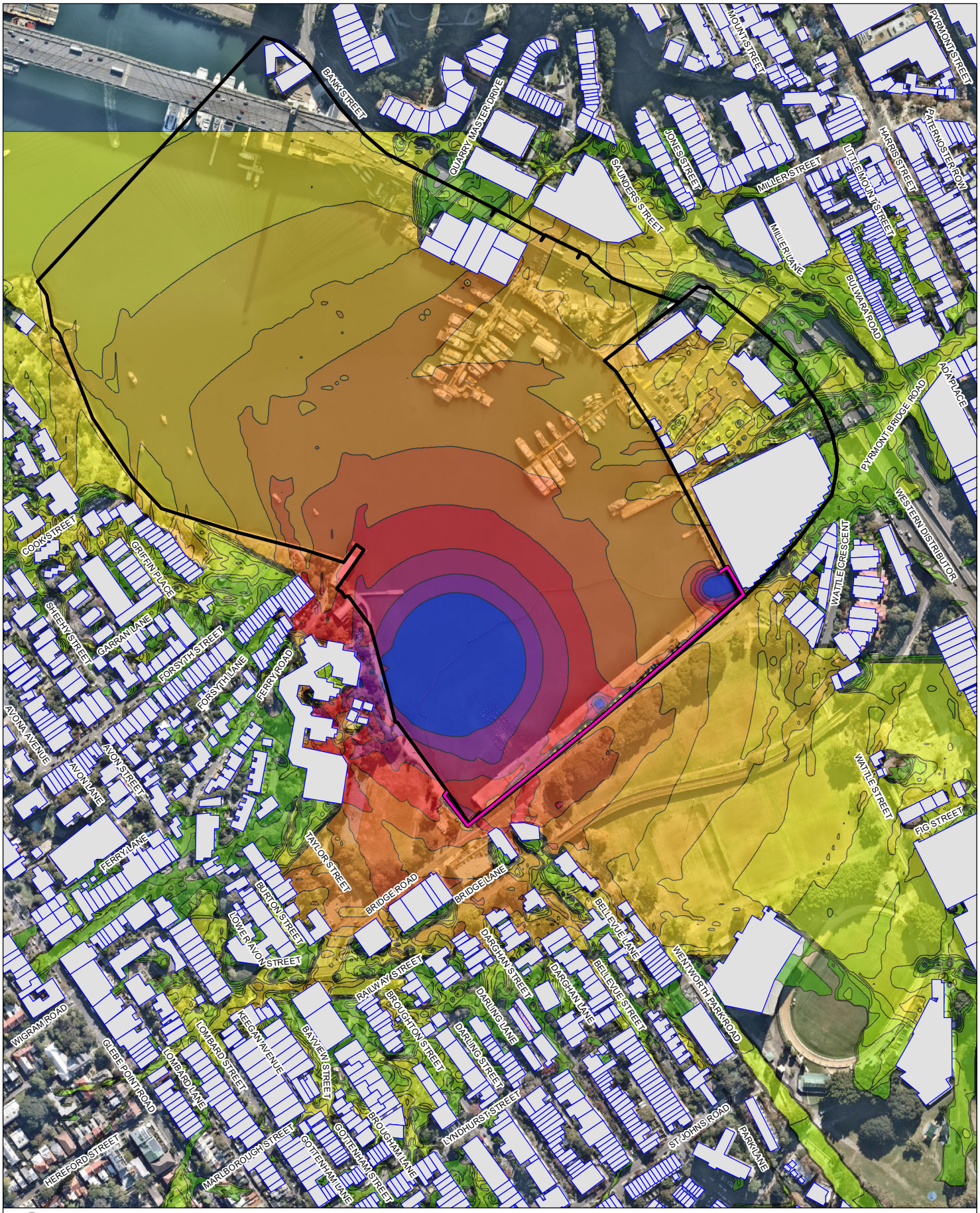
63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 2B Typical (Impact Piling) with 2m Barrier

FIGURE 32

H:\Projects-SLR\610-SrvSYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 2B Typical (Impact Piling) with 2m Barrier.mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	20-Aug-2021
Drawn by:	ML

2.4m Noise Barrier

Receivers

Noise Level dB(A)

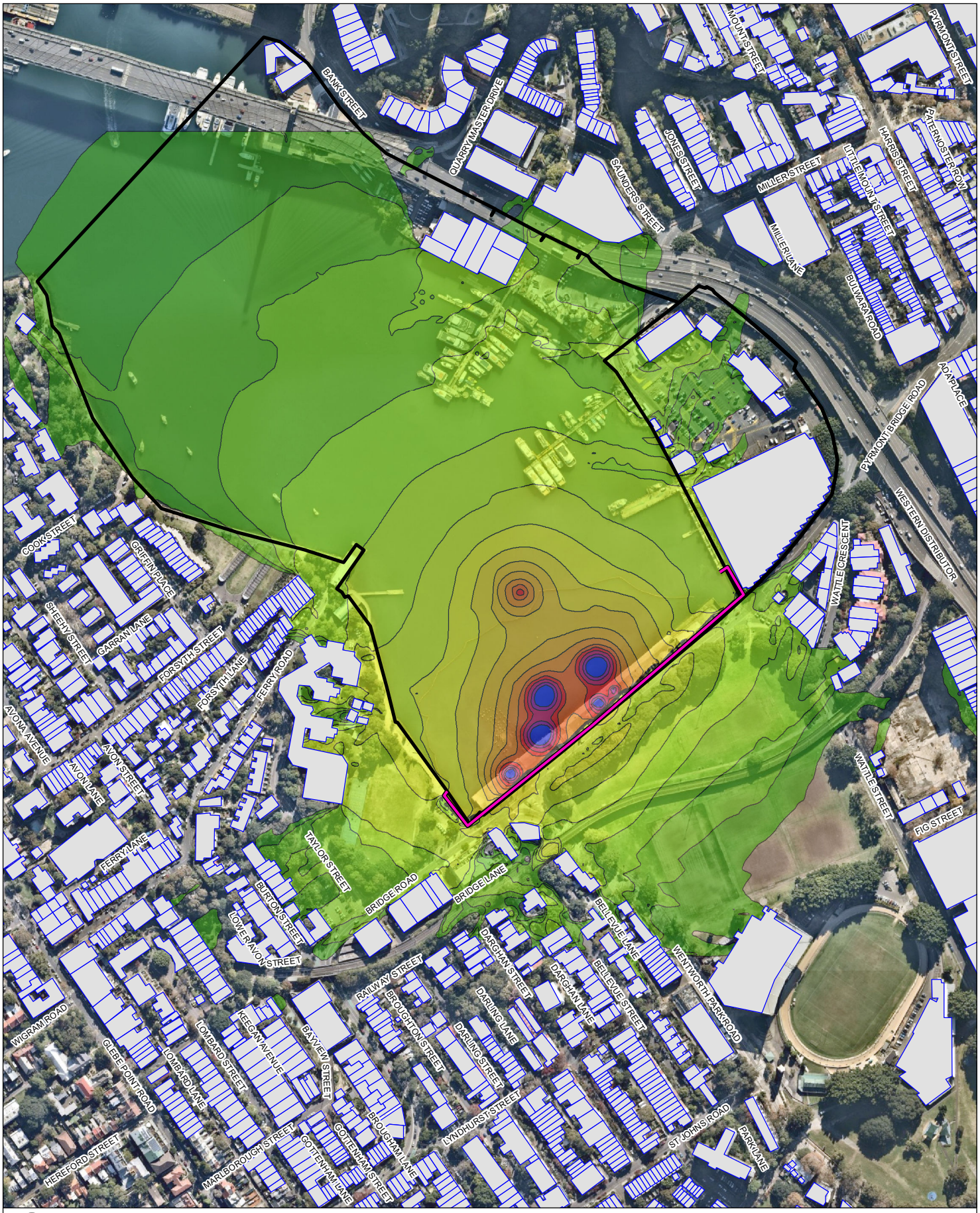
63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 2B Worst Case (Impact Piling) with 2m Barrier

FIGURE 33

H:\Projects-SLR\610-SrvSYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 2B Worst Case (Impact Piling) with 2m Barrier.mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	20-Aug-2021
Drawn by:	ML

2.4m Noise Barrier

Receivers

Noise Level dB(A)

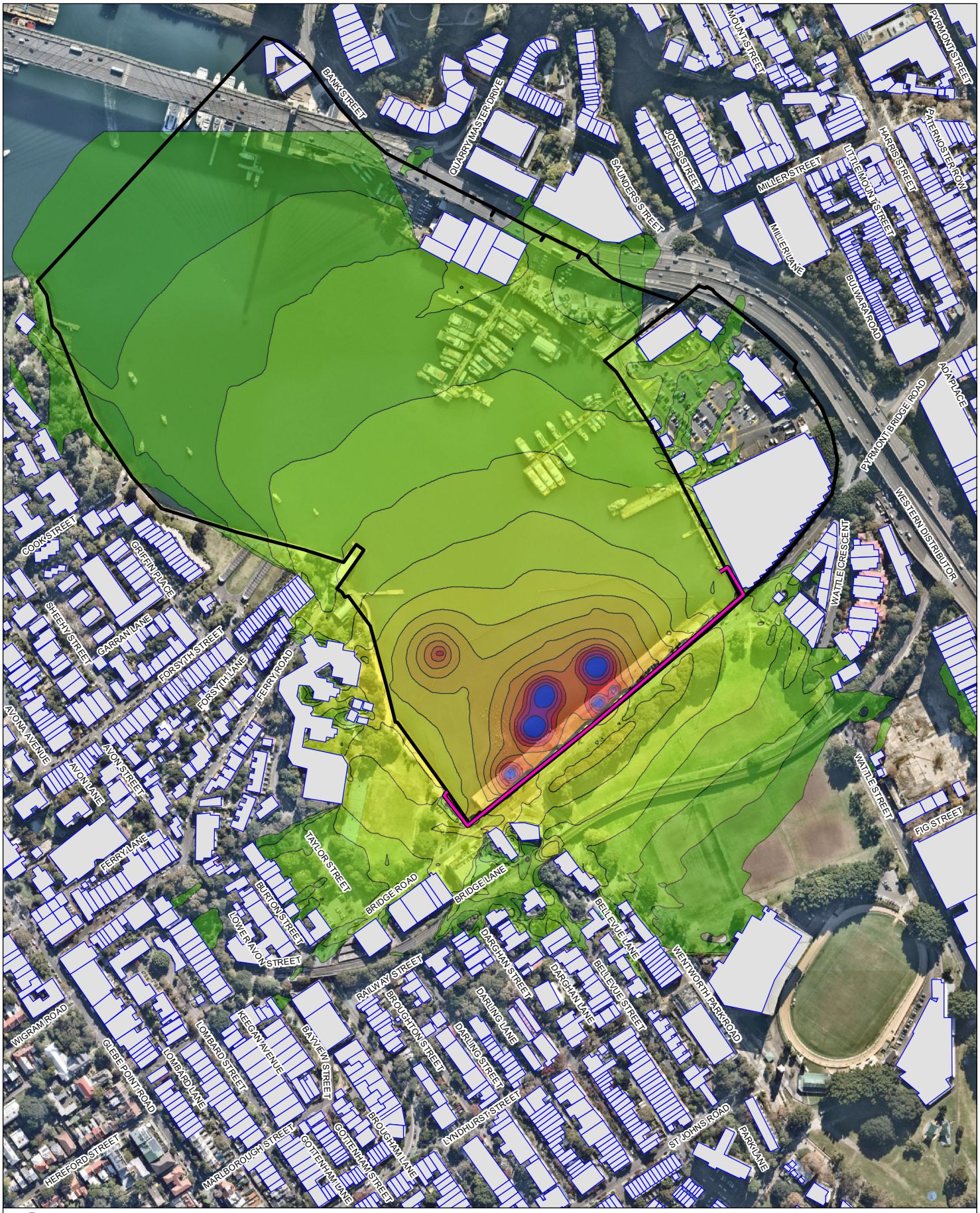
63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 3A Typical (Impact Piling) with 2m Barrier

FIGURE 34

H:\Projects-SLR\610-SrvSYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CADD\GIS\GIS\610.30264 Scenario 3A Typical (Impact Piling) with 2m Barrier.mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	20-Aug-2021
Drawn by:	ML

2.4m Noise Barrier

Receivers

Noise Level dB(A)

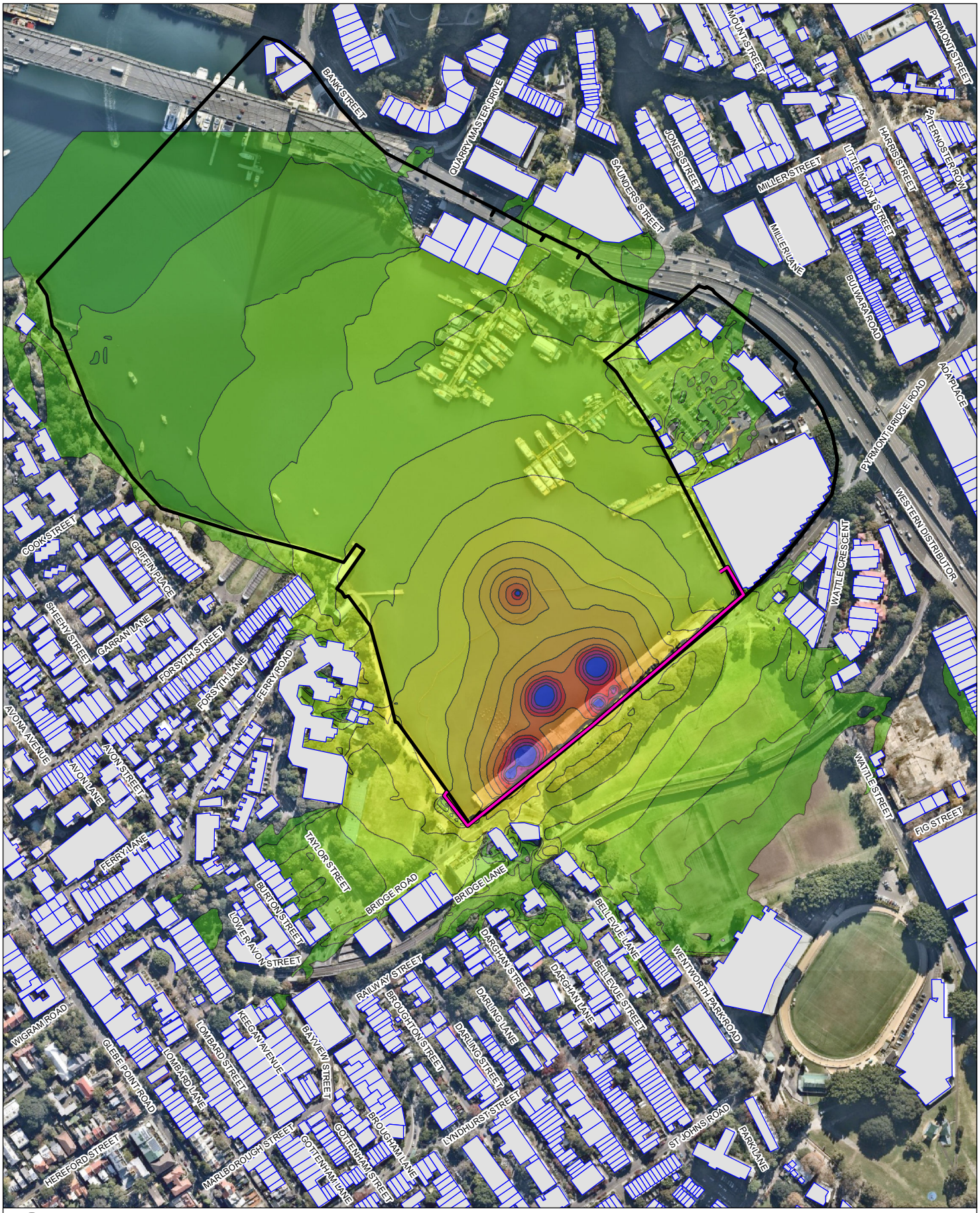
63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 3A Worst Case (Impact Piling) with 2m Barrier

FIGURE 35

H:\Projects-SLR\610-SrvSYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 3A Worst Case (Impact Piling) with 2m Barrier.mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	20-Aug-2021
Drawn by:	ML

2.4m Noise Barrier

Receivers

Noise Level dB(A)

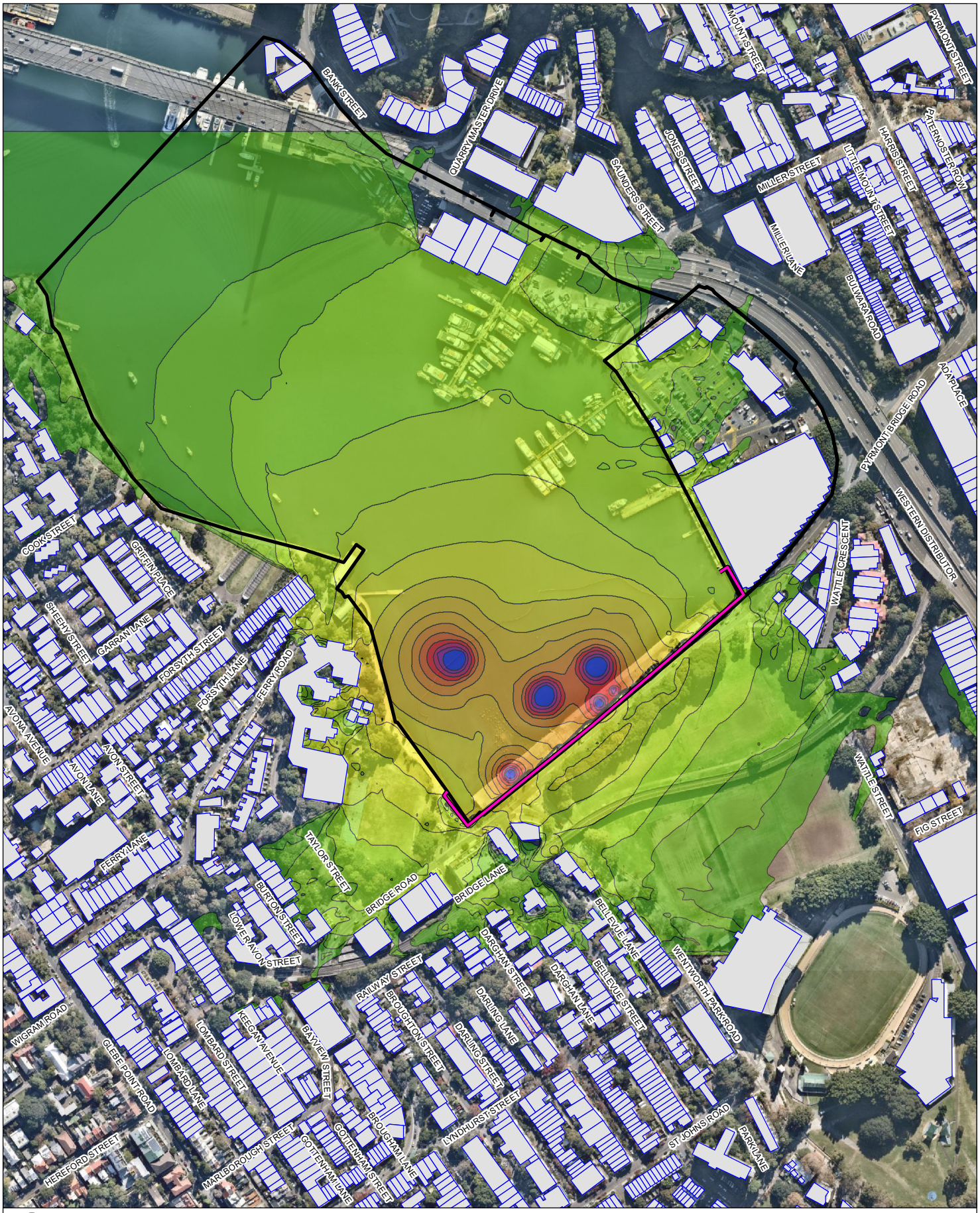
63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 3B Typical (Impact Piling) with 2m Barrier

FIGURE 36

H:\Projects-SLR\610-SrvSYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Scenario 3B Typical (Impact Piling) with 2m Barrier.mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	20-Aug-2021
Drawn by:	ML

2.4m Noise Barrier

Receivers

Noise Level dB(A)

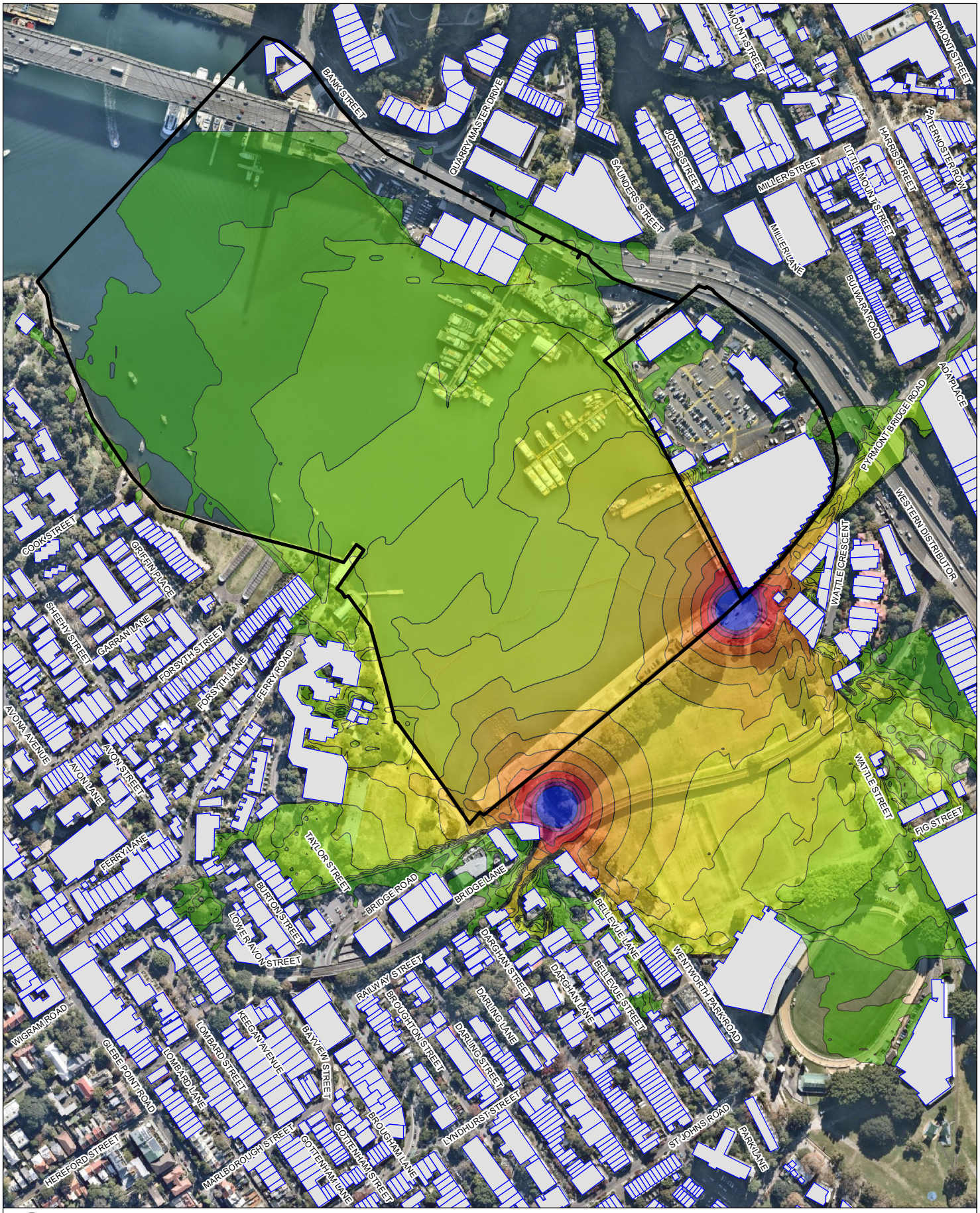
63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 3B Worst Case (Impact Piling) with 2m Barrier

FIGURE 37

H:\Projects-SLR\610-SrvSYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CADD\GIS\GIS\610302264 Scenario 3B Worst Case (Impact Piling) with 2m Barrier.mxd



0 50 100 m

Receivers

Noise Level dB(A)

63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	18-Aug-2021
Drawn by:	ML

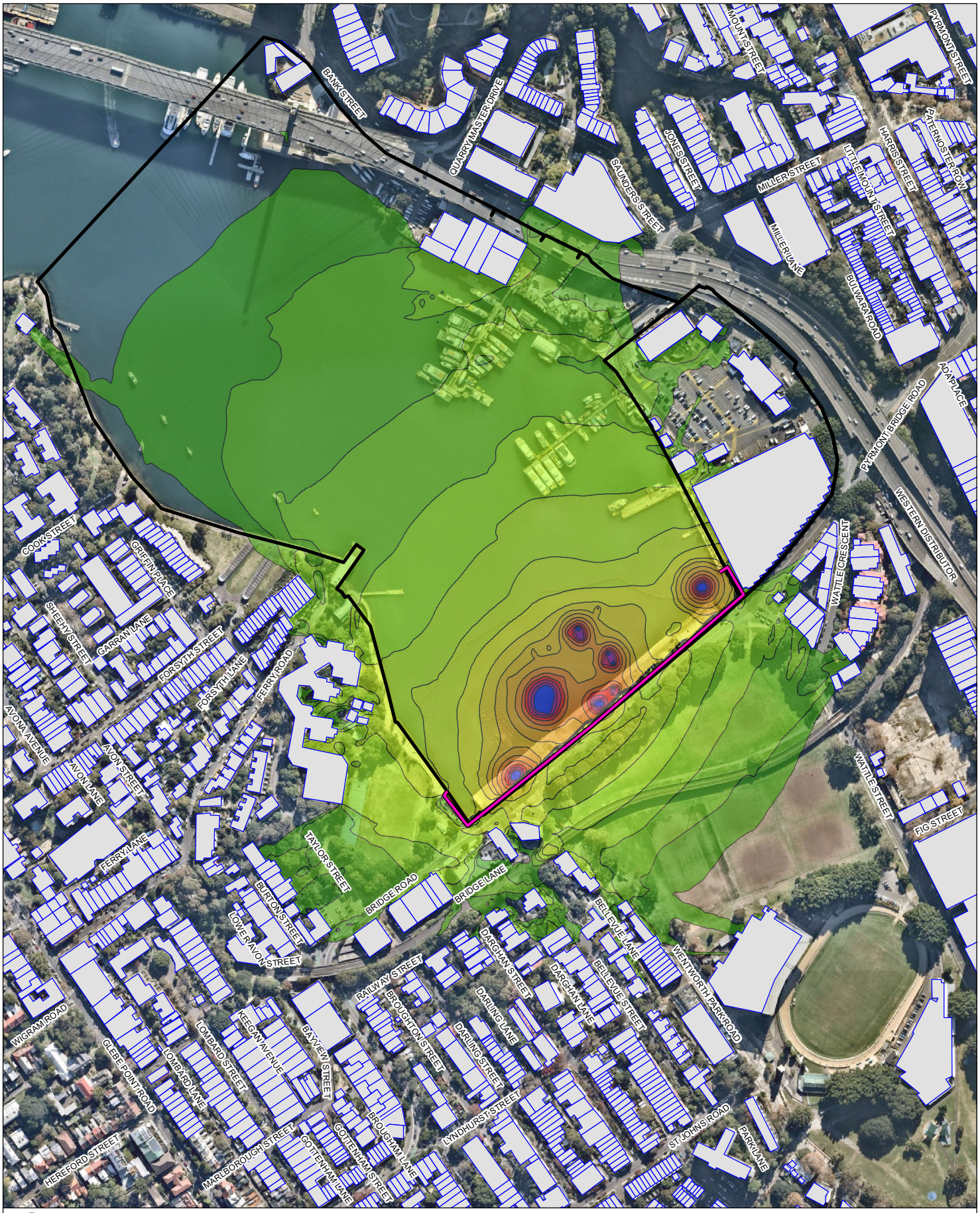
SLR

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 4B Worst Case

FIGURE 37

H:\Projects-SLR\610-SrvSYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CADD\GIS\GIS\610.30264 Scenario 4B Worst Case.mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	20-Aug-2021
Drawn by:	ML

2.4m Noise Barrier

Receivers

Noise Level dB(A)

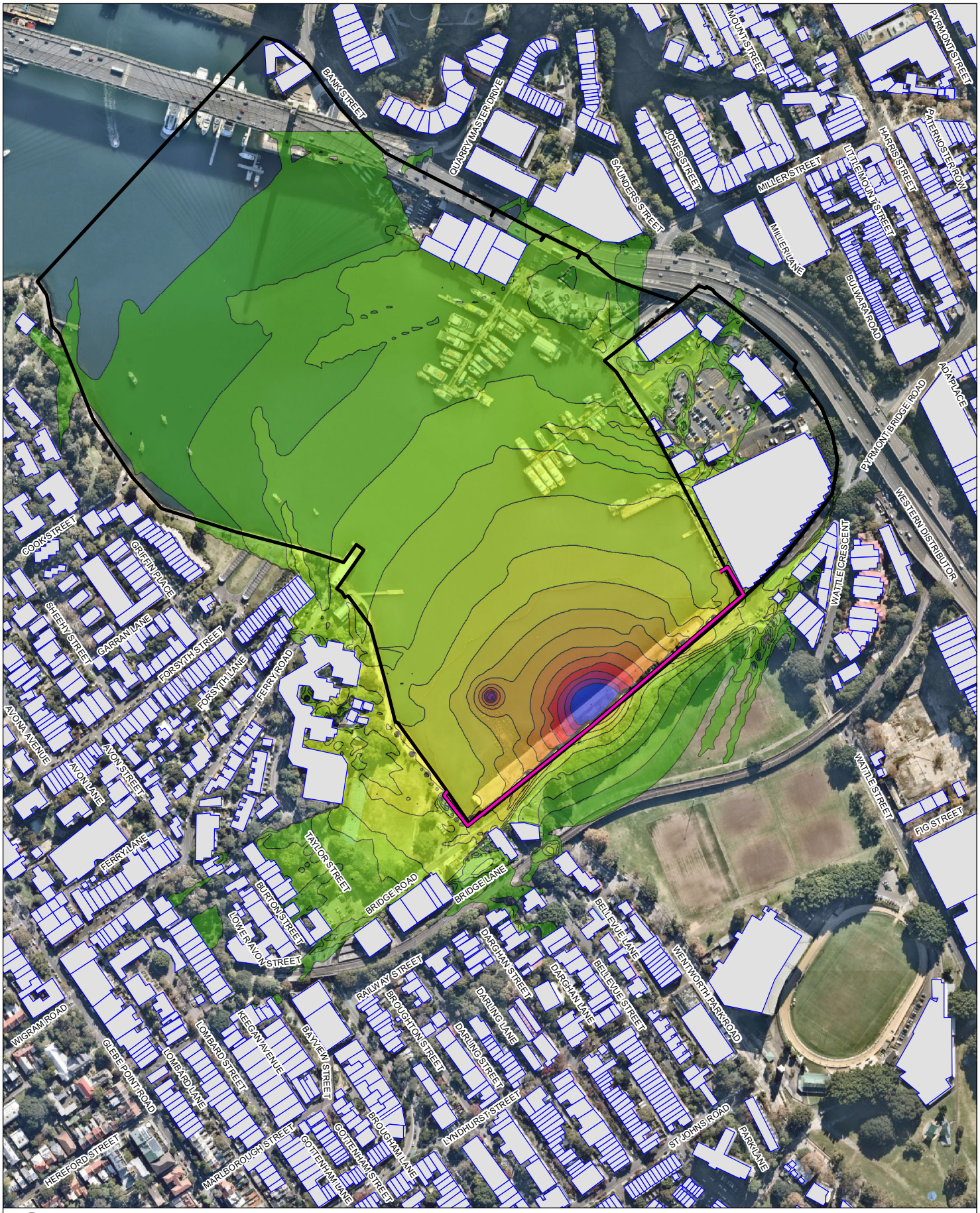
63	73	85	
65	75	87	
67	77	89	
69	79	91	
71	81	93	
	83		

SYDNEY FISH MARKET NOISE ASSESSMENT

Scenario 3C with 2m Barrier

FIGURE 38

H:\Projects-SLR\610-SrvSYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CADD\GIS\GIS\610302264 Scenario 3C with 2m barrier.mxd



0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	20-Aug-2021
Drawn by:	ML

2.4m Noise Barrier

Receivers

Noise Level dB(A)

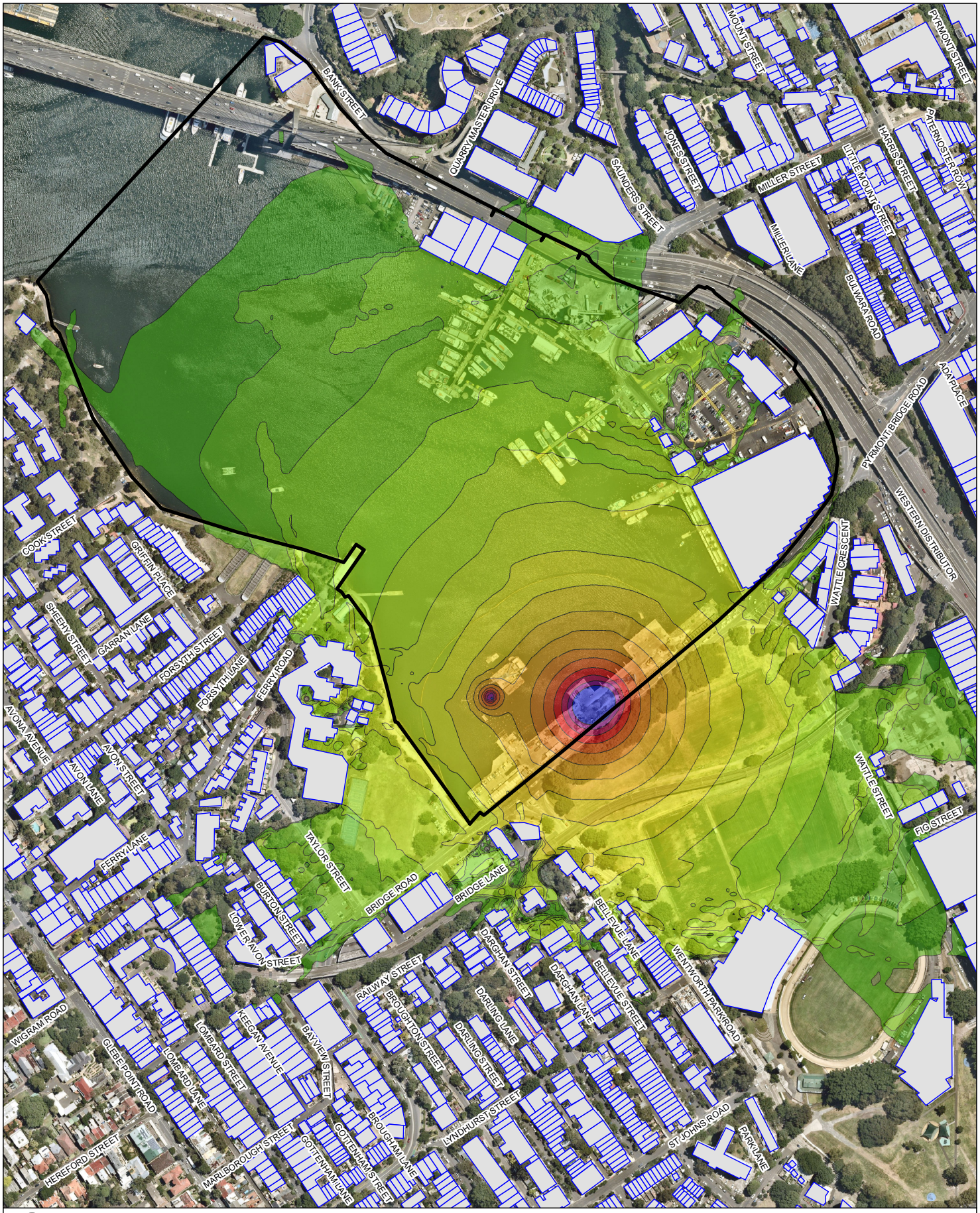
63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93

SYDNEY FISH MARKET NOISE ASSESSMENT

Stage 1 Construction with 2m Barrier

FIGURE 39

H:\Projects-SLR\610-SrvSYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610302 64 Stage 1 Construction with Barrier.mxd



0 50 100 m

Receivers

Noise Level dB(A)

63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93

Coordinate System:	GDA 1994 MGA Zone 56
Scale:	1:5,000 at A4
Project Number:	610.30264
Date:	16-Jul-2021
Drawn by:	ML

SLR

SYDNEY FISH MARKET NOISE ASSESSMENT

Stage 1 Construction

FIGURE 40

H:\Projects-SLR\610-Srv\SYD\610-SYD\610.30264.00000 New Sydney Fish Markets\06 SLR Data\01 CAD\GIS\GIS\610.30264 Stage 1 Construction.mxd

APPENDIX C

Attended Mobile Plant Measurements

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Multiplex Global (Multiplex) to conduct attended noise measurements on site during test piling and stage 1 construction early works to verify predicted noise levels at nearby receivers identified in **Table 2**.

This acoustic review is based on acoustic benchmark testing conducted on 8, 9, 17, 21, 23, 24 and 25 June 2021.

Methodology

Acoustic performance benchmark testing has been undertaken in close proximity of select mobile plant being utilised across various stages of the construction program.

The equipment used for the benchmark test is summarized in **Table C1** below.

Table C1 Equipment List

Type	Manufacturer	Model	Serial Number
Sound Level Meter	Brüel & Kjær	2270	3029485
Vibration level Meter	Instantel	Minimate Series III	12591

The sound level meter (SLM) used in the testing was designed to comply with the requirements of Australian Standard AS/NZS IEC 61672.1:2019 - *Electroacoustics—Sound level meters, Part 1: Specifications* and carried appropriate and current National Association of Test Authorities (NATA) calibration certificates. The calibration of the SLM was checked both before and after the test and was found to be within acceptable limits.

Results Summary

Noise

The attended noise measurements obtained in close proximity of mobile plant operations were used to determine the actual in-situ sound power level (SWL) of selected mobile plant. The purpose of these requested works is to verify predicted noise levels at nearby receivers during construction works of the New Sydney Fish Market. The following equipment was measured:

- Impact hammer (Junttan HHX-300)
- Rock breaker w/ 50t excavator
- Concrete saw
- Setting up Impact Piling Rig (vibratory attachment)
- Extracting existing wooden piles (vibratory attachment)

Results from the attended noise measurements is summarized below **Table C2**.

Table C2 Attended Mobile Plant Results

Item	Centre Band Frequency, Hz Plant Maximum Sound Power Level (SWL dBA)								Total dBA
	63	125	250	500	1000	2000	4000	8000	
Impact hammer (Junttan HHX-300)	92	104	115	127	132	132	133	123	138[1,2]
Rock breaker w/ 50t excavator	93	102	107	114	116	118	117	107	127[1]
Concrete saw	98	108	115	112	108	111	114	110	120[1]

Item	Centre Band Frequency, Hz Plant Maximum Sound Power Level (SWL dBA)								Total dBA
	63	125	250	500	1000	2000	4000	8000	
Setting up Impact Piling Rig	106	114	112	113	115	115	103	94	120
Extracting existing wooden piles	87	105	103	105	108	109	115	113	119

Note 1: 5 dB correction applied for a impulsive noise correction, as per Section 4.5 of the NSW Interim Construction Guideline 2009.

Note 2: Maximum source operation time is approximately 7.5 minutes per 15 minute period so an on-time correction has been applied.

Vibration

The overall Vibration Dose Values (VDV) vibration levels measured across the test piling period on 1st July at monitoring locations 1 and 2 (refer **Figure C1**) are included in **Table C3**.

Table C3 Summary of Maximum Vibration Levels

Site Activity	Monitoring Location	Approximate Distance from Piling Works	Analysis Period	On-time During this period	Measured Maximum Peak Component Particle Velocity (mm/s)	VDV (m/s^1.75) During On-Time Only	VDV over 8-hour period
Vibration Piling	1	60 metres	10 Minutes	100%	0.9 mm/s	0.007	0.018
	2	100 metres			0.7 mm/s	0.0014	0.004
Impact Piling	1	60 metres	40 Minutes	13.5%	1.4 mm/s	0.035	0.065
	2	100 metres			0.8 mm/s	0.022	0.041

For the assessment of human comfort, the measured VDVs versus distance and the criteria set out in **Table C3**.

It can be seen above in **Table C3** that on the site measurements conducted on 1 July 2021 are compliant with the human comfort criteria in **Table 8** for commercial, residential and educational building types.

Figure C1 Vibration monitoring locations



APPENDIX D

In-situ Receiver Façade Noise Performance Testing

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Multiplex Global (Multiplex) to provide advice relating to the sound insulation performance of the demountable teaching rooms and auditorium hall at Sydney Secondary College Blackwattle Bay Campus located on Taylor Street, Glebe.

This acoustic review is based on acoustic benchmark testing conducted on 20 May 2021.

Acoustic Benchmarking

Methodology

Acoustic performance benchmark testing has been undertaken in the demountable teach rooms and auditorium hall that are located on the foreshore of Blackwattle Bay.

The equipment used for the benchmark test is summarized in **Table D1** below.

Table D1 Equipment List

Type	Manufacturer	Model	Serial Number
Sound Level Meter	Brüel & Kjær	2270	3029485
Signal Generator	NTI	MR PRO	0917
Loud Speaker	JBL	EON615	15043136748

The sound level meter (SLM) used in the testing was designed to comply with the requirements of Australian Standard AS/NZS IEC 61672.1:2019 - *Electroacoustics—Sound level meters, Part 1: Specifications* and carried appropriate and current National Association of Test Authorities (NATA) calibration certificates. The calibration of the SLM was checked both before and after the test and was found to be within acceptable limits.

Results Summary

Results from the sound insulation measurements are shown in **Table D2**.

Table D2 Sound Insulation Measurements Results

Measurement I.D.	Partition	Receiving room	Sound Insulation dB D_w
T1	Glazed room front	Demountable Teaching room 1	27
T2	Glazed room front	Demountable Teaching room 2	30
T3	Brick Façade	Hall audience space	27

APPENDIX E

Modification of Development Consent

APPENDIX F

Modification of Development Consent 7

Sediment Capping and Glebe Island Associated Works

Introduction

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Multiplex to undertake a noise impact assessment of the proposed Sediment Capping works to be completed on the main work site and the works proposed at Glebe Island to assist sediment capping works related to the overarching new Sydney Fish Markets project. This assessment has been prepared to accompany the SSD-8925-MOD-7 application.

In consultation with Multiplex, SLR understands that there is no neighbouring construction related activities in the area of the New Sydney Fish Market Project.

Sediment Capping Works

SLR understands that Multiplex originally proposed a construction methodology to conduct the Sediment Capping works and have since proposed an alternative methodology. This section aims to compare the noise levels between the originally proposed methodology with the current proposed construction methodology.

As part of the alternative methodology, Multiplex have advised the following equipment to be in operation during the proposed works:

- Road trucks
- Excavators
- Generator
- Hand drill (drill rig)
- Pumps

Comparison of Sediment Capping Methodologies

A comparison between the primary noise generating equipment utilised in a previously proposed sediment capping works methodology and the currently proposed methodology has been outlined in **Table F1**

Table F1 Comparison of Sediment Capping Methodologies

Construction Stage	Equipment	Sound Power Level (dBA)	Combined Scenario Sound Power Level (dBA)
Previous Basement Construction Methodology	Metal Grinder	114	116
	Rattle Guns	110	
	Welders	97	
	Cranes	100	
Currently Proposed Sediment Capping Methodology	Road trucks	104	109
	Excavators	107	
	Generator	90	
	Hand drill (drill rig)	94	
	Pumps	90	

As shown in the table above, the overall noise level of the currently proposed methodology is less than the previously proposed methodology.

Glebe Island Works

Nearest Receivers

The nearest sensitive receivers are residential properties to the north and south. The nearest receivers are shown in **Figure F1** and **Table F2**.

Table F2 Surrounding Sensitive Receivers

ID	Address	Type	Distance (m)	Direction
R01	32A Refinery Drive, Pyrmont	Residential	270	SE
R02	34 Refinery Drive, Pyrmont	Residential	290	SE
R03	7 Waite Ave, Balmain	Residential	470	N
R04	13 Donnelly Street, Balmain	Residential	490	N
R05	26 Donnelly Street, Balmain	Residential	560	NW
R06	9 Rosebery Place, Balmain	Residential	470	NW

Figure F1 Nearest Receivers and Previous Logging Locations



Existing Noise Environment

In the absence of relevant recent noise logging data, background noise levels have been extracted from the SLR Noise Report as part of the approved 2013 REF and for the Balmain (east) – Grafton Street NCA, from the intrusiveness criteria presented in the 'White Bay Cruiser Terminal – Operational Environmental Management Plan – Cruise Operations', dated 1 March 2013. Due to the elapsed time since these measured noise levels, they are considered conservative, as noise levels have likely increased in the area since monitoring has taken place.

These background noise levels have been presented in **Table F3.**

Table F3 Previously Measured Background Noise Levels (March 2013)

ID	Address	Measured Noise Levels (dBA)		
		Background Noise (RBL)		
		Day	Evening	Night
L01	Balmain – Batty Street	51	49	42
L02	Pyrmont – Refinery Drive	50	49	47

Noise levels from L02 are applicable to receivers in the south (R01-R02) and noise levels from L01 are applicable to receivers in the north (R03-R06).

Assessment Noise Criteria

The Interim Construction Noise Guideline (ICNG) approach for determining NMLs at residential receivers is shown in **Section 5.1** (**Table 6)** above.

The Construction noise management levels are provided below in **Table F4**.

Table F4 Construction Noise Management Levels

Receiver Type	Noise Management Level ($L_{Aeq(15minute)}$ – dBA)				Sleep Disturbance Screening Criteria
	Standard Construction Hours	Out of Hours			
	Daytime	Daytime[1]	Evening	Night-time	
R01-R02 (L02)	60	n/a	n/a	n/a	n/a
R03-R06 (L01)	61	n/a	n/a	n/a	n/a

Note 1: This refers to the period on Saturday between 7am – 8am and 1pm – 6pm, on Sunday and public holidays between 8am – 6pm.

Construction Hours

For the construction of the New Sydney Fish Market the SSD-8925 development consent conditions have adopted construction hours within the ICNG standard construction hours. Additionally, SSD-8925 stipulates that certain activities may only be conducted during certain periods of the approved construction hours. The approved construction hours are reproduced below in **Table**. It is assumed that these works will occur during the approved standard construction hours only.

Table F5 Construction Hours

Day	Activity Type	Approved Construction Hours
Monday to Friday	Standard Construction Activities	7 am to 5:30 pm
	Rock breaking, rock hammering, sheet piling, pile driving, and similar activities	9 am to 12 pm 1 pm to 5 pm
Saturdays	Standard Construction Activities	7:30 am to 3:30 pm
	Rock breaking, rock hammering, sheet piling, pile driving, and similar activities	9 am to 1 pm
Sundays or Public Holidays	All activities	No construction

Construction Noise Assessment

Construction Noise Sources

As per the construction methodology provided by Multiplex, the construction noise sources **Table F6** have been modelled as part of this assessment. A worst case scenario has been modelled, assuming all equipment is running concurrently.

Table F6 Construction Noise Sources

Equipment	Sound Power Level (dBA)	Quantity
Front End Loaders	104	2
Truck and Dog Deliveries	107	1
Bob Cats	97	2
Excavator (Komatsu SSA6D125E-7)	107	1
Hopper Barge Idling	90	1

Construction Noise Predictions

To quantify noise levels from the construction activities a computer noise prediction model using the ISO-9613 algorithms was developed using SoundPLAN software.

Noise predictions from the proposed construction works have been predicted to the nearest receivers during the daytime and are summarised in **Table F7**.

Table F7 Predicted Construction Noise Levels

Receiver Location	Noise Level $L_{Aeq(15minute)}$ (dBA)			Compliance
	Noise Management Level – Standard Daytime	Predicted	Exceedance	
R01	60	50	-	Yes
R02	60	52	-	Yes
R03	61	44	-	Yes
R04	61	48	-	Yes
R05	61	43	-	Yes
R06	61	45	-	Yes

According to the above predictions, noise levels from construction noise at Glebe Island are expected to be compliant with the project specific Noise Management Levels at all receivers.

Port Authority Mitigation Measures

Port Authority have provided a number of standard mitigation measures for works at Glebe Island. These measures have been listed below.

1. Mobile plant will use non tonal 'squawker' reversing alarms where practical subject to compliance with work health and safety requirements.
2. Truck movements will be organised to minimise the need for trucks to reverse.
3. All machinery and equipment associated with the proposed activity is to be maintained in accordance with manufacturer's requirements.
4. The site operator will be required to implement a mobile plant driver awareness program covering:
    I. judicious use of the throttle during lifting as well as travel;
    II. minimising the idling of forklifts and trucks on site; and
    III. Immediate reporting and repair of any machinery defects which may cause /excess noise generation.
5. Noise level monitoring of the first gypsum shipment will be undertaken to verify the assumptions of this REF. Should excessive noise levels and/or noise complaints be noted, further mitigation measures will be considered and implemented where feasible.

Should noise from ongoing operations result in complaints from neighbouring sensitive receivers, existing noise mitigation measures will be reviewed and further mitigation measures will be investigated and implemented as deemed appropriate to alleviate the impact.

Multiplex have committed to ensure compliance with all of the above measures and the standard project mitigation measures reproduced above in **Section 7.1**. In addition, Multiplex are not proposing to use a grab bucket excavator attachment in this methodology as per advice from Port Authority to assist to further in reducing noise emissions.

Construction Vibration Criteria

Project specific Construction Vibration Criteria is provided in **Section 5.3** above.

Noise Mitigation Measures

Standard noise mitigation measures are proposed to be applied where reasonable and feasible. See **Section 7.1** for the standard noise mitigation measures**.**

Vibration Mitigation Measures

Standard vibration mitigation measures (offset distances) are provided in **Section 8**.

SLR understands the equipment proposed for the MOD 7 works are not identified as vibration intensive equipment in **Table 16**. Therefore, SLR does not consider a detailed vibration impact assessment is required for the proposed MOD 7 works.

Conclusion

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Multiplex to undertake a noise impact assessment of the proposed Sediment Capping works and the works proposed at Glebe Island to assist sediment capping works related to the overarching new Sydney Fish Markets project. This memorandum has been prepared to accompany the SSD-8925-MOD-7 application.

In consultation with Multiplex SLR understands that there is no neighbouring construction related activities in the area of the New Sydney Fish Market Project.

Table F1 shows that the overall noise level of the current proposed methodology is expected to be quieter than the originally proposed methodology.

Table F7 shows that all noise level predictions for the Glebe Island works comply with the project Noise Management Levels at the nearby noise sensitive receivers.

ASIA PACIFIC OFFICES

BRISBANE
Level 2, 15 Astor Terrace
Spring Hill QLD 4000
Australia
T: +61 7 3858 4800
F: +61 7 3858 4801

CANBERRA
GPO 410
Canberra ACT 2600
Australia
T: +61 2 6287 0800
F: +61 2 9427 8200

DARWIN
Unit 5, 21 Parap Road
Parap NT 0820
Australia
T: +61 8 8998 0100
F: +61 8 9370 0101

GOLD COAST
Level 2, 194 Varsity Parade
Varsity Lakes QLD 4227
Australia
M: +61 438 763 516

MACKAY
21 River Street
Mackay QLD 4740
Australia
T: +61 7 3181 3300

MELBOURNE
Level 11, 176 Wellington Parade
East Melbourne VIC 3002
Australia
T: +61 3 9249 9400
F: +61 3 9249 9499

NEWCASTLE
10 Kings Road
New Lambton NSW 2305
Australia
T: +61 2 4037 3200
F: +61 2 4037 3201

NEWCASTLE CBD
Suite 2B, 125 Bull Street
Newcastle West NSW 2302
Australia
T: +61 2 4940 0442

PERTH
Ground Floor, 503 Murray Street
Perth WA 6000
Australia
T: +61 8 9422 5900
F: +61 8 9422 5901

SYDNEY
Tenancy 202 Submarine School
Sub Base Platypus
120 High Street
North Sydney NSW 2060
Australia
T: +61 2 9427 8100
F: +61 2 9427 8200

TOWNSVILLE
12 Cannan Street
South Townsville QLD 4810
Australia
T: +61 7 4722 8000
F: +61 7 4722 8001

WOLLONGONG
Level 1, The Central Building
UoW Innovation Campus
North Wollongong NSW 2500
Australia
T: +61 2 4249 1000

AUCKLAND
Level 4, 12 O'Connell Street
Auckland 1010
New Zealand
T: 0800 757 695

NELSON
6/A Cambridge Street
Richmond, Nelson 7020
New Zealand
T: +64 274 898 628

Appendix 6: Construction Air Quality Management Plan

NEW SYDNEY FISH MARKET

Construction Air Quality and Dust Management Plan
SSD 8925

Prepared for:

Multiplex Constructions Pty Ltd
Level 22
135 King Street
SYDNEY NSW 2000



SLR Ref: 610.30264-R01
Version No: -v1.1
March 2021

PREPARED BY

SLR Consulting Australia Pty Ltd
ABN 29 001 584 612
Tenancy 202 Submarine School, Sub Base Platypus, 120 High Street
North Sydney NSW 2060 Australia

T: +61 2 9427 8100
E: sydney@slrconsulting.com www.slrconsulting.com

BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Multiplex Constructions Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.30264-R01-v1.1	26 March 2021	D Dsouza / A Naghizadeh	K Lawrence	A Naghizadeh
610.30264-R01-v1.0	21 March 2021	D Dsouza / A Naghizadeh	K Lawrence	A Naghizadeh

CONTENTS

1 INTRODUCTION 5
1.1 Objectives of the CAQMP 5
2 STATUTORY REQUIREMENTS 5
3 PROJECT OVERVIEW 6
3.1 Site Location and Context 6
3.2 Surrounding Land Uses and Receptors 9
3.3 Construction Activities 11
3.4 Construction Hours 12
3.5 Construction Contact Details 13
4 POTENTIAL SOURCES OF AIR EMISSIONS 13
4.1 Fugitive Dust Emissions from Construction Activities 14
4.2 Products of Combustion from Construction Plant and Machinery 14
4.3 Odours from Exposed Seabed 15
5 RELEVANT AIR QUALITY CRITERIA 15
5.1.1 Particulate Matter (Dust) 15
5.1.1.1 Suspended Particulate Matter 15
5.1.1.2 Deposited Dust 16
5.1.2 Summary of Relevant Ambient Air Quality Criteria 17
5.2 Local Government Air Quality Toolkit 17
6 RECEIVING ENVIRONMENT 17
6.1 Local Meteorology 17
6.2 Background Air Quality 20
7 ASSESSMENT OF AIR QUALITY EMISSIONS DURING CONSTRUCTION 22
8 MITIGATION MEASURES 23
9 PERFORMANCE OBJECTIVES 26
10 COMPLAINTS HANDLING AND RESPONSE PROCEDURE 28
11 AIR QUALITY MONITORING PROGRAM 28
12 CONTINGENCY MANAGEMENT PLAN 29
13 ROLES AND RESPONSIBILITIES 33
13.1 Contractor's Project Manager 33
13.2 Environmental Coordinator 33
13.3 All Workers on Site 33
14 REVIEW AND IMPROVEMENT OF THE CAQMP 34

CONTENTS

15 REFERENCES 34

DOCUMENT REFERENCES

TABLES

Table 1 Air Quality Management Conditions - SSD 8925 6
Table 2 Neighbouring Sensitive Receptors 10
Table 3 Construction Work Scenarios 12
Table 4 Construction Contact List 13
Table 5 NSW EPA Ambient Air Quality Criteria for Suspended Particulate Matter 16
Table 6 NSW EPA Criterion for Nuisance Dust Deposition 16
Table 7 Project Air Quality Goals 17
Table 8 Summary of Rozelle AQMS Data (2015 – 2019) 21
Table 9 Risk of Air Quality Impacts from Stage 2 Works 22
Table 10 Air Emission Mitigation Measures 23
Table 11 Summary of the Parameters to Assess the Effectiveness of Control Measures 27
Table 12 Summary of On-Site Monitoring Programme 28
Table 13 Additional Air Quality Monitoring 28
Table 14 Air Quality Contingency Management Plan for the Stage 2 Development Construction of the new Sydney Fish Markets 30

FIGURES

Figure 1 Site Layout – Level 1 8
Figure 2 Project Site Location 9
Figure 3 City of Sydney Local Environmental Plan – Area 5, Land Zoning Map 10
Figure 4 Sensitive Receptor Locations 11
Figure 5 New Sydney Fish Market Annual and Seasonal Wind Roses 2014 19
Figure 6 Air Quality Monitoring Locations 29

APPENDICES

Appendix A Project Sie Layout

1 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Multiplex Constructions Pty Ltd (Multiplex) to prepare a Construction Air Quality Management Plan (CAQMP) for the Stage 2 development of the new Sydney Fish Market (the Project), as per Development Consent (SSD 8925) conditions B77 and B81.

The Project Site is located at the head of Blackwattle Bay, between the Pyrmont Peninsula and the foreshore of Glebe. It is situated less than 2 kilometres (km) west of the Sydney CBD and is partially within the City of Sydney Local Government Area (LGA). The Stage 2 construction works to which this CAQMP relates, includes (but is not limited to) the construction of a three-storey building that will house wholesale and retail areas, business and offices and event spaces (among other activities), as well as a new public domain and a marina. The construction works are anticipated to occur over a 36-month period. Early Works activities, including demolition and site preparation activities have been completed as a separate stage of the works and are not covered by this CAQMP.

Multiplex have been contracted by Infrastructure NSW to undertake the Stage 2 construction works. This CAQMP is a sub-Plan of Multiplex's overarching Construction Environmental Management Plan (CEMP) for the Project.

1.1 Objectives of the CAQMP

The objectives of this CAQMP are as follows:

- Maintain acceptable levels of amenity for surrounding residents.
- Ensure compliance with relevant ambient air quality criteria for particulate matter and other relevant air pollutants at surrounding receptor locations.
- Maintain an effective response mechanism to deal with issues and complaints relating to emissions of dust and other air pollutants from the construction works.
- Outline roles and responsibilities in relation to the management of dust and other air pollutant emissions during construction; and
- Promote awareness of the Project's air quality impacts and responsibilities among employees and subcontractors.

2 Statutory Requirements

The requirements relating to air quality management stipulated Development Consent (SSD 8925) for the construction of the new Sydney Fish Market, and where they have been addressed in this CAQMP, are shown in **Table 1**.

Further information on State and national ambient air quality standards and guidelines relevant to the Project are detailed in **Section 5**.

Table 1 Air Quality Management Conditions - SSD 8925

Conditions	Section Reference
Condition B77*	
d) include a Dust Management Plan, incorporating the mitigation measures outlined in the Air Quality Impact Assessment, prepared by SLR Consulting, dated April 2019	**Section 8**
i) detail how the environmental performance of the site preparation and construction works will be monitored, and what actions will be taken to address identified potential environmental impacts, including but not limited to noise, traffic and air impacts,	**Section 8** **Section 9** **Section 11**
Condition B81-	
a) describe the measures that would be implemented on site to ensure: i. the control of air quality and odour impacts of the development, ii. that these controls remain effective over time, iii. that all reasonable and feasible air quality management practice measures are employed iv. the air quality impacts are minimised during adverse meteorological conditions and extraordinary events, v. and compliance with relevant conditions of consent.	**Section 8** **Section 11** **Section 12** **Section 13** **Section 14**
b) include performance objectives for monitoring dust and ensuring no off-site air quality impacts to nearby residences and businesses,	**Section 5** **Section 9** **Section 11**
c) includes an air quality monitoring program that: vi. is capable of evaluating the performance of the construction works, vii. includes a protocol for determining any exceedances of the relevant conditions of consent and responding to complaints viii. adequately supports the air quality performance objectives, and ix. evaluates and reports on the effectiveness of air quality management for the construction works.	**Section 9** **Section 10** **Section 11** **Section 12**
d) details on monitoring weather conditions and communicating changing conditions to the workforce,	**Section 11** **Section 13**
e) stop work procedures if performance objectives are not being met.	**Section 12**

3 Project Overview

3.1 Site Location and Context

The Project Site is located at the head of Blackwattle Bay, between the Pyrmont Peninsula and the foreshore of Glebe, less than 2 km west of the Sydney CBD and partially within the City of Sydney LGA. **Figure 2** illustrates the location of the existing and new Sydney Fish Market sites.

The land to which the development consent relates comprises Lots 3 - 5 in DP 1064339, part of Lot 107 in DP 1076596, part of Lot 1 in DP835794 and part of Lot 3 in DP 1018801. The site is partly on land above mean high water mark and partly on water below mean high water mark.

The Stage 2 development construction works include the following:

- A three-storey (4 levels) building with a gross floor area (GFA) of 26,751 m^2, comprising:
  - Wholesale services, product storage and processing
  - Retail, business and office premises
  - Multi-function spaces for events and functions
  - Staff amenities and end-of-trip facilities
  - Outdoor seating areas
  - Basement car park.
- New public domain, including a foreshore promenade and landscaping
- Marina
- Pedestrian, cycle and road access
- Upgrade works to Bridge Road and intersections with Wattle Street and Wentworth Park Road
- Provision of services and site level adjustments for stormwater management

The Project Site has a frontage to Bridge Road to the south and Blackwattle Bay to the north. Sydney Secondary College's Blackwattle Bay Campus is immediately southwest of the Project Site and the existing Fish Market is located immediately northeast.

A site layout plan for Level 1 of the Project is presented in **Figure 1**. Further detailed site layout plan is provided in **Appendix A**.

Figure 1 Site Layout – Level 1

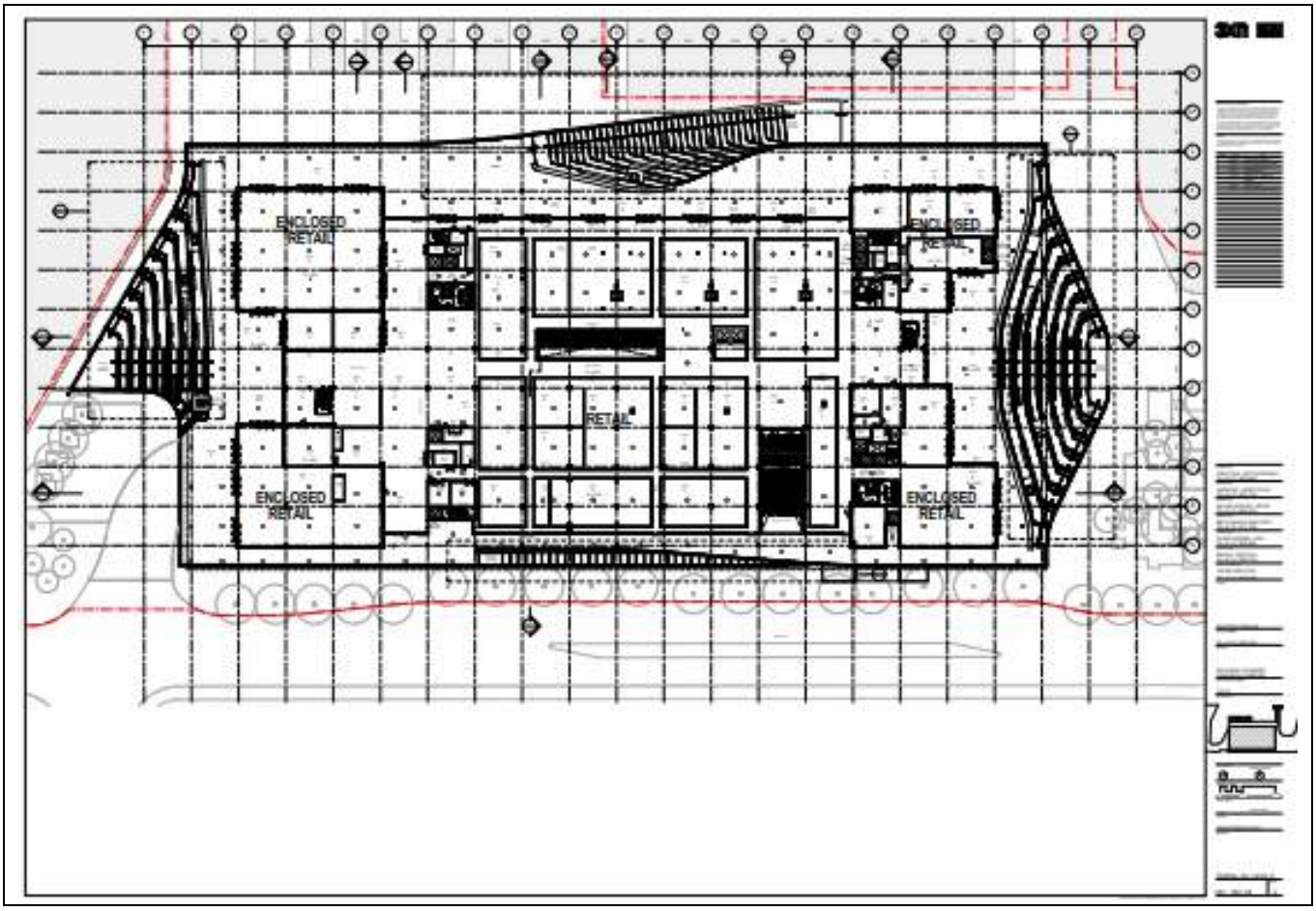
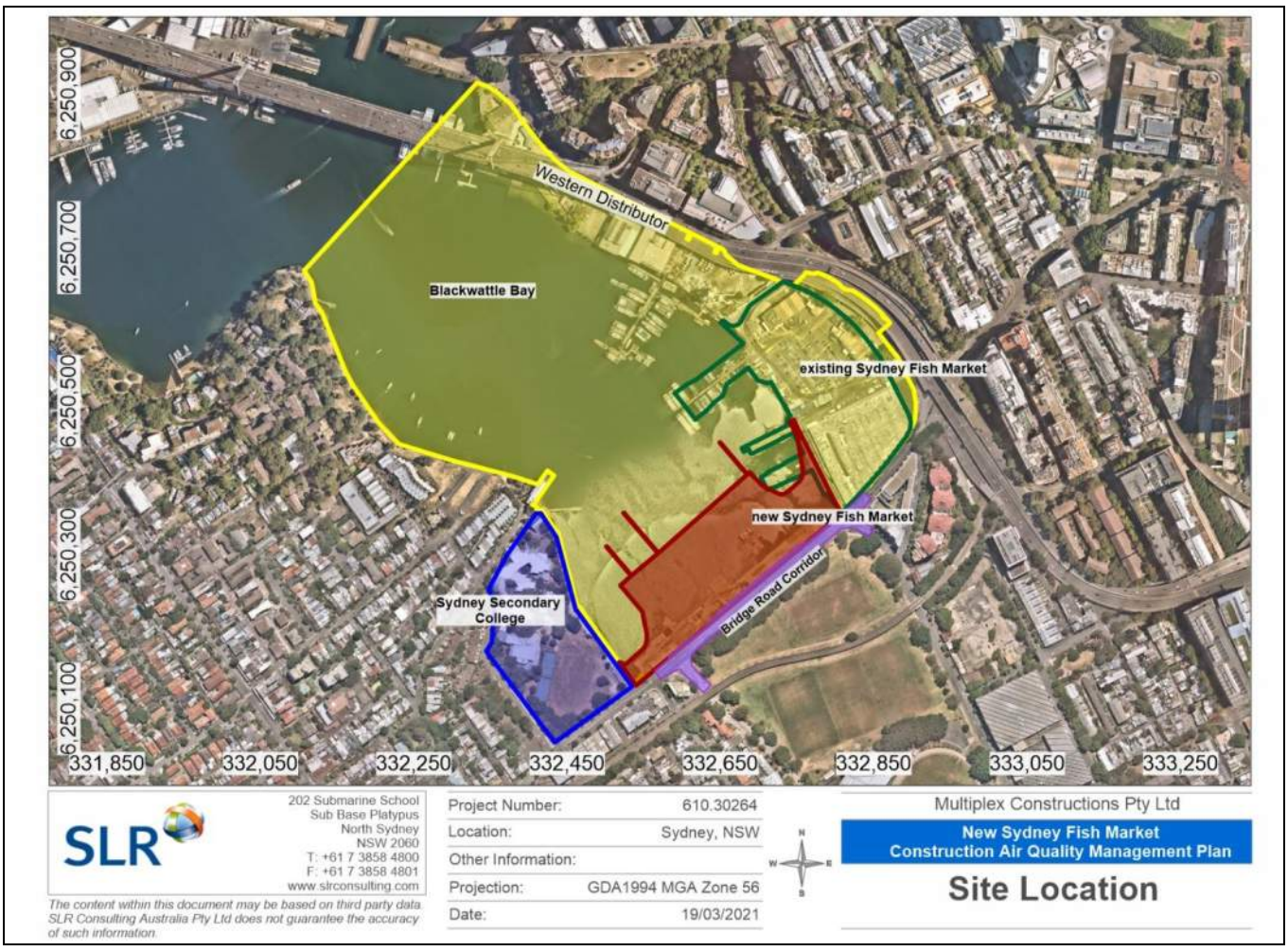


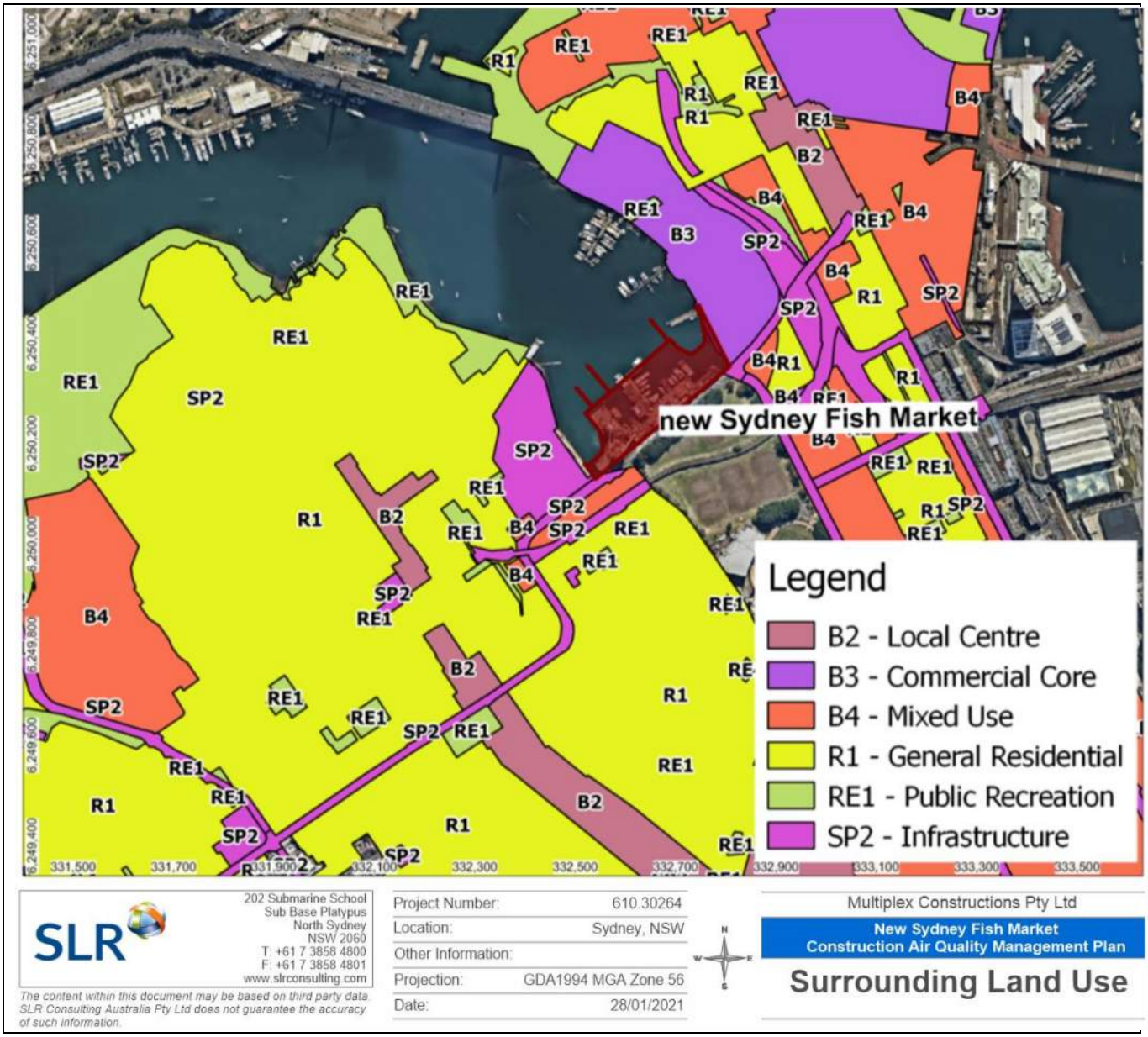
Figure 2 Project Site Location



3.2 Surrounding Land Uses and Receptors

The area surrounding the Project Site includes lands zoned as local centre, commercial core, mixed use, general residential, public recreation and infrastructure, as seen in **Figure 3.**

Figure 3 City of Sydney Local Environmental Plan – Area 5, Land Zoning Map



There are a number of existing residences located in close proximity to the Project Site. The nearest existing residential receptors are located approximately 55 m southwest of the site boundary at the corner of Bridge Road and Wentworth Park Road and 55 m east of the site boundary at 217/1 Wattle Crescent, Glebe. Other neighbouring sensitive receptors are shown in **Table 2** and identified in **Figure 4**.

Table 2 Neighbouring Sensitive Receptors

Receptor ID	Address	Property Description	Approximate Distance from the Project Site
R1	217/1 Wattle Crescent, Glebe	Residential	55 m east
R2	84 Wentworth Park Road, Glebe	Residential	55 m southwest

Receptor ID	Address	Property Description	Approximate Distance from the Project Site
R3	Sydney Secondary College, Glebe	Educational	75 m west
R4	13 Griffin Place, Glebe	Residential	255 m northwest
R5	1A Burton Street, Glebe	Residential	185 m/ southwest

Figure 4 Sensitive Receptor Locations



3.3 Construction Activities

Construction activities that will be undertaken at the Project Site under this CAQMP are summarised in **Table 3**.

Table 3 Construction Work Scenarios

Activity	Description	Timing
Pre-construction works *April 2021 – December 2021*	Profiling of the seabed will be undertaken in order to prepare the site for construction. It is anticipated that most of the excavated material will be moved to other areas underwater and will not be exposed to the atmosphere. Any material removed from the water will either be removed from site or returned to the seabed within 24-hours.	Standard hours
	Cofferdam installation, set up for impact piling (marine based, and land based).	Standard hours
	Hammering impact piles for structural support (marine based, and land based). OR Hammering for marine piles and auger method for land piles.	High impact hours[1]
Main building construction *January 2022 – January 2023*	Construction of the main building shell, including use of tower cranes, concrete trucks, power tools etc., and set up for impact piling (marine based).	Standard hours
	Hammering impact piles for structural support (marine based).	High impact hours[1]
	Cofferdam removal	Standard hours
Road Works *January 2022 –May 2023*	Road overlay construction and new full road construction	Standard hours
	Road completion works	Outside of standard hours (night works)
HV caballing to Camperdown *June 2021 – December 2021*	Trenching excavation works and laying of HV conduit	Outside of standard hours (night works)
	Asphalt laying works covering the previously trenched road	Outside of standard hours (night works)

1. As per condition C6 of SSD 8925, presented in **Section 3.4.**

Additionally, it is anticipated that the construction site will be accessed via Bridge Road from the southwest and northeast corners of the Project Site as shown in **Figure 4**.

3.4 Construction Hours

Construction hours will be in accordance with Conditions C2 to C6 of Development Consent SSD 8925, which are reproduced below:

C2 Construction, including the delivery of materials to and from the site, may only be carried out between the following hours:

(a) between 7.00 am and 5.30 pm, Mondays to Fridays inclusive, and

(b) between 7.30 am and 3.30 pm, Saturdays.

C3 No work may be carried out on Sundays or public holidays.

C2 *Construction, including the delivery of materials to and from the site, may only be carried out between the following hours:*

(a) between 7.00 am and 5.30 pm, Mondays to Fridays inclusive, and

(b) between 7.30 am and 3.30 pm, Saturdays.

C4 *Activities may be undertaken outside of these hours if required:*

(a) by the Police or a public authority for the delivery of vehicles, plant or materials,

(b) in an emergency to avoid the loss of life, damage to property or to prevent environmental harm.

C5 *Notification of such activities must be given to affected residents before undertaking the activities or as soon as is practical afterwards.*

C6 *Rock breaking, rock hammering, sheet piling, pile driving, and similar activities may only be carried out between the following hours;*

(a) 9.00 am to 12.00 pm, Monday to Friday,

(b) 1.00 pm to 5.00 pm Monday to Friday; and

(c) 9.00 am to 1.00 pm, Saturday.

3.5 Construction Contact Details

Table 4 lists the key contacts during the construction.

Table 4 Construction Contact List

Role	Name	Company	Contact Details
Senior Project Engineer	Anthony Toomeh	Multiplex	0475 984 498 anthony.toomeh@multiplex.global
Site Manager	Ben De Bono	Multiplex	0423 782 139 Ben.Debono@multiplex.global
Project Manger	Paul Couani	Multiplex	0401 719 593 Paul.Couani@mutliplex.global
WHS&E Coordinator	Darcy Lambert	Multiplex	0436 677 069 darcy.lambert@mutliplex.global

4 Potential Sources of Air Emissions

Potential air emissions associated with the construction of the Project include:

- Fugitive dust emissions;
- Products of combustion from construction plant, machinery and marine vessels; and
- Odours from exposed seabed material.

4.1 Fugitive Dust Emissions from Construction Activities

During the construction works, fugitive dust emissions are considered to have the greatest potential for off-site air quality impacts, which could give rise to nuisance and/or health impacts for the surrounding sensitive areas. The key potential sources of dust associated with construction works at the Project Site have been identified as:

- Dust emissions from earthworks activities (e.g. excavation and loading of soils to trucks and barges);
- Wind-generated dust from disturbed surfaces and stockpiles;
- Wheel-generated dust and particulate matter emissions in diesel exhaust emissions from on-site plant and equipment and construction traffic movements;
- Particulate matter associated with vehicle emissions from increased/congested traffic emissions due to road closures or diversions; and
- Dust generated from drilling, piling and hammering activities.

In addition to the construction activities being carried out at any point in time, a number of other environmental factors may also affect the generation and dispersion of dust emissions, including:

- Wind direction - determines whether dust generated at the Project Site are transported in the direction of the sensitive receptors;
- Wind speed - governs the potential lift off and drift resistance of particles;
- Rainfall or dew - rainfall or heavy dew that wets the surface of the soil reduces the risk of dust generation.
- Surface type - more erodible surface material types have an increased soil or dust erosion potential;
- Surface material moisture - increased surface material moisture levels reduces soil or dust erosion potential.

4.2 Products of Combustion from Construction Plant and Machinery

Diesel and petrol fuelled trucks, excavators, dozers, marine vessels and other equipment associated with the construction of the Project Site will emit products of fuel combustion. A review of the National Pollutant Inventory Emission Estimation Technique Manual (NPI EET) for Combustion Engines (DSEWPC, 2008) identifies the primary pollutants from combustion engines as:

- Carbon monoxide (CO).
- Oxides of nitrogen (NO_x).
- Particulate matter less than 2.5 µm in aerodynamic diameter ($PM_{2.5}$).
- Particulate matter less than 10 µm in aerodynamic diameter (PM_{10}).
- Sulfur dioxide (SO_2).
- Total Volatile Organic Compounds (TVOCs).

Other substances are also emitted in trace amounts as products of incomplete combustion, such as metallic additives, which contribute to the particulate content of the exhaust (DSEWPC, 2008).

4.3 Odours from Exposed Seabed

As part of the per-construction works, Multiplex proposes to reprofile the seabed of Blackwattle Bay in order to profile the seabed for future construction works. It is expected that the seabed will contain a significant amount of organic matter (marine growth). During handling and storage of these materials onsite, there is potential for this marine growth to be dislodged and/or to die and decompose. If this occurs, there is potential for the exposed and decomposing organic matter to be a potential odour source associated with the works.

The frequency and intensity of odours generated by these activities will depend on several factors, such as ambient temperatures and wind conditions.

At the time of preparing this plan, Multiplex are exploring two options for the handling of seabed material, namely:

- Option 1: Material will be immediately redistributed onto seabed and will not be stored on-site
- Option 2: Material will be stored on site prior to being placed back onto seabed

The mitigation measures that will be implemented during the works to reduce the potential for any nuisance odours are outlined in **Section 8**. These mitigation measures cover both material handling options outlined above.

5 Relevant Air Quality Criteria

The following sections outline the potential health and amenity issues associated with the particulate matter along with relevant ambient air quality compliance criteria.

Note - in the unlikely event that additional monitoring of other pollutants is required, then the CAQMP is to be updated with relevant compliance criteria.

5.1.1 Particulate Matter (Dust)

5.1.1.1 Suspended Particulate Matter

Airborne contaminants that can be inhaled directly into the lungs can be classified on the basis of their physical properties as gases, vapours or particulate matter. In common usage, the terms “dust” and “particulates” are often used interchangeably. The health effects of particulate matter are strongly influenced by the size of the airborne particles. Smaller particles can penetrate further into the respiratory tract, with the smallest particles having a greater impact on human health as they penetrate to the gas exchange areas of the lungs. Larger particles primarily cause nuisance associated with coarse particles settling on surfaces.

The term “total particulate matter” (TSP) refers to a category of airborne particles, typically less than 30 microns (µm) in diameter. Particulate matter with an aerodynamic diameter of 10 microns or less is referred to as PM_{10}. The PM_{10} size fraction is sufficiently small to penetrate the large airways of the lungs, while $PM_{2.5}$ (2.5 microns or less) particulates are generally small enough to be drawn in and deposited into the deepest portions of the lungs. Potential adverse health impacts associated with exposure to PM_{10} and $PM_{2.5}$ include increased mortality from cardiovascular and respiratory diseases, chronic obstructive pulmonary disease and heart disease, and reduced lung capacity in asthmatic children. In an urban setting, the emission of $PM_{2.5}$ is primarily associated with vehicles exhausts resulting from the incomplete combustion of diesel.

State air quality guidelines specified by the NSW Environmental Protection Agency (EPA) are published in the *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (NSW EPA, 2017)) (hereafter 'Approved Methods'). The ground level air quality impact assessment criteria listed in Section 7 of the Approved Methods have been established by NSW EPA to achieve appropriate environmental outcomes and to minimise associated risks to human health as published in the Approved Methods. They have been derived from a range of sources and are the defining ambient air quality criteria for NSW, and are considered to be appropriate as compliance criteria for the Project.

A summary of the relevant ambient air quality criteria for particulate matter is provided in **Table 5**.

Table 5 NSW EPA Ambient Air Quality Criteria for Suspended Particulate Matter

Pollutant	Averaging Period	Concentration
TSP	Annual	90 µg/m^3
PM_{10}	24 Hours	50 µg/m^3
	Annual	25 µg/m^3
$PM_{2.5}$	24 Hours	25 µg/m^3
	Annual	8 µg/m^3

Source: EPA 2017a

5.1.1.2 Deposited Dust

Section 5.1.1.1 is concerned in large part with the health impacts of particulate matter. Nuisance impacts need also to be managed, mainly in relation to deposited dust. Dust can cause nuisance by settling on surfaces and possessions, affecting visibility and contaminating tank water supplies. High rates of dust deposition can also adversely affect vegetation by blanketing leaf surfaces.

The relevant criterion for nuisance dust deposition is provided in **Table 6**. The rate of dust deposition is measured by means of a collection gauge, which catches the dust settling over a fixed surface area and over a period of about 30 days.

Table 6 NSW EPA Criterion for Nuisance Dust Deposition

Pollutant	Averaging Period	Assessment Criterion
Deposited dust	Annual	4 g/m^2/month (maximum total deposited dust level)

5.1.2 Summary of Relevant Ambient Air Quality Criteria

The air quality goals adopted for the Project, which conform to current EPA and Federal air quality criteria, are summarised in **Table 7**.

Table 7 Project Air Quality Goals

Pollutant	Averaging Time	Goal
TSP	Annual	90 µg/m^3
PM_{10}	24-hours Annual	50 µg/m^3 25 µg/m^3
$PM_{2.5}$	24-hours Annual	25 µg/m^3 8 µg/m^3
Dust Deposition	Annual	Maximum Total of 4 g/m^2/month (Project and other sources)

Source: Approved Methods, NSW EPA 2017

5.2 Local Government Air Quality Toolkit

The NSW EPA has developed the Local Government Air Quality Toolkit (NSW EPA, 2007a), in response to requests from local Council officers for information and guidance on the common air quality issues they manage. Guidance is available under Part 3 of the Local Government Air Quality Toolkit for Construction Sites.

This document lists the common sources of emissions and mitigation and management measures to control airborne dust levels from construction sites and has been consulted in the development of this CAQMP. Some guidance provided by this toolkit includes –

- Use of appropriate air pollution monitoring practices where relevant;
- Identifying ambient air pollution activities;
- Good housekeeping measures;
- Good dust management practices (for example - use of water sprays and dust suppression techniques, use of windbreakers where relevant, etc.);
- Management of dust producing processes (for example – waste generation, sand blasting, etc.);
- Identifying sensitive land uses surrounding the construction site.

6 Receiving Environment

6.1 Local Meteorology

SLR performed meteorological modelling using TAPM/CALMET models in *The New Sydney Fish Markets, Stage 2 -Main Works (SSD 8925), Air Quality Assessment* (SLR Consulting Pty Ltd, 2019). A summary of the annual wind behaviour predicted by the meteorological models at the Project Site for the calendar year 2014 is presented as wind roses in **Figure 5**.

Wind roses show the frequency of occurrence of winds by direction and strength. The bars correspond to the 16 compass points (degrees from north). The bar at the top of each wind rose diagram represents winds blowing from the north (i.e. northerly winds), and so on. The length of the bar represents the frequency of occurrence of winds from that direction, and the widths of the bar sections correspond to wind speed categories, the narrowest representing the lightest winds. Thus, it is possible to visualise how often winds of a certain direction and strength occur over a long period, either for all hours of the day, or for particular periods during the day.

The annual wind rose indicates the predominant wind directions in the area are from west-southwest and northeast. Calm wind conditions (wind speed less than 0.5 m/s) were predicted to occur approximately 1% of the time throughout the modelling period. The seasonal wind roses for the year 2014 indicate that:

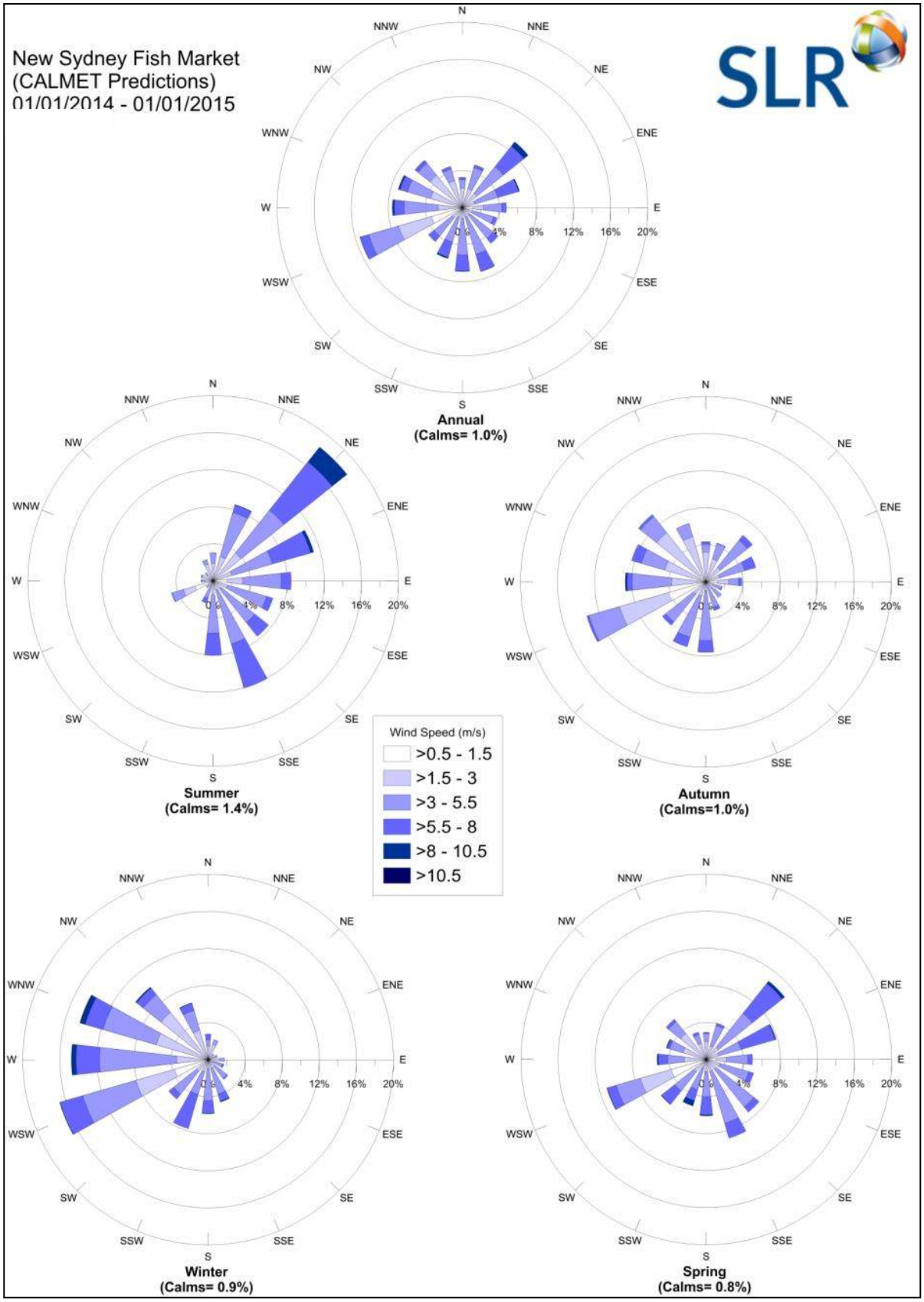
- In summer, winds are mostly gentle to moderate (between 3.0 m/s and 8 m/s) predominantly from the northeast, with very few winds from the northwest and southwest quadrants. Calms were predicted to occur 1.4% of the time during the summer months.
- In autumn, winds are light to moderate (between 0.5 m/s and 8 m/s) predominantly from the west-southwest directions. Calms were predicted to occur 1.0% of the time during the autumn months.
- In winter, winds are mostly gentle to moderate (between 3.0 m/s and 8 m/s) and are from the western quadrant with very few winds from the eastern quadrant. Calms were predicted to occur 0.9% of the time during the winter months.
- In spring, winds are mostly gentle to moderate (between 3.0 m/s and 8 m/s) and predominantly blow from the northeast, west-southwest and south-southeast. Calms were predicted to occur 0.8% of the time during the summer months.

As identified in **Section 3.2**, the closest existing sensitive receptors are located southwest and east of the Project Site boundary. Additional sensitive receptors are also located to the west and northwest of the Project Site.

Winds from between the north and east directions, which would blow air emissions from the Site towards the residences southwest of the site, occur approximately 28% of the time. Winds from between the west-northwest and west-southwest directions, which would blow air emissions from the Site towards the receptors to the east, occur approximately 25% of the time. The average annual speed of wind blowing towards the closest receptors is 4.4 m/s, which is relatively high and would assist in the dispersion of pollutants from the Site. However, it also has potential to exacerbate windblown dust being generated at the site and blown off-site.

It is noted here that the nearest Bureau of Meteorology (BoM) station is the Sydney Observatory Hill Station (Id- 66062) located approximately 1.8 kilometres (km) northeast of the Project Site. A daily review of weather data including predominant wind direction, wind speed, temperature and rainfall is to be performed in order to assist in planning of appropriate air quality management strategies. For example, additional mitigation strategies like increased watering of exposed stockpiles and haul routes may be required in certain months were dry and windy conditions are expected.

Figure 5 New Sydney Fish Market Annual and Seasonal Wind Roses 2014



6.2 Background Air Quality

Ambient air quality monitoring is performed by the NSW Department of Planning, Industry and Environment's Environment, Energy and Science (EES) group at a number of monitoring stations across NSW. Based on information from the EES Air Quality Monitoring Network, air quality is generally good in Sydney. For 2000-2019, the air quality was 'very good', 'good' or 'fair' for 91% of days in the Sydney South-West region. During this time, exceedances of the national air quality standards for particle pollution have usually been associated with regional dust storms and vegetation fires (NSW Government, 2017) (NSW OEH, 2017b) (NSW OEH, 2019).

The closest EES Air Quality Monitoring Station (AQMS) to the Project is Cook and Philip Park AQMS located approximately 1 km northeast of the Project. However, this station does not include long term data as it was commissioned in September 2019. The next closest AQMS to the Project site is the Rozelle AQMS located approximately 4 km to the northwest. The Rozelle AQMS station was commissioned in 1978 and is located on the grounds of Rozelle Hospital, off Balmain Road, Rozelle. It is situated in a residential area in the Parramatta River valley at an elevation of 22 m. It is part of the Sydney East air quality monitoring region.

Rozelle AQMS monitors the following air pollutants:

- Particulate matter less than 10 µm in diameter (PM_{10})
- Particulate matter less than 2.5 µm in diameter ($PM_{2.5}$)
- Nitrogen dioxide (NO_2)
- Carbon monoxide (CO)
- Sulphur dioxide (SO_2)

Air pollutant data recorded by the Rozelle AQMS for the calendar years 2015 – 2019 are summarised in **Table 8** (red font indicates an exceedance of the relevant criterion). To be consistent with the annual NSW compliance monitoring reports, the data for gaseous pollutants are presented in parts per hundred million (pphm) or parts per million (ppm), rather than µg/m^3 and mg/m^3.

The data shows that exceedances of the 24-hour average PM_{10} criterion were recorded by the Rozelle AQMS in all five years, and exceedances of the 24-hour average and $PM_{2.5}$ criteria were recorded in all five years except 2018. A review of the available compliance monitoring reports indicates that these exceedances were primarily due to exceptional events such as bushfire emergencies, dust storms and hazard reduction burns. The high number of exceedances recorded in 2019 was due to bush fire smoke that affected Sydney and the surrounding areas for a significant number of days in November and December of 2019.

Exceedances of the annual average $PM_{2.5}$ criterion were recorded in 2019. The annual average PM_{10} criterion was not exceeded for the five years reviewed.

Ambient concentrations of the gaseous pollutants NO_2, CO and SO_2 were all below the relevant criteria for all years investigated.

A review of background air quality data shows that elevated levels of background particulate matter are likely to occur at times, hence care should be taken during such periods to ensure the constructions works do not intensify air quality impacts due to regional events. In addition, backgrounds levels of combustion gases are well below the respective criteria, hence emission of these pollutants from construction works are unlikely to result in localised exceedances. Nevertheless, given the proximity to major roads in the areas, background concentrations of combustion gasses could be higher than those recorded at Rozelle AQMS. Thus, caution should be exercised in order to minimise gaseous emissions where possible.

Table 8 Summary of Rozelle AQMS Data (2015 – 2019)

Pollutant	PM_{10}		$PM_{2.5}$		NO_2		CO	SO_2	
Averaging Period	Maximum 24-hour	Annual	Maximum 24-hour	Annual	Maximum 1-hour	Annual	Maximum 1-hour	Maximum 1-hour	Annual
Units	µg/m³	µg/m³	µg/m³	µg/m³	pphm	pphm	ppm	pphm	pphm
2015	60.3	16.7	36.0	7.2	6.0	1.1	1.6	ND	ND
2016	58.8	16.8	49.4	7.4	5.0	1.1	1.7	2.0	0.1
2017	54.1	18.1	36.3	7.2	6.1	1.1	1.2	2.4	0.1
2018	88.3*	18.4*	19.2*	7.3*	5.7*	1.0*	1.0*	3.0*	0.1*
2019	142.7	22.7	101.8	10.3	9.0	0.9	5.2	3.2	0.1
Criterion	**50**	**25**	**25**	**8**	**12**	**3**	**25**	**20**	**2**

Notes:

[1] For 2015, one (1) exceedance of the 24-hour average PM_{10} and one (1) exceedance of the 24-hour average $PM_{2.5}$ were recorded.

[2] For 2016, one (1) exceedance of the 24-hour average PM_{10} and five (5) exceedances of the 24-hour average $PM_{2.5}$ were recorded.

[3] For 2017, one (1) exceedance of the 24-hour average PM_{10} and two (2) exceedances of the 24-hour average $PM_{2.5}$ were recorded.

[4] For 2018, two (2) exceedances of the 24-hour average PM_{10} were recorded.

[5] For 2019, 18 exceedances of the 24-hour average PM_{10} and 21 exceedances of the 24-hour average $PM_{2.5}$ were recorded.

ND = No Data

* The AQMS did not meet 75% data availability, due to recommissioning of the site. The AQMS was offline between 15 February 2018 and 30 May 2018. The data presented is based on available data.

7 Assessment of Air Quality Emissions During Construction

As per previously conducted Air Quality Assessment (SLR Consulting Pty Ltd, 2019), the predicted air quality impacts on sensitive receptors after the implementation of mitigation measures (presented in **Section 8**) are presented in **Table 9**.

Table 9 Risk of Air Quality Impacts from Stage 2 Works

Impact	Sensitivity of Area	Demolition*	Earthworks	Construction	Trackout
Dust Soiling	Medium	Low Risk	Low Risk	Low Risk	Negligible Risk
Human Health	Medium	Low Risk	Low Risk	Low Risk	Negligible Risk

*Note Demolition works were not previously considered in Air Quality Assessment (SLR Consulting Pty Ltd, 2019).

The mitigated dust deposition and human health impacts for earthworks and construction activities are anticipated to be *low*. For almost all construction activity, the IAQM Methods notes that the aim should be to prevent significant effects on receptors through the use of effective mitigation and experience shows that this is normally possible.

The previously conducted Air Quality Assessment (SLR Consulting Pty Ltd, 2019) was based on the following assumptions –

- It is assumed that demolition of total building volume of <20,000 m^3 is to be performed and construction material with low potential for dust emissions (e.g. metal cladding and timber) to be demolished. Thus, potential dust emission magnitude considered to be 'Small'.
- Assumptions made for earthworks involve a total site area <10,000 m^2, moderately dusty soil type (eg silt), 5 to 10 heavy earth moving vehicles active at any one time, formation of bunds 4 m to 8 m in height, total material moved 20,000 t to 100,000 t. Thus 'Medium' magnitude for potential dust emissions considered.
- The construction phase is assumed to comprise construction of total building volume greater than 100,000 m^3 and involved piling and activities. Thus, potential for dust emission magnitude considered to be 'Large'.
- Trackout phase is assumed to involve less than 10 heavy vehicle movements per day on surface with low potential for dust generation and less than 50 m of unpaved road length. Hence, a 'Small' magnitude for potential dust emission has been considered.

It is noted, that in the event of any changes being implemented to the scope of the construction works, an update to the previous Air Quality Assessment would be required and subsequent modifications to this CAQMP and mitigation measures are to be implemented.

8 Mitigation Measures

The air emissions during construction at the Project Site and the potential impact (as discussed in **Section 4**) on surrounding sensitive receptors will be controlled through a range of mitigation measures, including good site management, good housekeeping measures, appropriate vehicle maintenance and applying appropriate mitigation measures where required. The dust and odour mitigation measures to be implemented during construction are detailed in **Table 10**.

Table 10 Air Emission Mitigation Measures

Environmental Management Control	Person Responsible	Timing / Frequency	Reference / Notes
Communications			
Multiplex's Community Communications Strategy will be implemented.	Communications and Community Liaison Representative	Prior to commencing construction and ongoing	SSD 8925 Condition B21
The name and contact details of person(s) accountable for air quality and dust issues will be displayed on the site boundary.			Best practice
The head or regional office contact information will be displayed on site signage.			
Complaints and enquiry procedures are to be prepared.			SSD 8925 Condition B21
Site Management			
Where excessive dust events occur (i.e. prolonged visual dust in a particular area), additional watering of dust producing activities will be undertaken or activities temporarily halted until such times that the dust source is under control.	Multiplex	During excessive dust events	Best practice
Nearest Bureau of Meteorology station (Sydney Observatory Hill) weather forecast will be reviewed daily (i.e. wind, rain) to inform site dust management procedures for the day[1].		Daily	
Preparing and Maintaining the Site			
Adequate measures shall be taken to prevent dust from affecting the amenity of the neighbourhood during construction.	Multiplex	Ongoing	SSD 8925 Condition C45
			SSD 8925 Condition C45, a
Earthworks and scheduling activities shall be managed to coincide with the next stage of development to minimise the amount of time the site is left cut or exposed,			SSD 8925 Condition C45, b
All materials shall be stored or stockpiled at suitable locations and stockpiles shall be maintained at manageable sizes which allow them to be covered, if necessary, to control emissions of dust and or VOCs/odour			SSD 8925 Condition C45, c

Environmental Management Control	Person Responsible	Timing / Frequency	Reference / Notes
The surface should be dampened slightly to prevent dust from becoming airborne but should not be wet to the extent that run-off occurs			SSD 8925 Condition C45, d
Gates shall be closed between vehicle movements and shall be fitted with shade cloth			SSD 8925 Condition C45, g
Cleaning of footpaths and roadways shall be carried out regularly			SSD 8925 Condition C45, h
Dust generating activities in areas close to receptors will be closely monitored and additional mitigation applied as required to best manage potential dust emissions			Best practice
Stockpiles that will be in place for more than 20 days and are not actively used as well as any stockpiles that are susceptible to wind or water erosion will be suitably protected from erosion within 10 days of the establishment of each stockpile. Temporary stabilisation of disturbed surfaces will be undertaken within two weeks of the stockpile being established.			
Site fencing and barriers will be kept clean using wet methods.			
Excavated seabed material is to be returned underwater or removed from site within 24-hours of excavation in order inhibit odour impacts due to prolonged exposure to atmosphere.		During pre-construction works.	
Prioritise the replacement of highly odorous excavated seabed material onto seabed where possible to limit odour emissions.			
Excavated seabed material is to be kept covered where possible to limit odour emissions.			
Operating Vehicle/Machinery and Sustainable Travel			
All vehicles carrying spoil or rubble to or from the site shall at all times be covered to prevent the escape of dust or other material	Multiplex	Ongoing	SSD 8925 Condition C45, e
All equipment wheels shall be washed before exiting the site using manual or automated sprayers and drive- through washing bays			SSD 8925 Condition C45, f
All on-road vehicles will comply with relevant vehicle emission standards (prescribed by the NSW RMS), where applicable, and will be maintained in good condition, in accordance with manufacturer's specifications and POEO Act.			Best practice
Delivery trucks will switch off engines whilst undertaking a delivery on-site, if idling time is likely to exceed 5 minutes.			

Environmental Management Control	Person Responsible	Timing / Frequency	Reference / Notes
Vehicle speed limit restrictions are implemented on site, including: • General - 20km/h • High risk area - 10km/h • Haul routes – 50 km/h			
Truck queuing and unnecessary trips will be minimised through logistical planning and by the identification and use of specific park up/hold areas away from the Project.			
General			
Only cutting, grinding or sawing equipment fitted with suitable dust suppression systems, such as filters or water sprays will be used.	Multiplex	Ongoing	Best practice
Adequate water supply will be available on the site for effective dust/particulate matter suppression/ mitigation using a combination of potable and non-potable water sources.			
Water carts will be used on all denuded or exposed surfaces and unsealed roads to minimise dust emissions.			
Equipment, inclusive of, but not limited to Environmental spill kits will be readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.			
Works will be assessed during strong winds or in weather conditions where high levels of airborne particulates may potentially impact the sensitive receivers. Continual monitoring of wind speed and direction will be undertaken to guide this decision and ensure that adequate mitigation measures are undertaken		Continuously and during high winds	
Waste Management			
All trucks entering or leaving the Site will have their loads covered.	Multiplex	Ongoing	SSD 7348 Condition D99b
No waste materials, timbers or any other combustible materials will be burnt on site.			Best practice
Earthworks			
Scopes of work will be planned in such a way to assist in minimising the duration that surfaces are left denuded	Multiplex	Ongoing	Best practice
Rehabilitation of disturbed surfaces will be undertaken within 20 days of final construction levels.		Within 20 days of final construction levels	

Environmental Management Control	Person Responsible	Timing / Frequency	Reference / Notes
If unanticipated strong odours or significant visual dust emissions are noted or observed on site, an investigation will be undertaken by the Project Manager to identify the scope of work or source of the emission prior to undertaking and applying any additional mitigation measures.		Ongoing	
Stockpiles			
Sand and other aggregates will not be allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.	Multiplex	Ongoing	Best practice
Trackout			
Water-assisted road sweeper(s) will be used on an as required basis should any material be tracked out of the site.	Multiplex	Ongoing	Best practice
Record all regular inspections and maintenance undertaken of site haul routes and project related access roads in a site log book.			
A wheel washing system and/or cattle grid system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site) will be implemented.			
Demolition			
Ensure effective water suppression of dust is used during demolition operations.	Multiplex	Ongoing	Best practice
Bag and remove any biological debris or damp down such material before demolition.			

1. To access wind data from Sydney Observatory Hill - http://www.bom.gov.au/products/IDN60901/IDN60901.94768.shtml

9 Performance Objectives

As required by condition B81 (d), **Table 11** summarises the performance objectives identified to assess the effectiveness of the control measures shown in **Section 8**.

Table 11 Summary of the Parameters to Assess the Effectiveness of Control Measures

Parameter	Visible Dust	Odours	Dust Deposition	PM_{10}	Products of Combustion	Complaints
Key performance indicator	No visible dust leaving the site boundary	No odours detected at the boundary of the Project Site	<4 g/m^2/month	<50 $\mu g/m^3$ as a 24-hour average	No clearly visible exhaust emissions on any mobile plant or marine vessels for a sustained period of 5 seconds when engine is idling[1]	No complaints related to dust or other air quality issues
Monitoring method	Visual inspection / observations	Field observations	Dust deposition gauges	See note	Visual inspection / observations	-
Location, frequency and duration of monitoring	Daily onsite inspection	Daily onsite inspection	Section 10	See note	Daily onsite inspection	-
Record keeping	Section 8	Section 8	Section 11	Section 11	Section 8	Section 8
Response procedures	Section 12	Section 12	Section 12	Section 12	Section 12	Section 12
Compliance monitoring	-	-	Section 11	See note	-	-

Note: Real-time suspended particulate monitors are installed at the site to assist with dust management (see **Section 10**).

1. Adopted from https://www.nzta.govt.nz/resources/rules/vehicle-exhaust-emissions-2007/#4

10 Complaints Handling and Response Procedure

All complaints will be handled in accordance with the section B21 'Community Communication Strategy' and B29- 'Complaints and Enquiries Procedure' of SSD 8925.

11 Air Quality Monitoring Program

A summary of the proposed on-site dust monitoring programme to be under taken at the Project Site is shown in **Table 12**. The proposed locations of these monitors are shown in **Figure 6**.

Table 12 Summary of On-Site Monitoring Programme

Pollutant	Equipment Used	Monitoring Sites	Criterion (Averaging Period)
Suspended Particulate Matter (PM_{10}, $PM_{2.5}$)	SiteHive Hexanode, multi-sensor monitor [a]	Location 1, Location 2, Location 3	50 µg/m^3 (24-hour average)
Deposited dust	Dust Deposition Gauges (DDGs)[b]	Location 1, Location 2	4 g/m^2/month (annual average)

[a] The SiteHive Hexanode system is non-compliant with the Approved Methods and is used as a management tool to proactively manage the onsite operations to reduce dust impacts.

[b,] To be undertaken in compliance with the AS/NZS 3580.1.1:2016.

In addition, monitoring activities listed in **Table 13** will also be conducted in order to ensure appropriate management of mitigation measures.

Table 13 Additional Air Quality Monitoring

Environmental Management Control	Person Responsible	Timing/ frequency	Reference
Perform on-site and off-site inspections where receptors (including roads) are nearby, to observe visible dust and odours travelling off-site, as well as smoky vehicle exhausts and confirm compliance with the relevant performance criteria in **Table 11**. Record inspection results and make the log available to the local authority when asked.	Multiplex	Daily	Best Practice
Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust/odour are being carried out and during prolonged dry or windy conditions.		Ongoing	

Figure 6 Air Quality Monitoring Locations



Note- If the monitoring locations need to be changed due to site specific constraints, for example- availability of power, security, local hazards, etc., then this AQMP will be revised to incorporate the new locations.

12 Contingency Management Plan

The air quality contingency management plan for construction at the Project Site is shown in **Table 14**. Data from the monitoring program presented in **Section 11** will be utilised to inform the appropriate contingency response for construction.

Table 14 Air Quality Contingency Management Plan for the Stage 2 Development Construction of the new Sydney Fish Markets

Key Element	Trigger / Response	Condition Green	Condition Amber	Condition Red
Visible dust leaving the site	Trigger	Daily inspections show that there is no visible dust leaving the site.	Daily inspections show that there is visible dust leaving the site.	Daily inspections show that there is visible dust leaving the site multiple times during a day OR from multiple locations within the site.
	Response	Continue monitoring program as normal.	Review and investigate construction activities and respective control measures. Where appropriate, implement additional remedial measures, such as: • *Deployment of additional water sprays, water trucks etc*	Undertake an investigation of the dust generating activities, and if necessary, temporarily halt the dust generating activities
Dust deposition reading of >4g/m^2/month	Trigger	Dust deposition rates are less than 4 g/m^2/month at all the dust gauges.	Dust deposition rate greater than 4 g/m^2/month is recorded by any of the dust gauges	Dust deposition rates greater than 4 g/m^2/month are recorded by two dust gauges for two months in a row.
	Response	Continue monitoring program as normal.	• Project Manager to analyse data to try to identify the source(s) of dust. • Multiplex to review operations to reduce dust emissions from the identified key source(s). Implement any additional mitigation measures as required, such as additional watering.	• Project Manager to review and investigate construction activities and respective control measures for the monitoring period. • Multiplex to submit an incident report to relevant government agencies, if it is concluded that construction activities were directly responsible for the exceedance (i.e. the exceedance event was not caused due to high regional dust levels or local non-project dust source), and the exceedance has caused, is causing or is likely to cause material harm to the environment.

Key Element	Trigger / Response	Condition Green	Condition Amber	Condition Red
Real-time suspended particulate matter monitoring (TSP and PM_{10})	Trigger	Running 24-hour average PM_{10} concentrations < 40 µg/m^3	Running 24-hour average PM_{10} concentrations >40 µg/m^3 but <50 µg/m^3	Running 24-hour average PM_{10} concentrations >50 µg/m^3
	Response	Continue monitoring program as normal.	Project Manager to review and investigate construction activities and respective control measures. Where appropriate, implement additional remedial measures, such as: • Deployment of additional water sprays, water trucks etc • Relocation or modification of dust-generating sources • Record findings of investigations and actions taken to reduce dust levels • Continue to closely monitor dust levels to ensure they are decreasing If elevated dust levels are due to regional dust event (fire, dust storm etc) – still take action to minimise dust from the Project Site to minimise cumulative impacts, but also record details of the cause of the elevated background levels.	• Project Managers to review and investigate construction activities and respective control measures for the monitoring period, in an air pollution incident report. • If it is concluded that construction activities at Project Site were directly responsible for the elevated PM_{10} concentrations, Multiplex to engage specialist air quality consultants to audit site activities and operator to implement additional mitigation measures (and possibly Australian Standard monitoring) based on audit findings.

Key Element	Trigger / Response	Condition Green	Condition Amber	Condition Red
Complaints received regarding nuisance dust or odour	Trigger	There are no complaints received during the construction	An air-quality related complaint is received from a nearby resident	Further complaints are received from the same complainant after the additional mitigation measures have been implemented
	Response	Continue monitoring program as normal.	• Complaints are to be recorded in the site complaint register. To be provided to regulator upon request. • Review and investigate construction activities and increase dust suppression measures (additional watering, covering stockpiles etc), where appropriate OR • Implement additional odour remedial measures (cover odour generating stockpile, remove odour sources from site)	• Review real-time monitoring data at the existing continuous monitors to investigate the likelihood of onsite activities contributing to dust impacts. OR • Undertake an investigation of the odour generating activities, and if necessary, temporarily halt the odour generating activities.
Odours detected off-site	Trigger	Daily inspections show that there are no off-site odour observations.	Daily inspections show that there are off-site odour observations.	• Daily inspections show that there are off-site odour observations multiple times during a day OR from multiple locations within the site.
	Response	Continue monitoring program as normal.	Review and investigate construction activities and respective control measures. Where appropriate, implement additional remedial measures, such as: *Covering of odorous stockpiles, removal of odour sources from site, etc*	• Undertake an investigation of the odour generating activities, and if necessary, temporarily halt the odour generating activities.

13 Roles and Responsibilities

The key responsibilities specifically for air quality management are as follows:

13.1 Contractor's Project Manager

- Ensuring appropriate resources/plant/personnel are available for the implementation of this CAQMP;
- Assessing data from inspections and the monitoring program, and providing project-wide advice to ensure consistent approach and outcomes are achieved;
- Providing necessary training for project personnel to cover air quality management;
- Reviewing and update of this CAQMP;
- Ensuring that the Environmental Coordinator monitors the PM_{10} data being supplied by the onsite monitors, and any other dust monitoring systems identified as being required;
- Assessing and engaging (as required) additional mitigation controls to best manage the risks of elevated dust levels before commencing works each day and ensuring that the appropriate controls are implemented and effective;
- Ceasing particular scopes of works as required in the event of excessive dust generation due to extreme weather conditions or inadequately controlled construction activities (eg high winds, surface dirt accumulation, etc.); and
- In case of elevated odour emissions, implementing appropriate mitigation measures and/or ceasing particular scopes of works.
- In the event that an air quality complaint is received, the procedure as per SSD 8925 B21 will be implemented.

13.2 Environmental Coordinator

- Undertaking dust monitoring program;
- Review that control measures are working in accordance with the CAQMP;
- Alerting the Project Manager of any non-compliances with monitoring data;
- Reviewing weather forecasts daily and current observations of meteorological conditions (as recorded at Sydney Observatory Hill AWS) and provide details of changing conditions to workforce;
- Throughout the day, visually assessing the dust levels and the effectiveness of any dust controls that have been implemented, which may include engaging additional resources to reduce or mitigate the risk of dust leaving the site;
- Performing on-site and off-site odour observations to ensure no odour impacts arising on neighbouring receptors.

13.3 All Workers on Site

- Observing any dust emission control instructions and procedures that apply to their work;
- Taking action to prevent or minimise dust emission incidents; and

- Identifying and reporting dust emission incidents.

14 Review and Improvement of the CAQMP

The review of the CAQMP will be undertaken annually and will include participation by Multiplex. The review will comprise, as a minimum, the following:

- Identification of areas of opportunity for ongoing improved environmental performance;
- Analysis of the causes of any recorded non-compliances, including those identified in environment inspections and audits;
- Verification of the effectiveness of corrective and preventative actions; and
- Highlighting any changes in procedures resulting from process improvement.

This CAQMP will also be reviewed and, if necessary, revised in the following circumstances:

- Where there is any change to the scope of the construction activities and/or disturbance footprint;
- Where it is identified that the environmental performance is not meeting the objectives of the CAQMP;
- In the event of a substantiated complaint being received regarding air quality impacts; and/or
- At the request of a relevant regulatory authority.

15 References

Dr Alvarez M.C. et al. (2012). Causes and Consequences of Odours from Marine Growth Organisms. *The Institute of Estuarine and Coastal Studies – University of Hull, Report to Oil and Gas UK, 17 December 2012*, Report number: ZBB801-F-2012,.

DSEWPC. (2008, June). NPI Emission Estimation Technique Manual for Combustion Engines. *Version 3.0*. Department of Sustainability, Environment, Water, Population and Communities.

NSW EPA. (2007a). *Local Government Air Quality Toolkit - Construction Sites.*

NSW EPA. (2017, January). *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales.* New South Wales Environment Protection Authority.

NSW Government. (2017, June). *Air Quality in NSW.* Retrieved from https://www.epa.nsw.gov.au/~/media/EPA/Corporate%20Site/resources/air/Air-Quality-in-NSW.ashx

NSW OEH. (2017b). *NSW Annual Air Quality Statement 2017.*

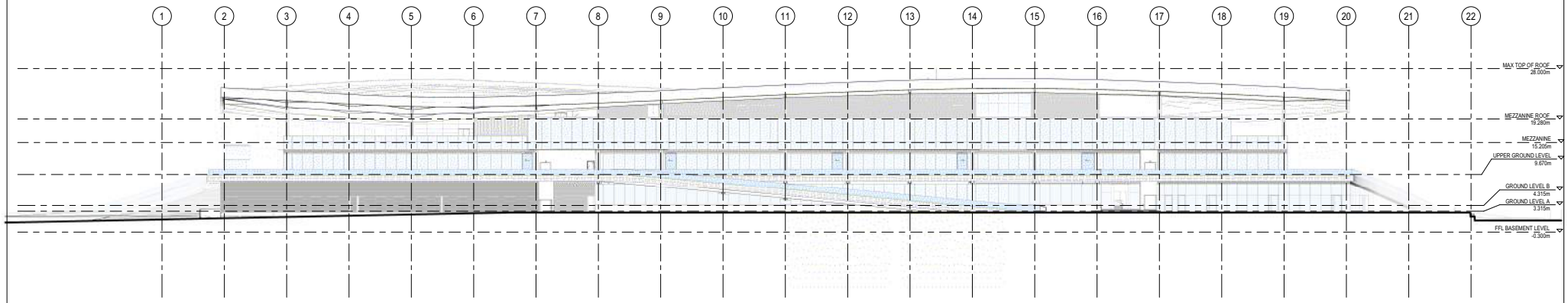
NSW OEH. (2019). *NSW Annual Air Quality Statement 2018.*

Pasquill. (1961). The estimation of the dispersion of windborne material. *The Meteorological Magazine, 90*(1063), 33-49.

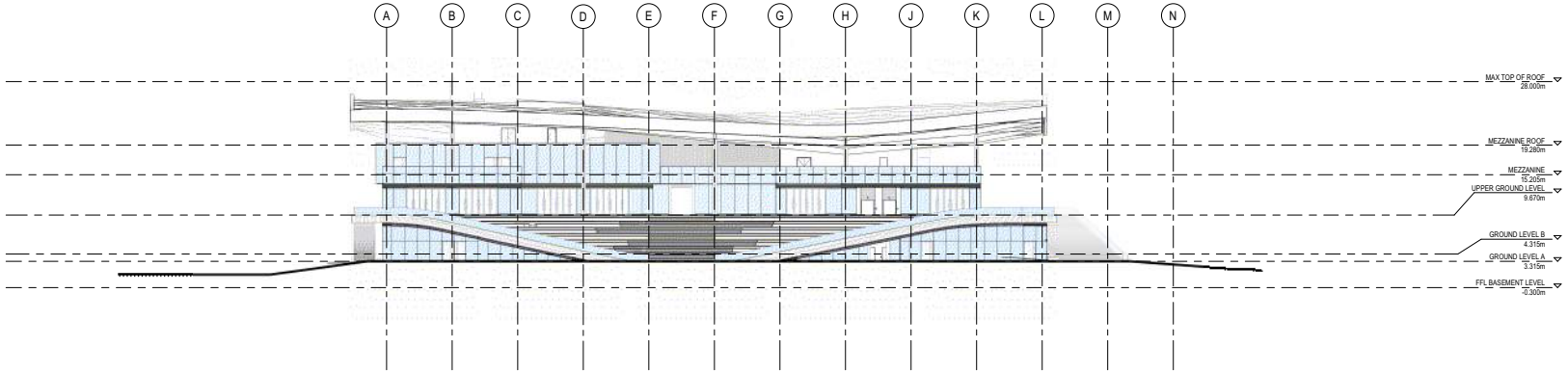
SLR Consulting Pty Ltd. (2019). *The New Sydney Fish Markets, Stage 2 -Main Works (SSD 8925), Air Quality Assessment.*

APPENDIX A

Project Site Layout



1 10C-AA01 - OVERALL SOUTH ELEVATION



2 10C-AA01 - OVERALL EAST ELEVATION

3XN BVN

INTELLECTUAL PROPERTY
COPYRIGHT BVN ARCHITECTURE PTY LIMITED. UNLESS OTHERWISE AGREED IN WRITING BY BVN, THIS DOCUMENT AND SUBJECT TO PAYMENT IN FULL OF ALL BVN CHARGES BVN'S DOCUMENT MAY ONLY BE USED FOR THE PURPOSE FOR WHICH IT WAS PREPARED AND IT MAY NOT BE MODIFIED IF IT HAS BEEN CREATED AND DELIVERED, AS BOTH BVN'S INTERESTS OF BVN AND THIS DOCUMENT MAY NOT BE. OTHERWISE USED, OR COPIED OR REPRODUCED (IN WHOLE OR IN PART). IT MUST BE RETURNED ON REQUEST FROM, AND WITHOUT LIMITING BVN'S RIGHTS THE USER INCLUDES ANY INDEMNIFIES BVN FROM AND AGAINST ALL LOSS AS A RESULT.

NOTE
CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING.

ISSUE	DATE	FOR
A	12/06/19	FOR CLIENT REVIEW
B	19/09/19	TENDER ISSUE
C	01/03/20	TENDER ISSUE

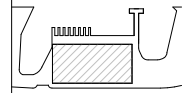
CONSULTANT
STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT
LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT
BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT
BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT
FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT
BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER
THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013
DRAWING KEY



GRAPHIC SCALE
0 5000 12500
SCALE @ A0

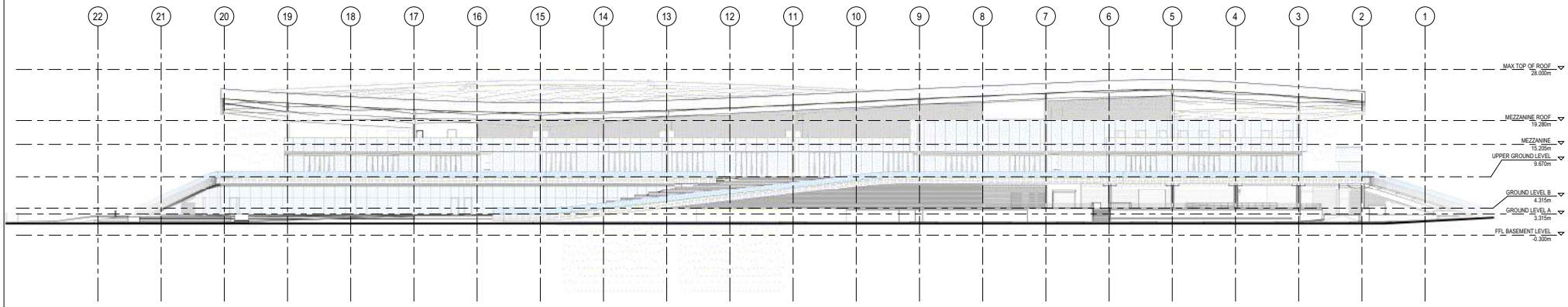
1 : 250 DO NOT SCALE
STATUS

FOR TENDER
DRAWING

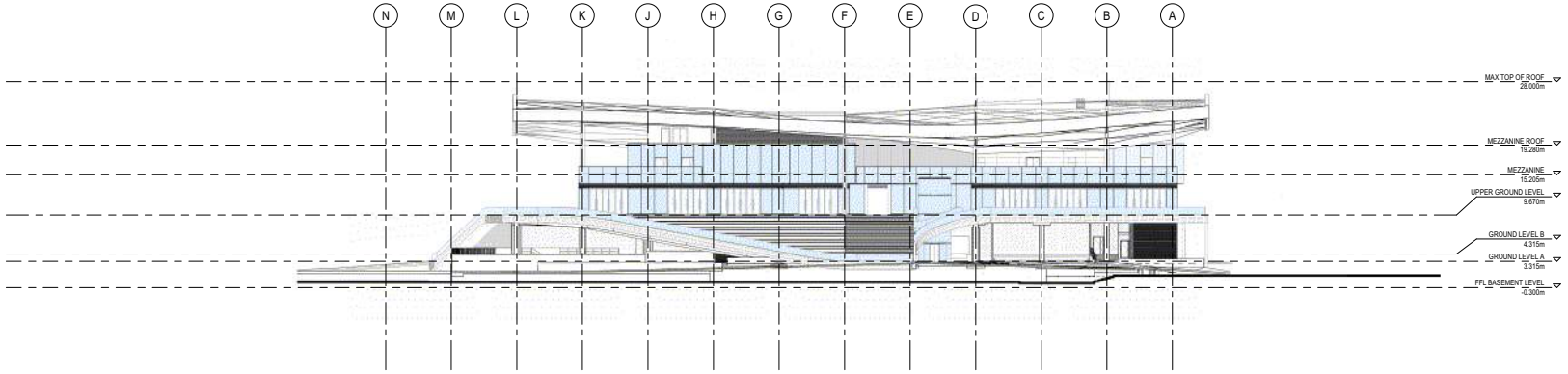
SOUTH AND EAST ELEVATION

AR-1- 10C-AA01

ISSUE C



1 10C-AA02 - OVERALL NORTH ELEVATION



4 10C-AA02 - OVERALL WEST ELEVATION

3XN BVN

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED. UNLESS OTHERWISE AGREED IN WRITING, BVN'S TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN CHARGES THEREOF. THIS DOCUMENT MAY ONLY BE USED FOR THE PURPOSE FOR WHICH IT WAS SUBMITTED AND IS LIMITED. IT WAS NEVER LIMITED AND SHALL NOT BE DEEMED OR REPRESENTED BY BVN AND THIS DOCUMENT MAY NOT BE DEPARTED UNDER OR COPIED WITHOUT THE PRIOR WRITTEN CONSENT OF BVN. DIMENSIONS OF BUILDING OR OF THE SITE AND ARE AND WITHOUT LIMITING BVN'S RIGHTS THE USER RELEASES AND INDEMNIFIES BVN FROM AND AGAINST ALL LOSS AS AWARDED.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING.

ISSUE	DATE	FOR
A	07/05/19	FOR CLIENT REVIEW
B	19/06/19	TENDER ISSUE
C	01/05/20	TENDER ISSUE

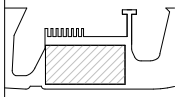
CONSULTANT
STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT
LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT
BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT
BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT
FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT
BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER
THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013
DRAWING KEY



TRUE NORTH PROJECT NORTH

GRAPHIC SCALE
0 5000 12500
SCALE @ A0

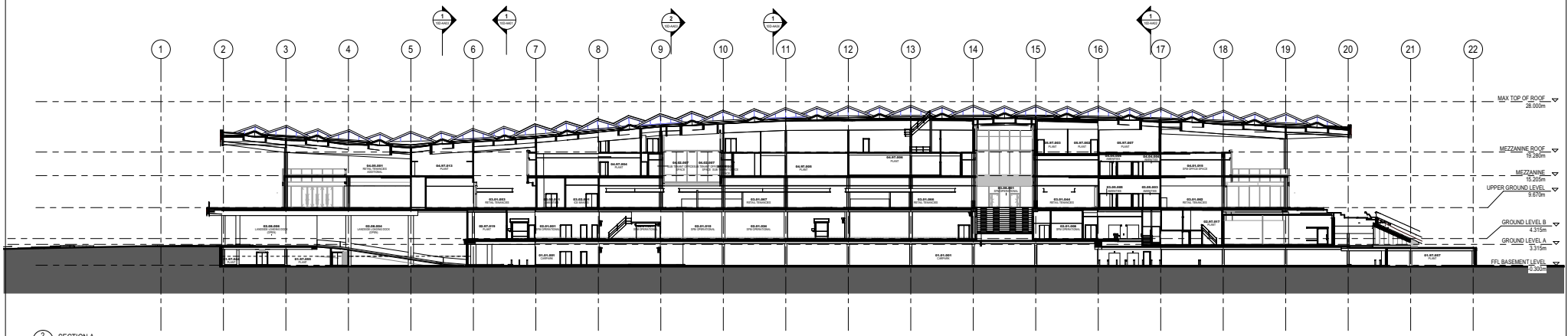
1 : 250 DO NOT SCALE
STATUS

FOR INFORMATION ONLY
DRAWING

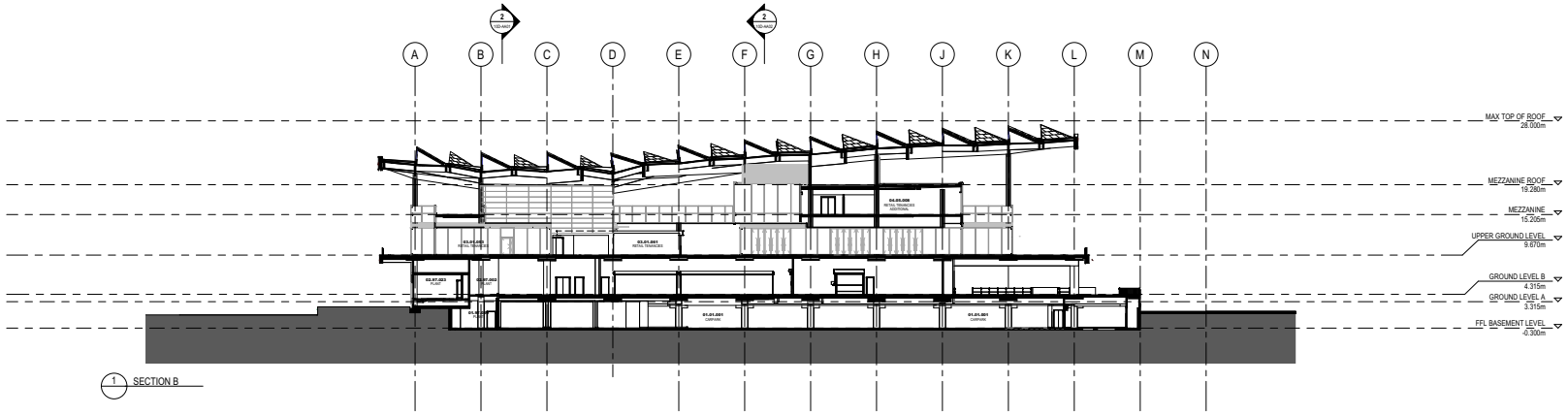
NORTH AND WEST ELEVATION

AR-1- 10C-AA02 ISSUE C

BBC BUILDING SYDNEY FISH MARKETPROPERTY_WEST_Building.rvt 1/05/2020 6:17:26 PM



2 SECTION A



1 SECTION B

INTELLECTUAL PROPERTY

COPYRIGHT BIG IDEAS TECTURE PTY LIMITED. UNLESS OTHERWISE AGREED IN WRITING BY BIG IDEAS TECTURE PTY LIMITED THIS DOCUMENT AND SUBJECT TO PAYMENT IN FULL OF ALL SUMS CHARGED BY BIG IDEAS TECTURE PTY LIMITED THIS DOCUMENT MAY ONLY BE USED FOR THE PURPOSE FOR WHICH IT WAS GIVEN TO THE CLIENT AND HAS BEEN CREATED AND DELIVERED, AND NEITHER IN WHOLE OR IN PART BIG IDEAS TECTURE PTY LIMITED THIS DOCUMENT MAY NOT BE: (I)MADE BY BIG IDEAS TECTURE PTY LIMITED OR ITS CLIENT OR ANY OTHER PERSON OR CORPORATION BE REPRODUCED OR STORED IN ANY MANNER OR IN ANY FORM, INCLUDING BUT WITHOUT LIMITATION INTO ANY RETRIEVAL SYSTEM OR DATA, WITHOUT THE PRIOR WRITTEN PERMISSION OF BIG IDEAS TECTURE PTY LIMITED AND THE USER INCLUDES AND INDEMNIFIES BIG IDEAS TECTURE PTY LIMITED AGAINST ALL LOSS AS ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING.

ISSUE	DATE	FOR
A	07/06/19	FOR CLIENT REVIEW
B	19/09/19	TENDER ISSUE
C	01/05/20	TENDER ISSUE

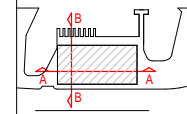
CONSULTANT
STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT
LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT
BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT
BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT
FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT
BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER
THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013
DRAWING KEY



GRAPHIC SCALE
0 5000 12500
SCALE @ A0

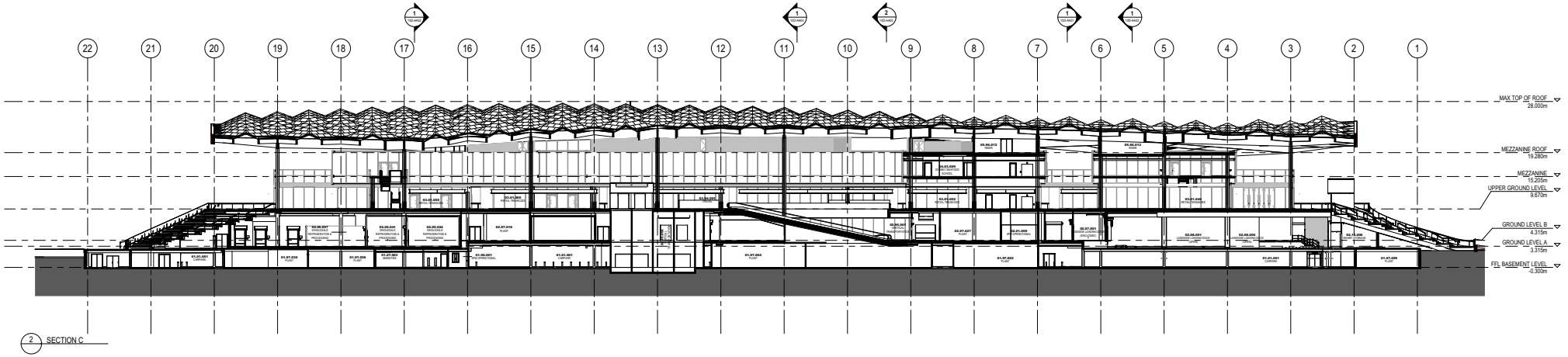
1 : 200 DO NOT SCALE
STATUS

TENDER ISSUE
DRAWING

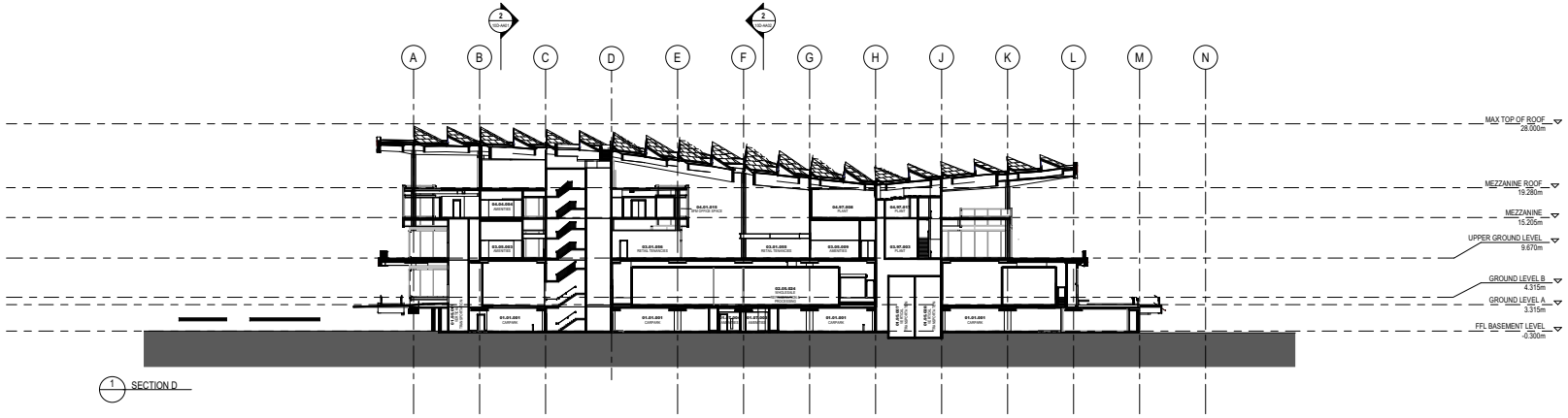
OVERALL SECTION A & B

ISSUE

AR-1- 10D-AA01 C



2 SECTION C



1 SECTION D

3XN BVN

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTS PTY LIMITED. UNLESS OTHERWISE AGREED IN WRITING BY BVN ARCHITECTS PTY LIMITED, THIS DOCUMENT AND ANY INFORMATION IS FULL OF ALL SOLE OWNERSHIP AND COPYRIGHT MAY ONLY BE USED FOR THE PURPOSES AGREED BY BVN ARCHITECTS PTY LIMITED. ANY IDEAS CREATED AND DISCLOSED, AS SUCH IS CONFIDENTIAL AND PROPRIETARY OF BVN AND THIS DOCUMENT MAY NOT BE: (I)MADE OR USED; OR COPIED OR REPRODUCED; OR DISCLOSED TO ANY PERSON OTHER THAN THE PERSON FOR WHOM AND WITH SUCH LIMITED RIGHTS AS MAY BE THE USER, RELEASED AND INDEMNIFIED BVN FROM AND AGAINST ALL LOSS AS ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING.

ISSUE	DATE	FOR
A	07/06/19	FOR CLIENT REVIEW
B	19/09/19	TENDER ISSUE
C	01/05/20	TENDER ISSUE

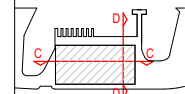
CONSULTANT
STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT
LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT
BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT
BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT
FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT
BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER
THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013
DRAWING KEY



GRAPHIC SCALE
0 5000 12500
SCALE @ A0

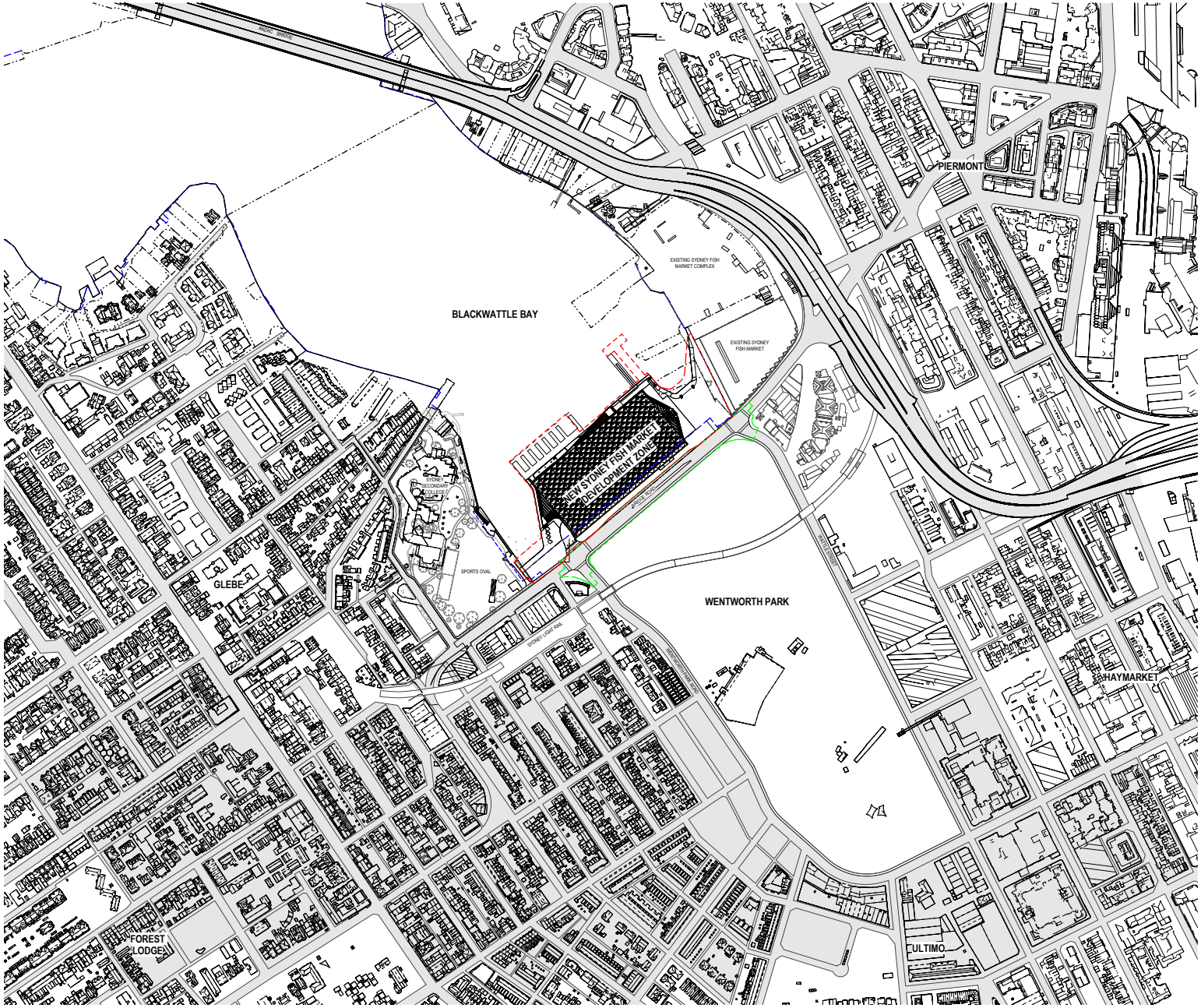
1 : 200 DO NOT SCALE
STATUS

TENDER ISSUE
DRAWING

OVERALL SECTION C & D

AR-1- 10D-AA02 ISSUE C

BVN 3XN NAVE STUDIO 1 FISH MARKET\AR_1\01_ARCH_Building.rvt 13/5/2020 4:32:33 PM



3xn BVN

INTELLECTUAL PROPERTY

COPYRIGHT IN THIS DOCUMENT IS VESTED IN BATES SMART PTY LIMITED. UNLESS OTHERWISE AGREED IN WRITING BATES SMART PTY LTD DOES NOT GRANT ANY LICENCE TO THE RECIPIENT OF THIS DOCUMENT OR ANY OTHER PERSON THAT IS NOT A PARTY TO THE AGREED PURPOSES AND SPECIFICALLY FOR THAT PURPOSE AS ISSUED BY BATES SMART PTY LTD. ALL OTHER CHANGES PRODUCED BEFORE THAT PURPOSE HAS BEEN CARRIED OUT AND DELIVERED AS AUTHORISED WRITTEN OR ELECTRONIC COPIES OF THIS DOCUMENT MAY NOT BE OTHERWISE USED. ON EXPIRED OR WITHDRAWN AGREEMENT THIS DOCUMENT MUST BE RETURNED TO BATES SMART PTY LTD. THE USER AGREES TO INDEMNIFY BATES SMART PTY LTD FROM AND AGAINST ALL LOSS OR DAMAGES.

NOTE

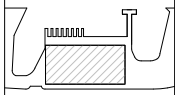
CONTRACTORS TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING.

ISSUE	DATE	FOR
A	01/05/09	TENDER ISSUE

CONSULTANT
STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT
LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT
BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT
BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT
FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT
BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER
THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

INFRASTRUCTURE NSW
CLIENT NUMBER
TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER
1611013
DRAWING KEY

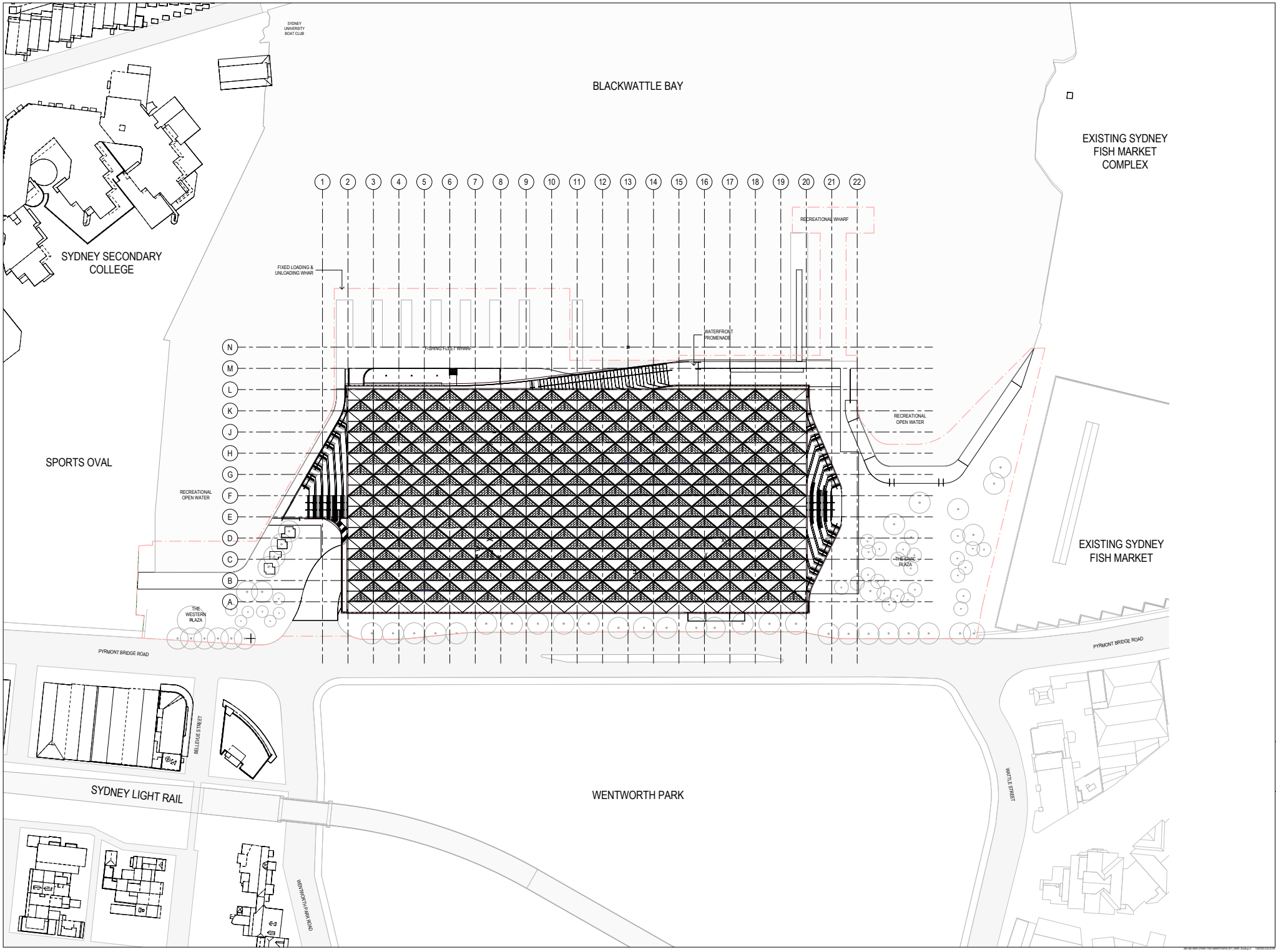


TRUE NORTH PROJECT NORTH
GRAPHIC SCALE
0 40000 100000
SCALE @ A0
1 : 2000 DO NOT SCALE
STATUS
DRAWING

LOCALITY - CONTEXT PLAN

AR-0- 00A-AA12 ISSUE A

BVN DECTECH 2.0.0.0 / FISH MARKET FINISH_RVT_2009_Building.rvt 1/05/2009 4:03:23 PM



3XN BVN

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED. UNLESS OTHERWISE SPECIFIED IN WRITING, BLANK TO THE DOCUMENT AND SUBJECT TO PAYMENT IN FULL OF ALL BVN CHARGES THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED. IN ENTERING IN WRITING BY BVN ARE THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED, WITHOUT THE PRIOR WRITTEN CONSENT OF THE DOCUMENT, IN WHOLE OR IN PART, NOR AND WITHOUT LIMITING BVN'S RIGHTS THE USER RELEASES AND INDEMNIFIES BVN FROM AND AGAINST ALL LOSS OR ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING.

ISSUE	DATE	FOR
A	01/05/20	TENDER ISSUE

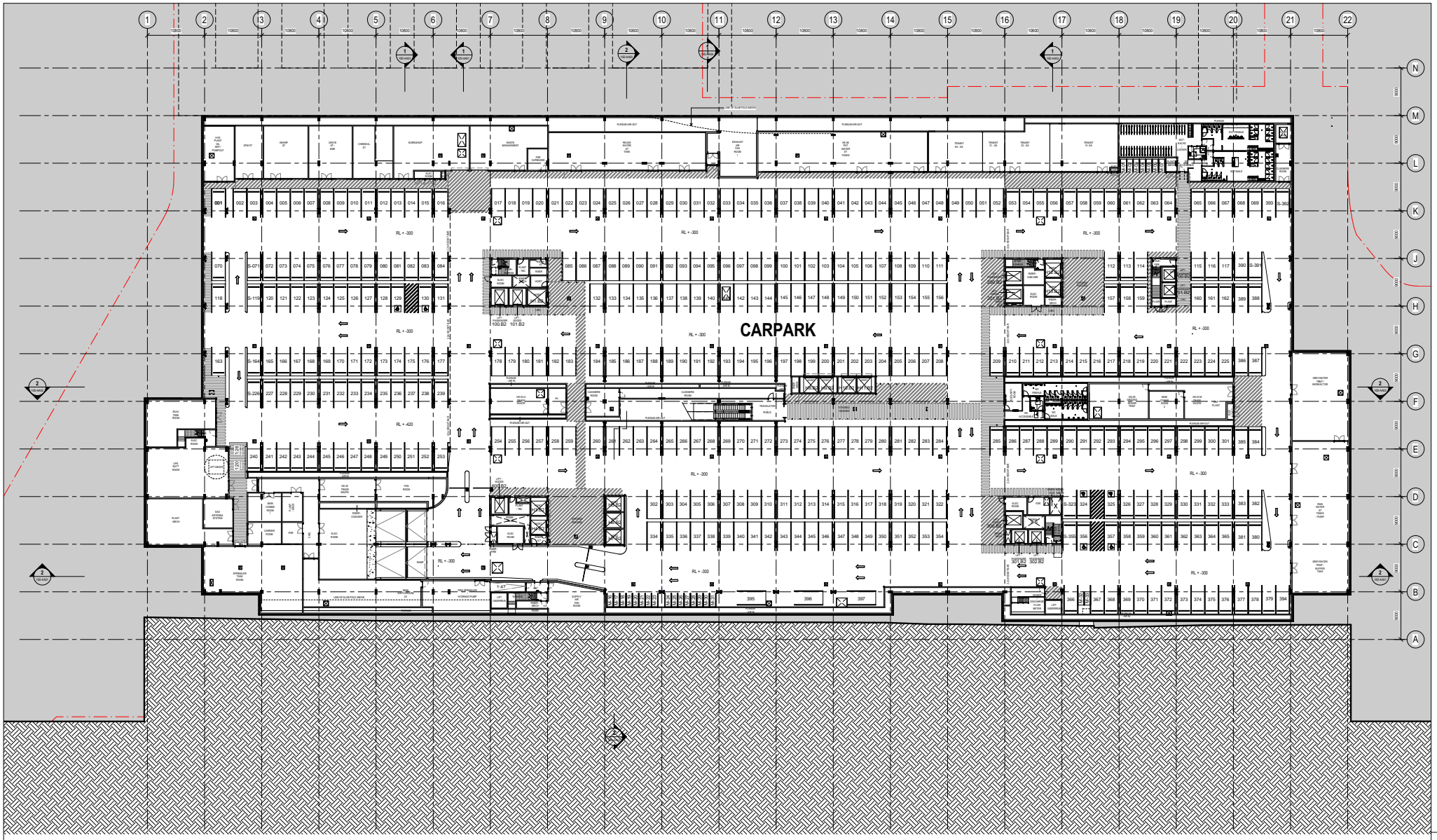
CONSULTANT
STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT
LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT
BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT
BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT
FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT
BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER
THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

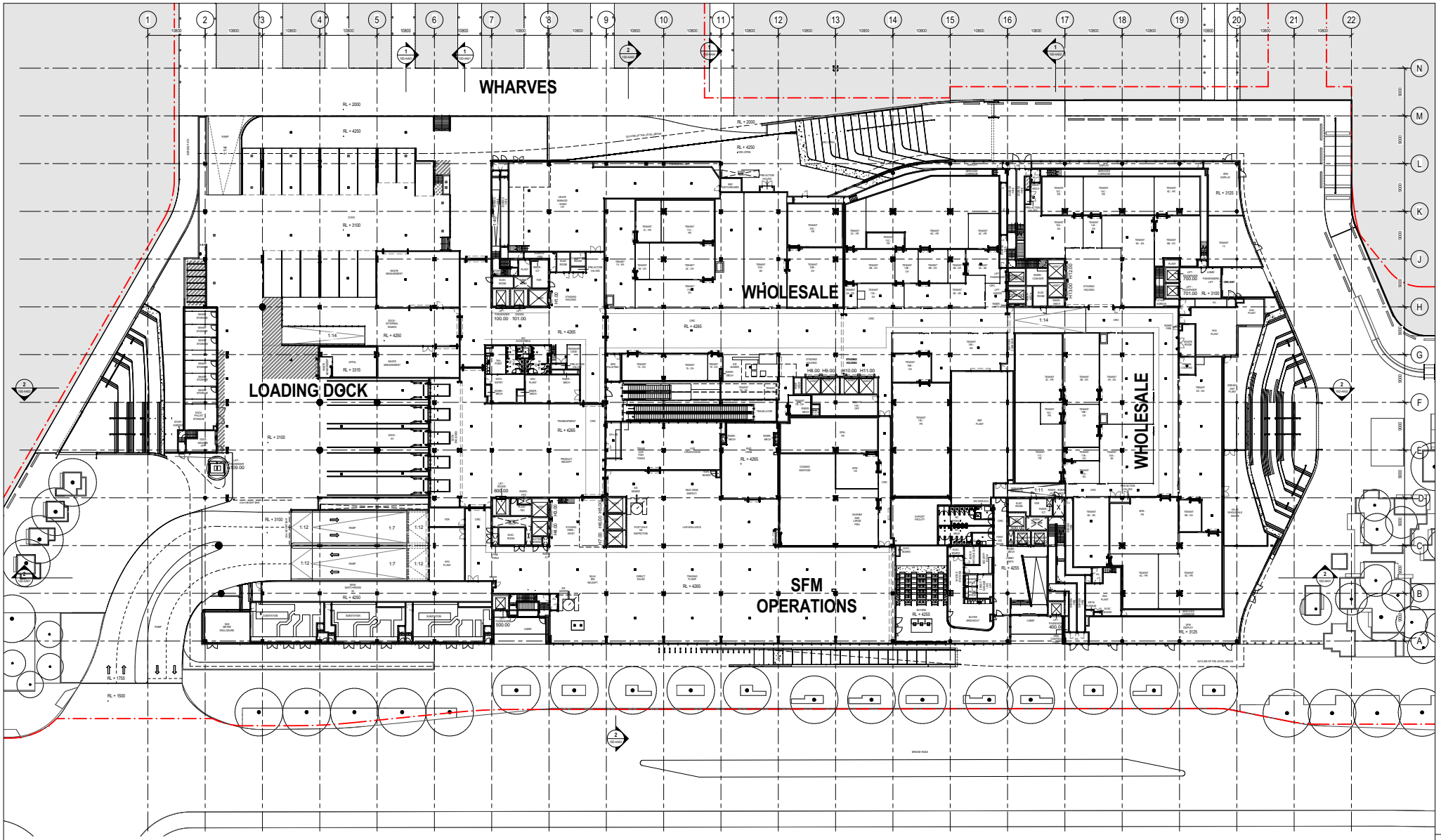
INFRASTRUCTURE NSW
CLIENT NUMBER
TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER
1611013
DRAWING KEY

TRUE NORTH PROJECT NORTH
GRAPHIC SCALE
0 10000 25000
SCALE @ A0
1 : 500 DO NOT SCALE
STATUS
DRAWING

SITE PLAN - ROOF LEVEL
AR-0- 00A-AA13 ISSUE A


CARPARK
RL + -300
RL + -420
RL + -300
RL + -300
RL + -300



3xn BVN

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED. UNLESS OTHERWISE AGREED IN WRITING, ALL RIGHTS TO THE DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BIDS CHARGED THEREIN AND MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT WAS BEEN CREATED AND DELIVERED. AS NOTIFIED IN WRITING BY BVN AND THE DOCUMENT MAY NOT BE OTHERWISE USED OR COPIED ANY OTHER PURPOSE OR ON THIS DOCUMENT IN ANY OTHER WORK EXCEPT WITH THE WRITTEN PERMISSION AND WITHOUT LIMITING BVN'S RIGHTS THE USER RELEASES AND INDEMNIFIES BVN FROM AND AGAINST ALL LOSS OR AMENDS.

NOTE

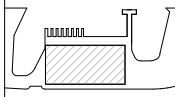
CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING.

ISSUE	DATE	FOR
A	07/05/19	FOR CLIENT REVIEW
B	21/05/19	FOR QS COSTING REVIEW
C	19/06/19	TENDER ISSUE
D	15/11/19	PHASE 3 A1 - BASIS OF DESIGN
E	01/05/20	TENDER ISSUE
F	06/05/20	TENDER ISSUE
G	31/07/20	LANDLORD'S WORK TO 80%

CONSULTANT
STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT
LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT
BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT
BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT
FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT
BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER
THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

INFRASTRUCTURE NSW
CLIENT NUMBER
TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD. GLEBE NSW
BVN PROJECT NUMBER
1611013
DRAWING KEY

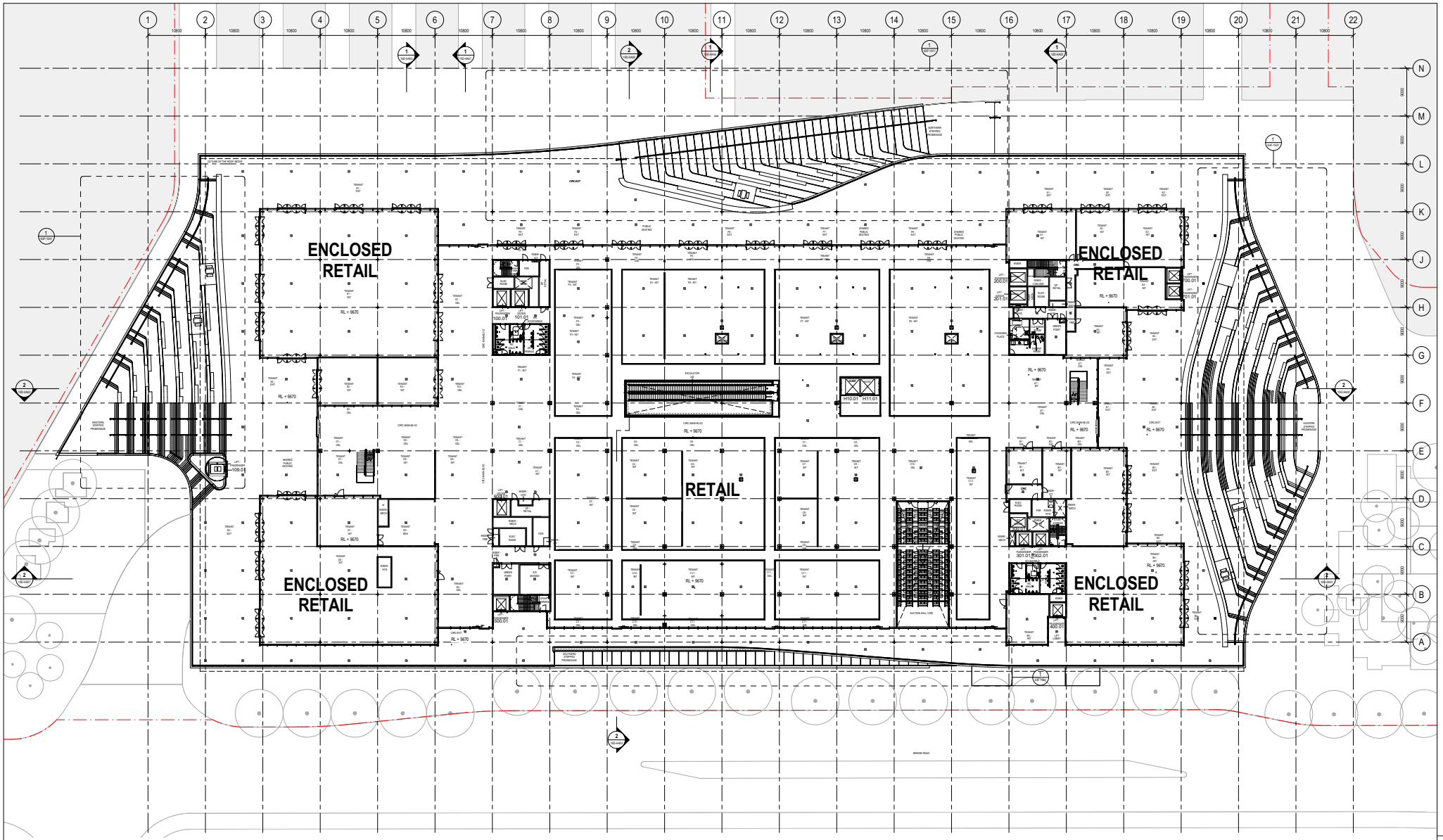


TRUE NORTH PROJECT NORTH
GRAPHIC SCALE
0 5000 12500
SCALE @ A0
1 : 250 DO NOT SCALE
STATUS
FOR INFORMATION ONLY
DRAWING

OVERALL GA - LEVEL L0

AR-1- 10B-L000 ISSUE G

BBC BUILDING SYDNEY FISH MARKET/BBC_RVT_WRKST_Building.rvt 2020/12/03 6:02:13 PM



3XN BVN

INTELLECTUAL PROPERTY

NOTE

ISSUE	DATE	FOR
A	17/06/19	FOR CLIENT REVIEW
B	21/06/19	FOR QS COSTING REVIEW
C	09/07/19	FOR INFORMATION
D	19/07/19	TENDER SET A
E	15/11/19	TENDER SET A1 - BASIS OF AWARD
F	31/05/20	TENDER ISSUE
G	21/07/20	LANDLORDS WORK TO 80%

CONSULTANT
STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT
LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT
BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT
BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT
FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT
BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER
THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013
DRAWING KEY

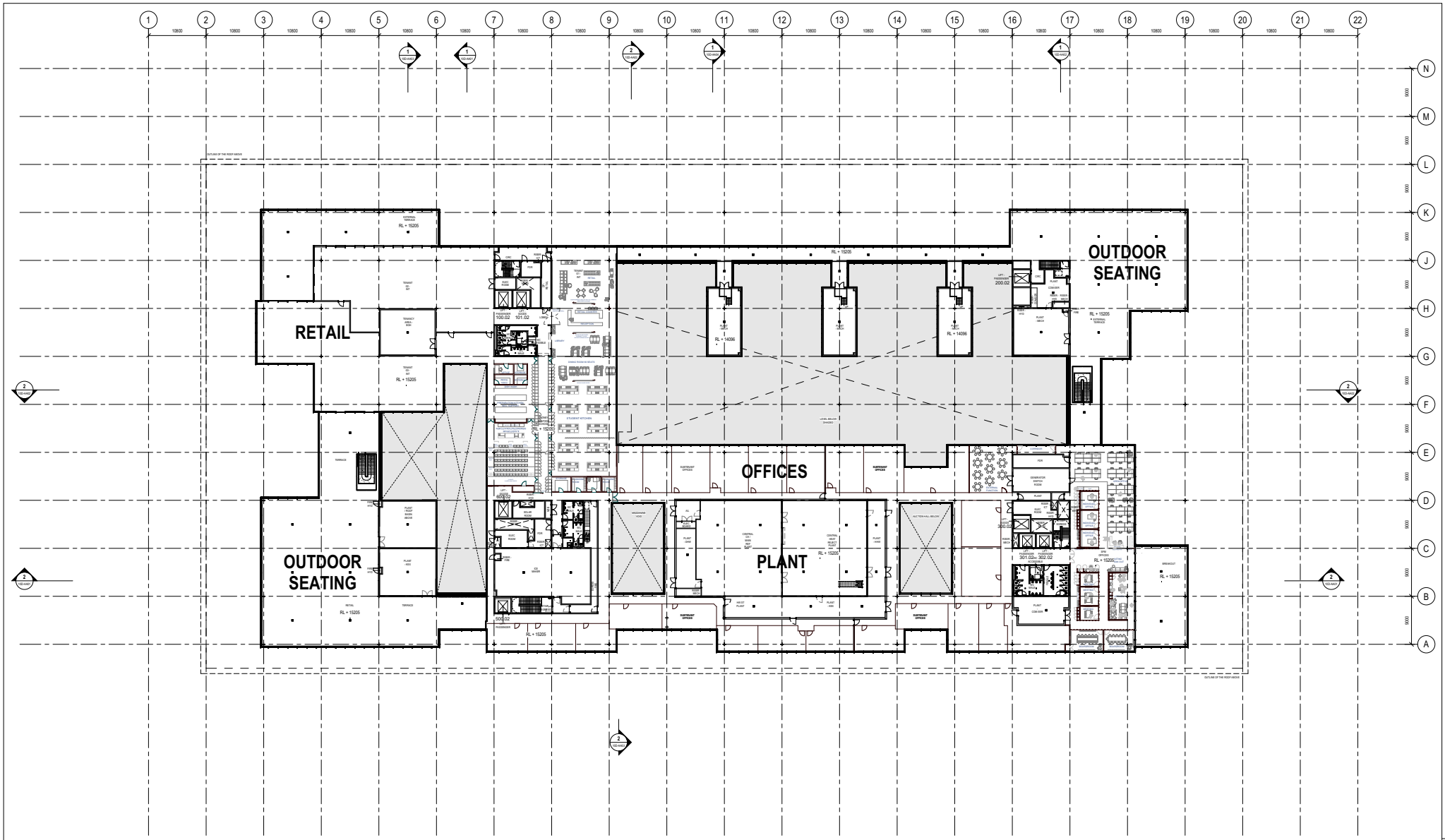
TRUE NORTH PROJECT NORTH
GRAPHIC SCALE
0 5000 12500
SCALE @ A0

1 : 200 DO NOT SCALE
STATUS

FOR INFORMATION ONLY
DRAWING

OVERALL GA - LEVEL L1

AR-1- 10B-L100 ISSUE G



3xn BVN

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED. UNLESS OTHERWISE AGREED IN WRITING, BVN RETAINS OWNERSHIP OF ALL INTELLECTUAL PROPERTY RIGHTS IN ALL OF THE DRAWINGS, DOCUMENTS AND DESIGNS (INCLUDING BUT NOT LIMITED TO ANY IMAGES, MODELS, PLANS, SPECIFICATIONS, PRODUCT SPECIFICATIONS, SPECIFICATIONS, ESTIMATES, SAMPLES AND COMPUTER PROGRAMS) THEY MAY BE EXPRESSED TO BE THE PROPERTY OF ANY OTHER PERSON AFTER PAYMENT OF ALL AND ANY SUMS DUE AND PAYABLE TO BVN PURSUANT TO THE LEGAL AGREEMENT BETWEEN US. THE DRAWINGS, DOCUMENTS AND DESIGNS (OR ANY PART OF THEM) MAY NOT BE USED, REVISED, REPRODUCED OR EXHIBITED IN ANY WAY FOR ANY PURPOSE UNTIL ALL SUMS DUE AND PAYABLE TO BVN UNDER THE LEGAL AGREEMENT BETWEEN US HAVE BEEN PAID IN FULL.

NOTE

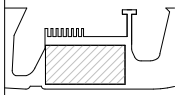
CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING.

ISSUE	DATE	FOR
A	07/05/19	FOR CLIENT REVIEW
B	20/05/19	FOR CLIENT REVIEW
C	31/05/19	FOR COSTING REVIEW
D	19/06/19	TENDER ISSUE
E	15/11/19	PHASE 3.A1 - BASIS OF DESIGN
F	01/05/20	TENDER ISSUE

CONSULTANT
STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT
LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT
BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT
BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT
FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT
BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER
THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

INFRASTRUCTURE NSW
CLIENT NUMBER
TEL +61 (0) 2 9216 5700
PROJECT

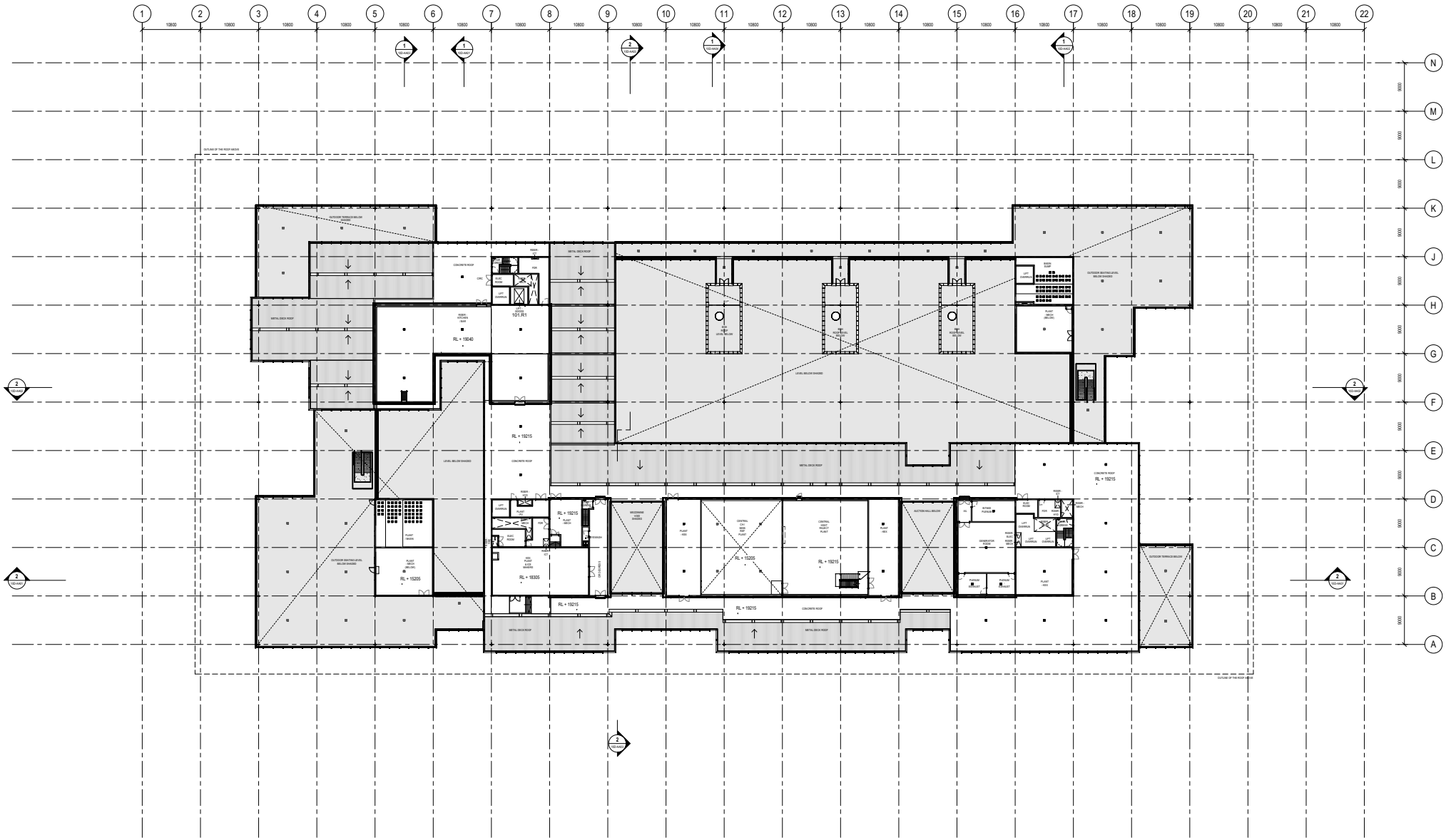
NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER
1611013
DRAWING KEY



TRUE NORTH PROJECT NORTH
GRAPHIC SCALE
0 5000 12500
SCALE @ A0
1 : 250 DO NOT SCALE
STATUS
FOR INFORMATION ONLY
DRAWING

OVERALL GA - LEVEL L2
ISSUE
AR-1- 10B-L200 F

BBC BUILDING SYDNEY FISH MARKET PROPE_BVN_Building.rvt 20/05/2020 11:08:20 PM



3xn BVN

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED. UNLESS OTHERWISE AGREED IN WRITING, ALL RIGHTS OF THE DOCUMENT ARE SUBJECT TO THE RIGHT IN THE FULL OF ALL BVN CHARGES PURCHASED DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED. AS NOTIFIED IN WRITING OF BVN AND THIS DOCUMENT MAY NOT BE OTHERWISE USED OR COPIED ANY WHICH DOES NOT ARE THE DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S RIGHTS THE USER WILL BE LIABLE AND INDEMNIFIED BVN FROM AND AGAINST ALL LOSS OR ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING.

ISSUE	DATE	FOR
A	07/09/19	FOR CLIENT REVIEW
B	21/05/19	FOR QS COSTING REVIEW
C	05/01/19	FOR INFORMATION
D	19/06/19	TENDER ISSUE
E	15/11/19	PHASE 1A1 - BASIS OF DESIGN
F	01/05/20	TENDER ISSUE

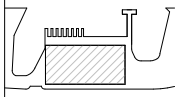
CONSULTANT
STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT
LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT
BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT
BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT
FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT
BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER
THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013
DRAWING KEY



TRUE NORTH PROJECT NORTH

GRAPHIC SCALE
0 5000 12500
SCALE @ A0

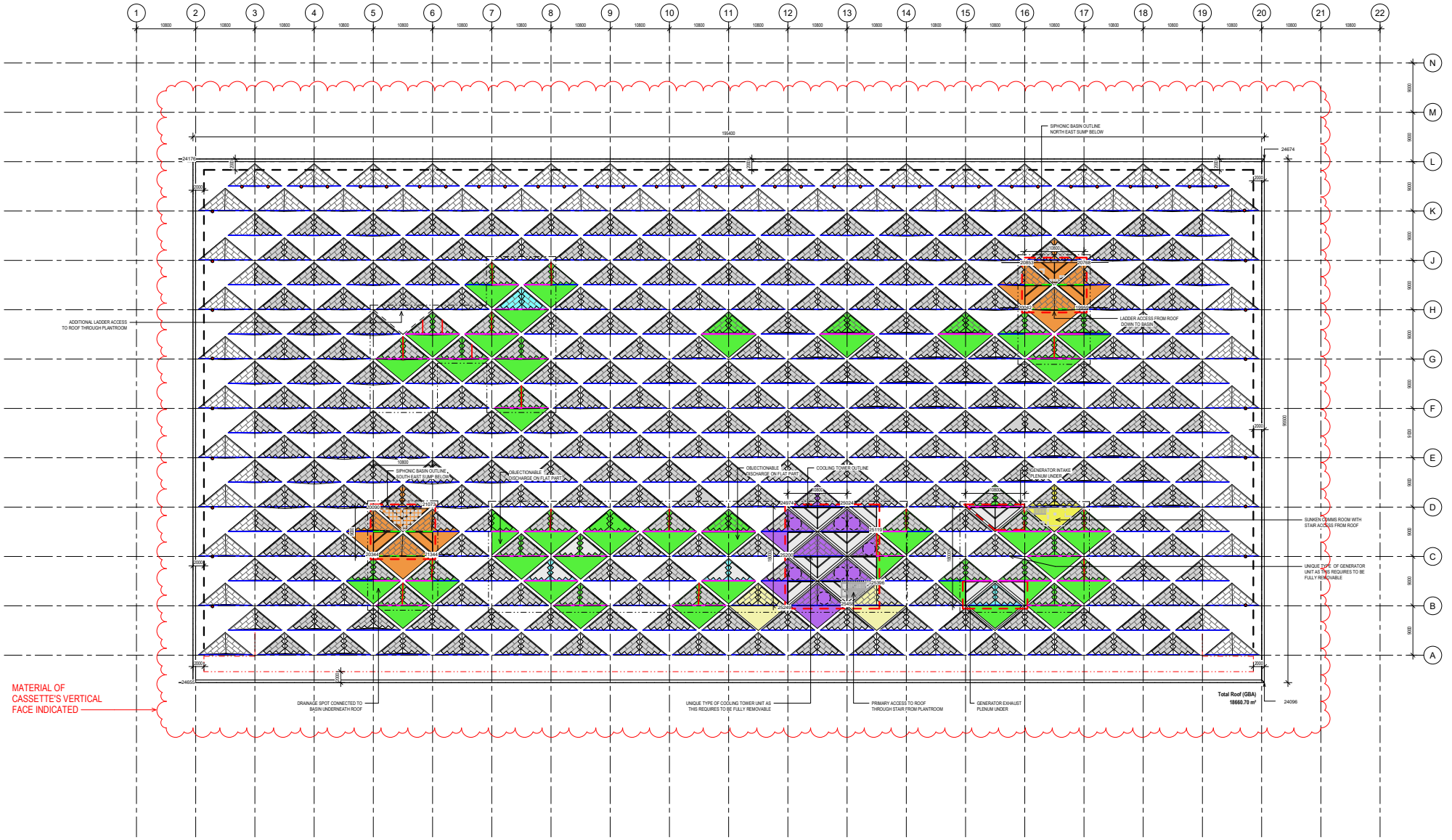
1 : 250 DO NOT SCALE
STATUS

FOR INFORMATION ONLY
DRAWING

OVERALL GA - LEVEL R1

AR-1- 10B-R100 ISSUE F

BBC BUILDING SYDNEY FISH MARKET\TEMP\R_PLOT_WRIGHT_Building.rvt 30/06/2020 11:38:05 PM



Cassette Function Types_Schedule				
	Geometry Type	Width	Length	Count
ANTENNA				
	1.Standard	9729	4065	1
				1
COOLING TOWER				
	1.Standard	9729	4065	6
	2.Custom	9729	4065	2
				8
DRAINAGE				
	1.Standard	9729	4065	6
	2.Custom	9729	4065	2
				8
EXHAUST (NOTE: THIS TYPE REQUIRES DEMOUNTABILITY FOR PLANT REMOVAL)				
	1.Standard	9729	4065	22
	2.Custom	9729	4065	11
				33
GPS ANTENNA				
	1.Standard	9729	4065	2
				2
HAZARDOUS (NOTE: THIS TYPE REQUIRES FIRE RATING ACCORDING TO ENGINEERS.)				
	1.Standard	9729	4065	3
	2.Custom	9729	4065	1
				4
Total number of items				56

DRAWING LEGEND:

- SAFETY LINE
- STATIC LINE
- FALL ARREST ANCHOR POINT SHOWN FOR PERIMETER ONLY - REFER TO CASSETTE TYPES FOR CASSETTE SPECIFIC FALL ARREST REQUIREMENTS — SEE ACCESS SCHEME REPORT BY ACCESS CONSULTANT APEX
- COLOUR CODE FOR OPEN AREA SEE MECHANICAL REQUIREMENTS BY AECOM
- AREA OF PLANT AT MEZZANINE ROOF
- FIRE SEPARATION WALL INSIDE OF MECHANICAL PODS
- PV-ELEMENTS FULL AREA OF PV-ELEMENTS (AS SHOWN) = 4170 m²
- GLAZED VERTICAL FACE
- LOUVRED VERTICAL FACE
- OPEN VERTICAL FACE

LEGEND ADDED

CASSETTE FUNCTION TYPE DIAGRAMS

DIAGRAMS INDICATIVE FOR TYPICAL TYPE. FURTHER DETAILS REFER TO ACE SERIES ROOF ELEMENT DRAWINGS

TYPICAL MATERIAL OF CASSETTE'S VERTICAL FACE AMENDED

ANTENNA · COOLING TOWERS · DRAINAGE · STANDARD GLAZED

EXHAUST · GPS ANTENNA · HAZARDOUS

OVERALL GA PLAN NOTES:

1) COOLING TOWER ZONE REQUIRES 80% OF FREE AREA ON FLAT CASSETTES PANELS ACCORDING TO MECHANICAL ENGINEERS.
2) COORDINATE LOCATION AND APPLIED FORCES OF ANCHOR POINTS AND STATIC LINE WITH STRUCTURAL ARRANGEMENT AND DESIGN OF ROOF CASSETTES. APPLIES LOADS ARE NOMINATED IN APEX ACCESS SCHEME REPORT.
3) SIPHONIC BASINS REQUIRE FALL ARREST HANDRAIL AROUND. CODE: BAL-22.

GENERAL NOTE:

A) THE ROOF GEOMETRY AND BUILD UP IMPACTS THE STRUCTURAL AND CIVIL STORMWATER DESIGN OF THE ROOF. THE COORDINATED DESIGN BEING PROPOSED IS HIGHLY SENSITIVE AND ANY VARIATION TO THE GEOMETRY AND/OR BUILD UP WILL NEED TO BE VERIFIED BY ALL DISCIPLINES.
B) ROOF BUILD UP CAN BE FOUND ON AR-1-42G-0100 AND HAS BEEN DEVELOPED TO ENSURE COMPLIANCE WITH THE FER

REFER DOCUMENTS:

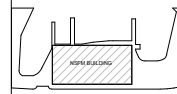
SUBJECT	CONSULTANT	DOCUMENT NUMBER
ACOUSTIC	AECOM	AC-0-47R-AA00-NSFM Acoustic Design Report
BMEMS	AECOM	BM-0-77Z-AA00-NSFM D&C Performance Specification BMS EMS Services
COMMUNICATION TECHNOLOGY	AECOM	CM-0-96Z-AA00-NSFM D&C Performance Specification Information and Communication Technology Services
ELECTRICAL	AECOM	EL-0-90Z-AA00-NSFM D&C Performance Specification Electrical Services
FIRE	AECOM	FS-0-83Z-AA00-NSFM D&C Performance Specification Fire Services
HYDRAULIC	AECOM	HY-0-80Z-AA0-NSFM D&C Performance Specification Hydraulic Services
MECHANICAL	AECOM	ME-0-70Z-AA00-NSFM D&C Performance Specification Mechanical Services
STRUCTURE	MATT MACDONALD	SPECIFICATIONS AND DRAWINGS
MAINTENANCE	APEX	NSFM Access Scheme Report
FACADE / ROOF	APEX	SPECIFICATIONS AND DRAWINGS
SOLAR ENERGY	GXN	GXN-WP_PHOTOVOLTAIC SYSTEMS

INTELLECTUAL PROPERTY
COPYRIGHT WALKER TECTON PTY LIMITED. UNLESS OTHERWISE AGREED IN WRITING THIS DRAWING IS AN INSTRUMENT OF SERVICE AND IS SUBJECT TO PAYMENT IN FULL OF ALL MONIES OWING TO WALKER TECTON PTY LIMITED. THIS DRAWING IS NOT TO BE USED FOR ANY PURPOSE OTHER THAN THAT AUTHORISED BY WALKER TECTON PTY LIMITED. THIS DRAWING AND THE DESIGN EMBODIED THEREIN MAY NOT BE USED, REPRODUCED OR REVISED IN ANY MANNER WHATSOEVER NOR ASSIGNED TO ANY THIRD PARTY WITHOUT THE PRIOR AND EXPRESS WRITTEN CONSENT OF WALKER TECTON PTY LIMITED AND THAT CONSENT MAY BE GIVEN ON SUCH CONDITIONS AS WALKER TECTON PTY LIMITED THINKS FIT AND WALKER TECTON PTY LIMITED EXPRESSLY RESERVES ITS RIGHT TO BE PAID A REASONABLE FEE BEFORE CONSENTING TO ANY SUCH USE, REPRODUCTION OR REVISION.

NOTE
CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING.

ISSUE	DATE	FOR
A	130719	FOR CLIENT REVIEW
B	260919	FOR CLIENT REVIEW
C	040919	ISSUE FOR REVIEW
D	180919	TENDER SUBMISSION
E	051119	PHASE DA / BASIS OF DESIGN
F	010520	TENDER ISSUE
G	030720	TENDER ADDENDUM

CONSULTANT
STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT
LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT
BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT
BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT
FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT
BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER
TBC
CLIENT
URBAN GROWTH NSW
CLIENT NUMBER
TEL +61 (0) 2 9216 5700
PROJECT
NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER
1611013
DRAWING KEY



TRUE NORTH · PROJECT NORTH
GRAPHIC SCALE
0 2000 5000
SCALE @ A3
1 : 250
DO NOT SCALE
STATUS
FOR TENDER
DRAWING
OVERALL GA - LEVEL R2
AR-1- 10B-R200
ISSUE G

ASIA PACIFIC OFFICES

BRISBANE
Level 2, 15 Astor Terrace
Spring Hill QLD 4000
Australia
T: +61 7 3858 4800
F: +61 7 3858 4801

CANBERRA
GPO 410
Canberra ACT 2600
Australia
T: +61 2 6287 0800
F: +61 2 9427 8200

DARWIN
Unit 5, 21 Parap Road
Parap NT 0820
Australia
T: +61 8 8998 0100
F: +61 8 9370 0101

GOLD COAST
Level 2, 194 Varsity Parade
Varsity Lakes QLD 4227
Australia
M: +61 438 763 516

MACKAY
21 River Street
Mackay QLD 4740
Australia
T: +61 7 3181 3300

MELBOURNE
Level 11, 176 Wellington Parade
East Melbourne VIC 3002
Australia
T: +61 3 9249 9400
F: +61 3 9249 9499

NEWCASTLE
10 Kings Road
New Lambton NSW 2305
Australia
T: +61 2 4037 3200
F: +61 2 4037 3201

NEWCASTLE CBD
Suite 2B, 125 Bull Street
Newcastle West NSW 2302
Australia
T: +61 2 4940 0442

PERTH
Ground Floor, 503 Murray Street
Perth WA 6000
Australia
T: +61 8 9422 5900
F: +61 8 9422 5901

SYDNEY
Tenancy 202 Submarine School
Sub Base Platypus
120 High Street
North Sydney NSW 2060
Australia
T: +61 2 9427 8100
F: +61 2 9427 8200

TOWNSVILLE
12 Cannan Street
South Townsville QLD 4810
Australia
T: +61 7 4722 8000
F: +61 7 4722 8001

WOLLONGONG
Level 1, The Central Building
UoW Innovation Campus
North Wollongong NSW 2500
Australia
T: +61 2 4249 1000

AUCKLAND
Level 4, 12 O'Connell Street
Auckland 1010
New Zealand
T: 0800 757 695

NELSON
6/A Cambridge Street
Richmond, Nelson 7020
New Zealand
T: +64 274 898 628

Appendix 7: Air Quality Report

THE NEW SYDNEY FISH MARKET

Concept and Stage 1 Works (SSD 8924)
Air Quality Impact Assessment

Prepared for: UrbanGrowth NSW Development Corporation

SLR Ref: 610.17553
Version No: -v3.0
April 2019

PREPARED BY

SLR Consulting Australia Pty Ltd
ABN 29 001 584 612
2 Lincoln Street
Lane Cove NSW 2066 Australia
(PO Box 176 Lane Cove NSW 1595 Australia)
T: +61 2 9427 8100 F: +61 2 9427 8200
E: sydney@slrconsulting.com www.slrconsulting.com

BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with the Client. Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of UrbanGrowth NSW Development Corporation. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.17553-R02-v3.0	1 April 2019	A Naghizadeh	K Lawrence	A Naghizadeh
610.17553-R02-v2.0	5 November 2018	A Naghizadeh	K Lawrence	A Naghizadeh
610.17553-R02-v1.0	13 August 2018	A Naghizadeh	G Starke	G Starke

EXECUTIVE SUMMARY

SLR was commissioned by UrbanGrowth NSW Development Corporation (UrbanGrowth NSW) to perform an Air Quality Impact Assessment (AQIA) for the proposed development of the new Sydney Fish Market (the site). The site is located at the head of Blackwattle Bay between the Pyrmont Peninsula and the foreshore of Glebe, situated less than 2 km west of Sydney's CBD and is partially within the City of Sydney Local Government Area.

This report has been prepared in response to the Secretary's Environmental Assessment Requirements (SEAR's) for Concept and Stage 1 Works of the development of the site, which includes the demolition and site preparation works for the subsequent construction phases of the development.

The main potential sources of air emissions were identified as dust impacts during the demolition works and odour impacts due to the decomposition of marine growth on the underwater structures should they be stored on-site for an extended period.

The potential for off-site dust impacts was assessed using a qualitative risk-based approach prescribed by the Institute of Air Quality Management (IAQM). The results of this assessment indicate that dust impacts due to the Stage 1 works can be adequately managed with the implementation of site-specific mitigation measures, and that the residual impacts are likely to be low for demolition and earthworks activities and negligible for trackout activities.

The potential for off-site odour impacts due to decomposition of marine growth was also assessed using a qualitative risk-based approach. The results of this assessment concluded that these odour impacts can be managed by either removing the marine growth before it is stored or stockpiled on-site, or by ensuring the materials are transported off-site without delay. Assuming these measures are implemented, the residual off-site odour impacts are anticipated to be of neutral significance.

CONTENTS

1 INTRODUCTION AND OVERVIEW 7
1.1 Background 7
1.2 Site and Context 7
1.3 Approval Strategy 8
1.4 Summary of the Development 9
1.4.1 Concept Development Application 9
1.1.1 Main Works Development Application 10
1.5 Purpose of this Report 11
1.6 Approach to Assessment 11

2 PROJECT DESCRIPTION 13
1.2 Stage 1 Works 13
1.3 Sensitive Receptors 13
1.4 Local Topography 14

3 POLLUTANTS OF CONCERN 16
1.5 Identification of Air Emission Sources 16
1.5.1 Dust Emissions from Stage 1 Works 16
1.5.2 Products of Combustion from Stage 1 Works 16
1.5.3 Odour Emissions from Stage 1 Works 17
1.6 Relevant Air Quality Criteria 17
1.6.1 Carbon Monoxide 17
1.6.2 Oxides of Nitrogen 18
1.6.3 Suspended Particulate Matter 18
3.1.1 Deposited Particulate 19
1.6.4 Sulphur Dioxide 19
1.6.5 Volatile Organic Compounds 20
1.6.6 Odour 20

2 BASELINE CONDITIONS 22
2.1 Local Meteorological Conditions 22
2.2 Surrounding Sources of Emissions to Atmosphere 24
2.2.1 Road Traffic and Marine Vessels 24
2.2.2 Industrial Sources 24
2.3 Background Air Quality 27

CONTENTS

3 ASSESSMENT OF IMPACTS 31
3.1 Products of Combustion due to Fuel Combustion 31
3.2 Dust Impacts from Stage 1 Works 31
3.2.1 Step 1 – Screening Based on Separation Distance 31
3.2.2 Step 2a – Assessment of Scale and Nature of the Works 31
3.2.3 Step 2b – Risk Assessment 32
3.2.4 Risk Assessment 33
3.2.5 Step 3 - Mitigation Measures 33
3.2.6 Step 4 - Residual Impacts 35
3.3 Odour Impacts from Stage 1 Works 36
3.3.1 Risk Assessment 36
3.3.2 Mitigation Measures 37
4 CONCLUSIONS 38
5 REFERENCES 39

CONTENTS

TABLES

Table 1 Secretary's Environmental Assessment Requirements – Air Quality and Odour 11
Table 2 Assessment Criteria for Carbon Monoxide (CO) 18
Table 3 Assessment Criteria for Nitrogen Dioxide (NO_2) 18
Table 4 EPA Goals for Allowable Dust Deposition 19
Table 5 Assessment Criteria for Sulphur Dioxide (SO_2) 19
Table 6 Identified Sources of Air Emissions in the Vicinity of the Site 25
Table 7 Summary of Rozelle AQMS Data (2012 – 2016) 28
Table 8 Categorisation of Dust Emission Magnitude 32
Table 9 Preliminary Risk of Air Quality Impacts from Stage 1 Works (Uncontrolled) 33
Table 10 Site-Specific Management Measures Recommended by the IAQM 33
Table 11 Residual Risk of Air Quality Impacts from Stage 1 Works 35
Table 12 Risk Assessment of Odour Impacts – Stage 1 Works 37

FIGURES

Figure 1 New Sydney Fish Market Location 8
Figure 2 City of Sydney Local Environmental Plan – Land Zoning Map 14
Figure 3 Topography of Area Surrounding the Site 15
Figure 4 New Sydney Fish Market Annual and Seasonal Wind Roses 2014 23
Figure 5 Location of Nearby Industrial Sources 26
Figure 6 Location of White Bay Cruise Terminal Monitoring Stations and Berths 30

APPENDICES

Appendix A TAPM and CALMET Modelling Parameters
Appendix B Construction Risk Assessment Methodology
Appendix C Odour Impact Assessment Methodology

1 INTRODUCTION AND OVERVIEW

1.1 Background

SLR Consulting (SLR) has been commissioned by UrbanGrowth NSW Development Corporation (UrbanGrowth NSW) to perform an Air Quality Impact Assessment (AQIA) for the development of the new Sydney Fish Market (the site).

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 (t) 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 at the head of Blackwattle Bay, adjacent to the existing Fish Market. In June 2017, the NSW Premier announced the appointment of Danish architects 3XN to lead the design team, which includes Sydney firms BVN and Aspect Studios. They have been working with key stakeholders, including UrbanGrowth NSW and Sydney Fish Market Pty Ltd (SFM), to develop the design for the new fish market. As announced by the NSW Premier, works are planned to commence in late 2018.

1.2 Site and Context

The site is located at the head of Blackwattle Bay between the Pyrmont Peninsula and the foreshore of Glebe, situated less than 2 kilometres (km) west of Sydney's CBD and partially within the City of Sydney Local Government Area. **Figure 1** illustrates the location of the existing Fish Market and new Sydney Fish Market sites.

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 m^2. 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.

Approximately 400m walking distance from the site are the 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.

Currently the site's 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 and 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.

Figure 1 New Sydney Fish Market Location



1.3 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 a 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;
2. A development application for the construction of the new fish market;
3. An application to amend the planning controls applying to the site to enable the proposed development to be a permissible use on all of the site. This is to be achieved by an amendment to *Sydney Regional Environmental Plan No 26—City West* ("SREP26").

These applications are to be lodged concurrently.

1.4 Summary of the Development

The proposal is to build a new fish market 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.

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

Included in the new fish market will be 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.

1.4.1 Concept Development Application

The Concept development application seeks approval for:

- the use of the site for the fish market including waterfront commercial and tourist facilities and ancillary uses and the distribution of uses;
- a gross floor area of up to 30,000 m^2 contained within a defined building envelope;
- waterfront structures such as wharves;
- concepts for improvements to the public domain including promenades, access to Blackwattle Bay and landscaping;
- pedestrian cycle and road access and circulation principles;
- 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.

1.1.1 Main Works Development Application

The Main Works development application seeks approval for:

- The construction of a new fish market including land and water-based structures.
- The use of the site for the fish market including waterfront commercial and tourist facilities and ancillary uses and the distribution of uses;
- A gross floor area of approximately 26,000 m^2 as calculated according to the definition of GFA under SREP 26 (approximately 25,600 m^2 as calculated according to the definition of GFA under the Standard Instrument).
- Public domain works including promenades access to Blackwattle Bay and landscaping;
- Pedestrian, cycle and road access and circulation;
- infrastructure provision and waste management;
- 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.

1.5 Purpose of this Report

The purpose of this report is to address the Secretary's Environmental Assessment Requirements (SEARs) pertaining to potential air quality and odour impacts as shown in **Table 1**. The scope of this AQIA is limited to the Stage 1 Works of the development, which as noted in **Section 1.3** relate to 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. Separate air quality assessments will be performed for the subsequent stages of the development.

Table 1 Secretary's Environmental Assessment Requirements – Air Quality and Odour

Key Issue	Assessment Requirement	Addressed in
Air Quality and Odour	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.	**Section 3.2.3**
	Identify the key air emission generating sources and activities from the proposed demolition and early works.	**Section 1.5**
	Identify measures to minimise and mitigate potential air quality, including dust control, and odour impacts on surrounding development.	**Section 3.2.5**; and **Section 3.3.2**

Source: SEAR for application number SSD 8924, 22 December 2017.

1.6 Approach to Assessment

For the assessment of impacts from the proposed Stage 1 works, the *Guidance on the Assessment of Dust from Demolition and Construction* developed in the United Kingdom by the Institute of Air Quality Management (IAQM) (Holman *et al* 2014) has been used to provide a qualitative assessment method (see **Appendix A** for full methodology).

The IAQM method uses a four-step process for assessing dust impacts from construction activities:

- **Step 1**: Screening based on distance to the nearest sensitive receptor; whereby the sensitivity to dust deposition and human health impacts of the identified sensitive receptors is determined.
- **Step 2**: Assess risk of dust effects from activities based on:
  - the scale and nature of the works, which determines the potential dust emission magnitude; and
  - the sensitivity of the area surrounding dust-generating activities.
- **Step 3**: Determine site-specific mitigation for remaining activities with greater than negligible effects.
- **Step 4**: Assess significance of remaining activities after management measures have been considered.

2 Project Description

1.2 Stage 1 Works

The first stage of the development seeks consent for the demolition of land- and water-based structures on the site, including removal of marine piles. Specifically, the following structures are proposed to be demolished (BBC 2017);

- A wharf structure comprising a reinforced concrete deck supported by 250 x 250 hardwood girders;
- A finger jetty;
- A concrete jetty;
- Piles supporting the existing wharves and jetty structures;
- The former Jones Brothers Coal Loader; and
- All other associated land and water based structures.

Stage 1 works construction activities will be undertaken by a combination of floating and land-based plant and equipment.

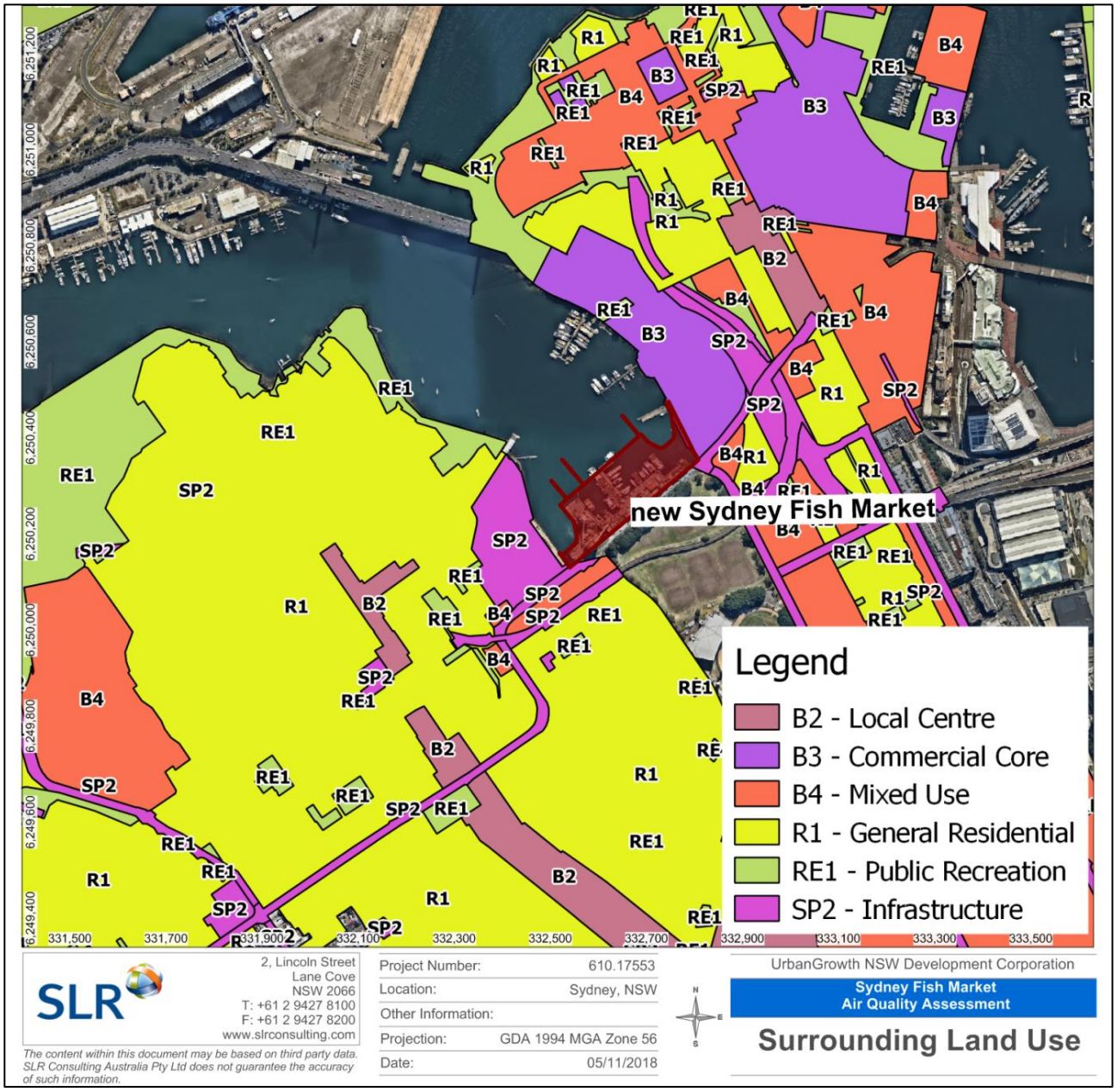
The indicative construction schedule for the Stage 1 works suggests that the works will be completed within a period of approximately 7.5 months (BBC 2017).

1.3 Sensitive Receptors

The area surrounding the site includes lands zoned as local centre, commercial core, mixed use, general residential, public recreation and infrastructure as seen in **Figure 2.**

There are a number of existing residences located southwest and west of the site. The nearest existing residential receptor is located approximately 50 m from the site boundary, at the corner of Bridge Road and Wentworth Park Road.

Figure 2 City of Sydney Local Environmental Plan – Land Zoning Map



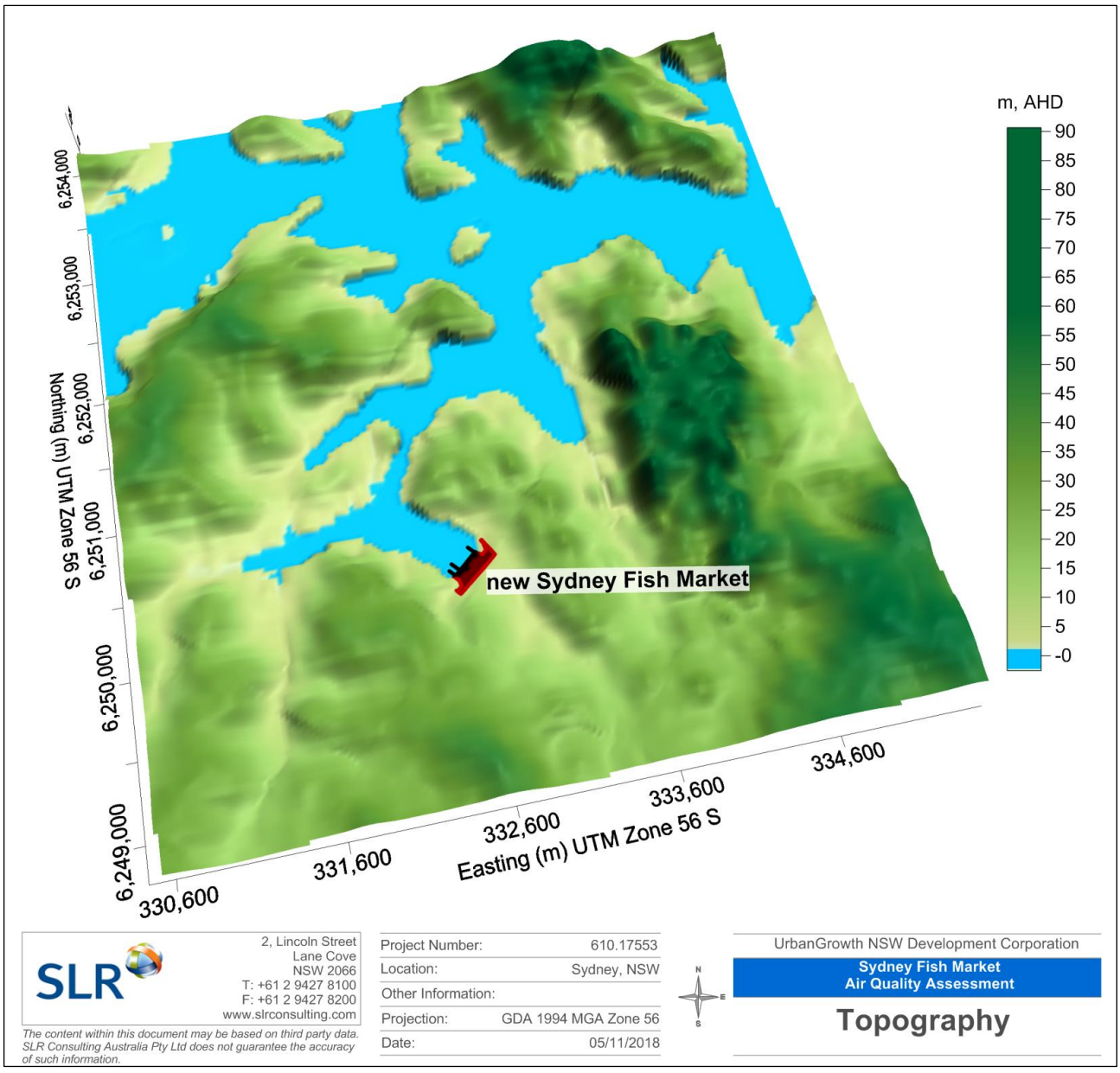
1.4 Local Topography

Topography is important in air quality studies as local atmospheric dispersion can be influenced by night-time katabatic (downhill) drainage flows from elevated terrain or channelling effects in valleys or gullies around the site.

A three dimensional representation of the area surrounding the site is given in **Figure 3**. The topography of the local area within a 2 km radius of the site ranges from an approximate elevation of -2 metres (m) to 90 m Australian Height Datum (AHD).

The area immediately surrounding the site gently slopes towards Blackwattle Bay and is relatively open, which will facilitate dispersion of air emissions and prevent 'pooling' of air pollutants.

Figure 3 Topography of Area Surrounding the Site



3 Pollutants of Concern

1.5 Identification of Air Emission Sources

Potential air quality impacts associated with the Stage 1 works may arise from:

- Dust emissions from Stage 1 works, including:
  - site clearance;
  - site preparation and grading;
  - demolition of existing buildings;
  - construction of services and temporary structures; and
  - windblown materials from demolished materials stockpiles.
- Emissions of products of combustion (as well as odours) from plant and machinery used during the demolition works;
- Odour from the decomposition of marine growth and silt attached to piles and other underwater structures stockpiled on-site.

1.5.1 Dust Emissions from Stage 1 Works

During the Stage 1 works, the potential for dust to be emitted from the site will be directly influenced by the nature of the activities being performed. Excavation works in particular have the potential to cause short-term emissions of dust and would require the application of suitable dust control measures. Other activities that may generate short-term emissions of dust include:

- Loading and unloading of demolition materials;
- Wheel-generated dust from trucks moving across the site and on adjacent public roads; and
- Wind erosion from exposed surfaces.

1.5.2 Products of Combustion from Stage 1 Works

Diesel and petrol fuelled trucks, excavators, dozers and other equipment associated with the demolition of the site will emit products of fuel combustion during Stage 1 works. A review of the National Pollutant Inventory Emission Estimation Technique Manual (NPI EET) for Combustion Engines (DEWHA 2008) identifies the primary pollutants from combustion engines as:

- Carbon monoxide (CO).
- Oxides of nitrogen (NO_x).
- Particulate matter less than 2.5 µm in aerodynamic diameter ($PM_{2.5}$).
- Particulate matter less than 10 µm in aerodynamic diameter (PM_{10}).
- Sulfur dioxide (SO_2).
- Total Volatile Organic Compounds (TVOCs).

Other substances are also emitted in trace amounts as products of incomplete combustion, such as metallic additives which contribute to the particulate content of the exhaust (DEWHA 2008).

1.5.3 Odour Emissions from Stage 1 Works

As listed in **Section 1.2**, the piles supporting the existing wharves and jetty structures are to be removed as part of the Stage 1 works. It can be expected that after years of submersion, the underwater structures at the site will have been colonised by marine organisms (marine growth). During handling and storage of these materials on-site there is potential for this marine growth to be dislodged and/or to die and decompose. A potential odour source associated with the Stage 1 works is therefore odour from the decomposition of marine growth attached to these underwater structures when they are brought to the surface and stockpiled on-site.

To understand the potential for odour generation, reference has been made to a study completed by the University of Hull on the causes and consequences of odours from marine growth organisms (Dr Alvarez M.C. et al 2012). This study was performed as one of three studies completed to inform the management of marine growth during decommissioning of off-shore oil and gas installations.

The frequency and intensity of odours experienced on-site or at nearby sensitive receptors will depend on several factors, such as ambient temperatures and wind conditions. The nuisance odour risk assessment due to the decomposing marine growth at the site is assessed in **Section 3.3.1** and the relevant mitigation measures to reduce nuisance odours are proposed in **Section 3.3.2**.

The VOCs emitted from the combustion of fuel in plant and equipment on-site also have the potential to result in localised odours, however these emissions will be minor in comparison to that generated by existing traffic on Bridge Road and therefore they have not been considered further.

1.6 Relevant Air Quality Criteria

Ambient air quality criteria for the pollutants identified in **Section 1.5** are prescribed by the NSW Environment Protection Authority document *Approved Methods for the Modelling and Assessment of Air Pollutants in NSW* (hereafter 'the Approved Methods') (EPA 2017).

Section 7.1 of the Approved Methods clearly outlines the impact assessment criteria for each of the above pollutants. The criteria specified in the Approved Methods are the defining ambient air quality criteria for NSW, and are considered to be appropriate for the setting.

1.6.1 Carbon Monoxide

Carbon monoxide (CO) is an odourless, colourless gas formed from the incomplete burning of fuels in motor vehicles. CO bonds to the haemoglobin in the blood and reduces the oxygen carrying capacity of red blood cells, thus decreasing the oxygen supply to the tissues and organs, in particular the heart and the brain.

CO in urban areas results almost entirely from vehicle emissions and its spatial distribution follows that of traffic flow. The highest concentrations are found at the kerbside, with concentrations decreasing rapidly with increasing distance from the road.

The goals specified within the Approved Methods for CO are provided in **Table 2**.

Table 2 Assessment Criteria for Carbon Monoxide (CO)

Pollutant	Averaging Period	Criterion
CO	15-min	87 ppm (100 mg/m^3)
	8-hour	9 ppm (10 mg/m^3)

Note: ppm = parts per million

1.6.2 Oxides of Nitrogen

Oxides of nitrogen (NO_X) is a general term used to describe any mixture of nitrogen oxides formed during combustion. In atmospheric chemistry NO_X generally refers to the total concentration of nitric oxide (NO) and nitrogen dioxide (NO_2).

NO is a colourless and odourless gas that does not significantly affect human health. However, in the presence of oxygen, NO can be oxidised to form NO_2 which can have significant health effects including damage to the respiratory tract and increased susceptibility to respiratory infections and asthma. Long term exposure to NO_2 can lead to lung disease.

NO will be converted to NO_2 in the atmosphere after leaving a car exhaust. The goals specified within the Approved Methods for NO_2 are provided in **Table 3**.

Table 3 Assessment Criteria for Nitrogen Dioxide (NO_2)

Pollutant	Averaging Period	Criterion
NO_2	1-hour	12 pphm (246 µg/m^3)
	Annual	3 pphm (62 µg/m^3)

Note: pphm = parts per hundred million

1.6.3 Suspended Particulate Matter

Airborne contaminants that can be inhaled directly into the lungs can be classified on the basis of their physical properties as gases, vapours or particulate matter. In common usage, the terms “dust” and “particulates” are often used interchangeably. The term “particulate matter” refers to a category of airborne particles, typically less than 30 microns (µm) in diameter and ranging down to 0.1 µm and is termed total suspended particulate (TSP).

The annual goal for TSP recommended by the NSW EPA is 90 micrograms per cubic metre of air (µg/m^3). The TSP goal was developed before the more recent results of epidemiological studies which suggested a relationship between health impacts and exposure to concentrations of finer particulate matter.

Emissions of particulate matter less than 10 µm and 2.5 µm in diameter (referred to as PM_{10} and $PM_{2.5}$ respectively) are considered important pollutants due to their ability to penetrate into the respiratory system. In the case of the $PM_{2.5}$ category, recent health research has shown that this penetration can occur deep into the lungs. Potential adverse health impacts associated with exposure to PM_{10} and $PM_{2.5}$ include increased mortality from cardiovascular and respiratory diseases, chronic obstructive pulmonary disease and heart disease, and reduced lung capacity in asthmatic children.

The NSW EPA PM_{10} assessment goals set out in the Approved Methods are as follows:

- a 24-hour maximum of 50 µg/m^3; and,

- an annual average of 25 µg/m^3.

The NSW EPA $PM_{2.5}$ assessment goals set out in the Approved Methods are as follows:

- a 24-hour maximum of 25 µg/m^3; and,
- an annual average of 8 µg/m^3.

3.1.1 Deposited Particulate

Section 1.6.3 is concerned in large part with the health impacts of airborne particulate matter. Nuisance impacts also need to be considered, mainly in relation to deposited dust.

In NSW, accepted practice regarding the nuisance impact of dust is that dust-related nuisance can be expected to impact on residential areas when annual average dust deposition levels exceed 4 grams per square metre per month (g/m^2/month).

Table 4 presents the impact assessment goals set out in the Approved Methods for dust deposition, showing the allowable increase in dust deposition level over the ambient (background) level to avoid dust nuisance.

Table 4 EPA Goals for Allowable Dust Deposition

Averaging Period	Maximum Increase in Deposited Dust Level	Maximum Total Deposited Dust Level
Annual	2 g/m^2/month	4 g/m^2/month

Source: Approved Methods, EPA 2017

1.6.4 Sulphur Dioxide

Sulphur dioxide (SO_2) is a colourless, pungent gas with an irritating smell. When present in sufficiently high concentrations, exposure to SO_2 can lead to impacts on the upper airways in humans (i.e. the noise and throat irritation). SO_2 can also mix with water vapour to form sulphuric acid (acid rain) which can damage vegetation, soil quality and corrode materials.

Main sources of SO_2 in the air are industries that process materials containing sulphur (i.e. wood pulping, paper manufacturing, metal refining and smelting, textile bleaching, wineries etc.). SO_2 is also present in motor vehicle emissions, however since Australian fuels are relatively low in sulphur, high ambient concentrations are not common.

Table 5 Assessment Criteria for Sulphur Dioxide (SO_2)

Pollutant	Averaging Period	Criterion
SO_2	10-min	25 pphm (712 µg/m^3)
	1-hour	20 pphm (570 µg/m^3)
	24-hour	8 pphm (228 µg/m^3)
	Annual	2 pphm (60 µg/m^3)

Note: pphm = parts per hundred million

1.6.5 Volatile Organic Compounds

Volatile Organic Compounds (VOCs) are organic compounds (i.e. contain carbon) that have high vapour pressure at normal room-temperature conditions. Their high vapour pressure leads to evaporation from liquid or solid form and emission release to the atmosphere.

VOCs are emitted by a variety of sources, including motor vehicles, chemical plants, automobile repair services, painting/printing industries, and rubber/plastics industries. VOCs that are often typical of these sources include benzene, cyclohexane, ethylbenzene, toluene and xylenes. Biogenic (natural) sources of VOC emissions are also significant (e.g. vegetation).

Impacts due to emissions of VOCs can be health or nuisance (odour) related. Benzene is a known carcinogen and a key VOC linked with the combustion of motor vehicle fuels.

1.6.6 Odour

Impacts from odorous air contaminants are often nuisance-related rather than health-related. Odour performance goals guide decisions on odour management, but are generally not intended to achieve "no odour".

The detectability of an odour is a sensory property that refers to the theoretical minimum concentration that produces an olfactory response or sensation. This point is called the *odour threshold* and defines one odour unit (ou). An odour goal of less than 1 OU would theoretically result in no odour impact being experienced.

In practice, the character of a particular odour can only be judged by the receiver's reaction to it, and preferably only compared to another odour under similar social and regional conditions. Based on the literature available, the level at which an odour is perceived to be a nuisance can range from 2 ou to 10 ou depending on a combination of the following factors:

- **Odour quality**: whether an odour results from a pure compound or from a mixture of compounds. Pure compounds tend to have a higher threshold (lower offensiveness) than a mixture of compounds.
- **Population sensitivity**: any given population contains individuals with a range of sensitivities to odour. The larger a population, the greater the number of sensitive individuals it contains.
- **Background level**: whether a given odour source, because of its location, is likely to contribute to a cumulative odour impact. In areas with more closely-located sources it may be necessary to apply a lower threshold to prevent offensive odour.
- **Public expectation**: whether a given community is tolerant of a particular type of odour and does not find it offensive, even at relatively high concentrations. For example, background agricultural odours may not be considered offensive until a higher threshold is reached than for odours from a landfill facility.
- **Source characteristics**: whether the odour is emitted from a stack (point source) or from an area (diffuse source). Generally, the components of point source emissions can be identified and treated more easily than diffuse sources. Emissions from point sources can be more easily controlled using control equipment. Point sources tend to be located in urban areas, while diffuse sources are more often located in rural locations.
- **Health effects**: whether a particular odour is likely to be associated with adverse health effects. In general, odours from agricultural activities are less likely to present a health risk than emissions from industrial facilities.

Experience gained through odour assessments from proposed and existing facilities in NSW indicates that an odour performance goal of 7 ou is likely to represent the level below which "offensive" odours should not occur (for an individual with a 'standard sensitivity' to odours). On this basis, the NSW OEH recommends within the Technical framework: Assessment and Management of odour from stationary sources in NSW (hereafter the 'Odour Framework') (DEC 2006) that, as design goal, no individual be exposed to ambient odour levels of greater than 7 ou. This is expressed as the 99th percentile value, as a nose response time average (approximately one second).

Odour performance goals need to be designed to take into account the range in sensitivities to odours within the community, and provide additional protection for individuals with a heightened response to odours, using a statistical approach which depends on the size of the affected population. As the affected population size increases, the number of sensitive individuals is also likely to increase, which suggests that more stringent goals are necessary in these situations. In addition, the potential for cumulative odour impacts in relatively sparsely populated areas can be more easily defined and assessed than in highly populated urban areas. It is often not possible or practical to determine and assess the cumulative odour impacts of all odour sources that may impact on a receptor in an urban environment. Therefore, the proposed odour performance goals allow for population density, cumulative impacts, anticipated odour levels during adverse meteorological conditions and community expectations of amenity.

For urban areas such as that surrounding the site, the relevant odour impact assessment criterion set by the Approved Methods for complex mixtures of odorous air pollutants is 2 ou (nose-response-time average, 99th percentile).

The Approved Methods states that the impact assessment criteria for complex mixtures of odorous air pollutants must be applied at the nearest existing or likely future off-site sensitive receptor(s).

2 Baseline Conditions

2.1 Local Meteorological Conditions

Local wind speed and direction influence the dispersion of air pollutants. Wind speed determines both the distance of downwind transport and the rate of dilution as a result of 'plume' stretching. Wind direction, and the variability in wind direction, determines the general path pollutants will follow and the extent of crosswind spreading. Surface roughness (characterised by features such as the topography of the land and the presence of buildings, structures and trees) will also influence dispersion.

The Bureau of Meteorology (BoM) maintains and publishes data from weather stations across Australia. The closest such station to the site is the Sydney Observatory Hill Automatic Weather Station (AWS), which is located approximately 1.8 km to the northeast of the site. However, this station does not record high definition data. Moreover, due to the location of the station within Sydney Harbour, the data would most likely not be representative of conditions at the site.

Other nearby BoM weather stations include the Sydney Airport AWS (approximately 8 km south-southwest of the site) and Canterbury Racecourse AWS (approximately 8 km west-southwest of the site). Given the variable topographical features of the land between the site and these two BoM weather stations, the recordings from these stations are also not considered to be a reasonable representation of the wind conditions experienced at the site. Therefore, The Air Pollution Model (TAPM) and CALMET meteorological models have been used to compile a site-representative dataset. A summary of the methodology used to model wind patterns using TAPM and CALMET, including the long term meteorological analysis to select an appropriate modelling year, are presented in **Appendix A**.

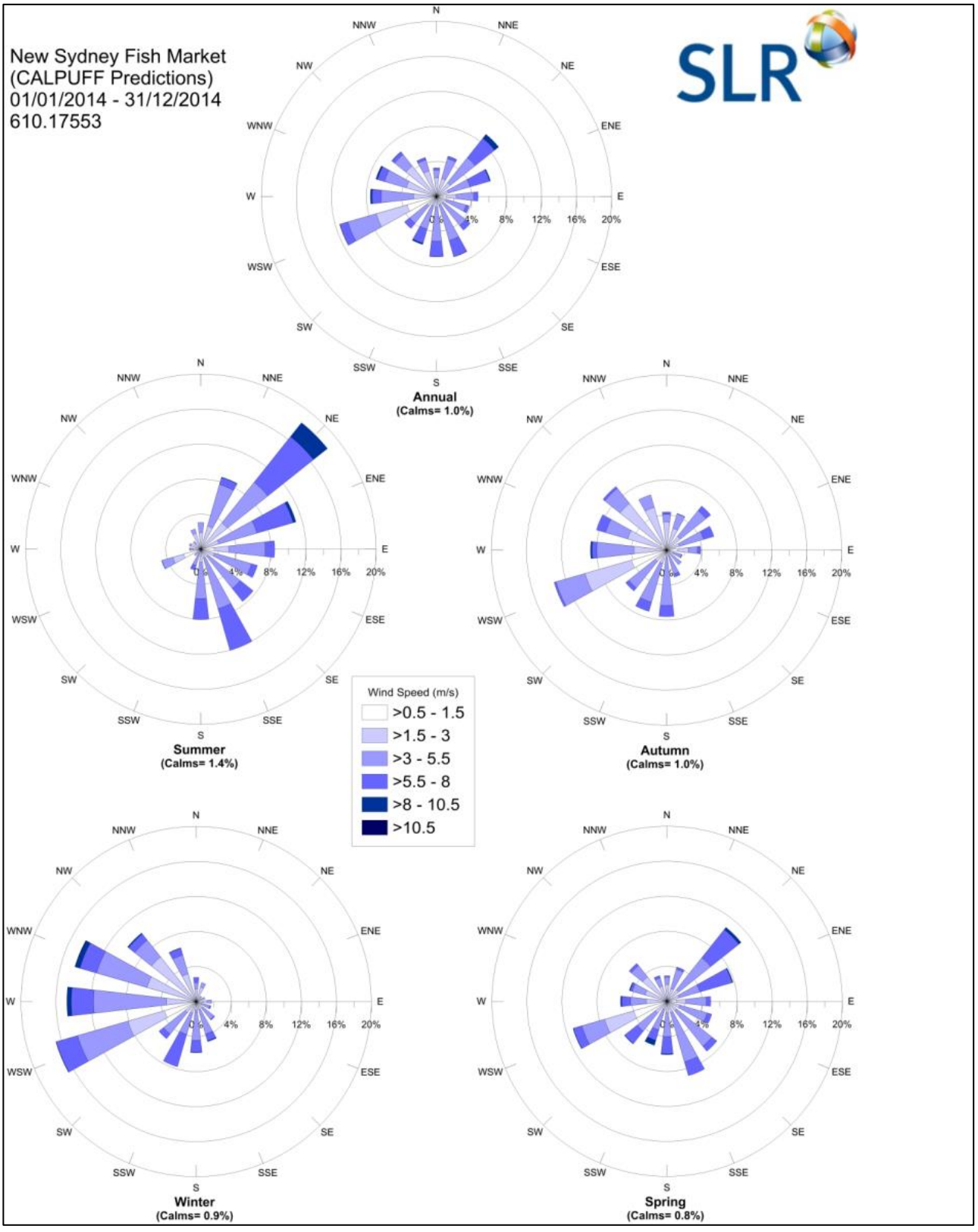
A summary of the annual wind behaviour predicted by CALMET for the modelled year (2014) at the site is presented as wind roses in **Figure 4**. Wind roses show the frequency of occurrence of winds by direction and strength. The bars correspond to the 16 compass points (degrees from North). The bar at the top of each wind rose diagram represents winds blowing from the north (i.e. northerly winds), and so on. The length of the bar represents the frequency of occurrence of winds from that direction, and the widths of the bar sections correspond to wind speed categories, the narrowest representing the lightest winds. Thus it is possible to visualise how often winds of a certain direction and strength occur over a long period, either for all hours of the day, or for particular periods during the day.

The annual wind rose indicates the predominant wind directions in the area are from west-southwest and northeast. Calm wind conditions (wind speed less than 0.5 m/s) were predicted to occur approximately 1% of the time throughout the modelling period. The seasonal wind roses for the year 2014 indicate that:

- In summer, winds are mostly gentle to moderate (between 3.0 m/s and 8 m/s) predominantly from the northeast, with very few winds from the northwest and southwest quadrants. Calms were predicted to occur 1.4% of the time during the summer months.
- In autumn, winds are light to moderate (between 0.5 m/s and 8 m/s) predominantly from the west-southwest directions. Calms were predicted to occur 1.0% of the time during the autumn months.
- In winter, winds are mostly gentle to moderate (between 3.0 m/s and 8 m/s) and are from the western quadrant with very few winds from the eastern quadrant. Calms were predicted to occur 0.9% of the time during the winter months.
- In spring, winds are mostly gentle to moderate (between 3.0 m/s and 8 m/s) and predominantly blow from the northeast, west-southwest and south-southeast. Calms were predicted to occur 0.8% of the time during the summer months.

As identified in **Section 1.3**, the sensitive receptors are located towards southwest and west of the site boundary. Winds from between the north and east directions, which would blow air emissions from the site towards the existing residences, occur approximately 28% of the time.

Figure 4 New Sydney Fish Market Annual and Seasonal Wind Roses 2014



2.2 Surrounding Sources of Emissions to Atmosphere

2.2.1 Road Traffic and Marine Vessels

The primary sources of air emissions in the area immediately surrounding the site is expected to be vehicles travelling along Bridge Road. Engine exhaust emissions will also be generated by marine traffic within Blackwattle Bay and the wider Sydney Harbour, including ferries and water taxis, fishing trawlers, cruise ships visiting Darling Harbour and recreational boating.

The rate and composition of air pollutant emissions from road vehicles and boats is a function of a number of factors, including the type, size and age of the vehicles/boats, the type of fuel combusted, number and speed of vehicles/boats and (for road traffic) the road gradient.

2.2.2 Industrial Sources

Industrial sites located in the area surrounding the site with the potential to be significant emitters of air pollutants were identified through:

- Desktop mapping of industrial sites regulated by the EPA;
- A review of facilities required to report to the National Pollutant Inventory (NPI); and
- A site visit.

Environment Protection Licences (EPL) are issued under the POEO Act and are regulated by the NSW EPA. EPLs stipulate emission limits to water, land and/or air and provide operational protocols to ensure emissions/operations comply with relevant standards. General requirements of EPLs relating to air quality include:

- Plant and equipment to be maintained and operated in a proper and efficient manner.
- Emissions of dust and odour from the premises are to be minimised/prevented.

The NPI database provides details on industrial emissions of over 4,000 facilities across Australia. The requirement to return annual reports to the NPI quantifying a facility's emissions is determined by the activities/processes being undertaken at the facility, and also whether those processes exceed process-specific thresholds in terms of activity rates (i.e. throughput and/or consumption). It is not intended to make a statement that the emissions associated with those activities will be significant in terms of their potential for impact and/or generation of complaint, however it provides a tool to identify significant emission sources in a specific area that then may be investigated further to assess their potential to impact on local air quality.

A search of the EPA public register and NPI database within a 3 km radius of the site identified several industries which could potentially impact local air quality. Details of these facilities are presented in **Table 6** and their location relative to the site is illustrated in **Figure 5**.

In addition to the facilities identified from the search of the EPA public register and NPI database, **Table 6** also includes the Hymix concrete batching facility, which is located inside the boundaries of the Blackwattle Bay investigation area. According to the NSW EPA POEO Public Register, the Environment Protection Licence for this facility has been surrendered and is no longer in force. However it is understood that concrete batching and possibly bulk shipping activities occur at the Hymix facility.

Table 6 Identified Sources of Air Emissions in the Vicinity of the Site

Licence Holder / Facility	Type of Activity	Approximate Distance from the Site	Air Pollutants Potentially Emitted	Likelihood of Significant Cumulative Impact
Malt Shovel Brewery	Brewing and packaging of beer	1.9 km (SW)	Odour	Low
Enwave Central Park Pty Ltd	Generation of electrical power from gas	1.4 km (SSE)	Products of gas combustion	Low
Hanson Construction Materials Pty Ltd	Shipping in bulk / concrete works	0 km	Particulate matter, products of combustion	High
Newcastle Port Corporation	Shipping in bulk	1.2 km (NE)	Particulate matter	Low
Sydney Ship Repair & Engineering Pty Ltd	Boat construction/maintenance (general)	2.5 km (NE)	TVOCs from painting/antifouling, particulate matter from sanding/blasting	Low
Cement Australia Holdings Pty Ltd	Cement or lime handling	1.4 km (NW)	Particulate matter	Low
Gypsum Resources Australia Pty. Limited	Shipping in bulk	1.5 km (NNW)	Particulate matter	Low
Harbour City Ferries Pty Ltd	Boat construction/maintenance (dry/floating docks)	2.0 km (N)	TVOCs from painting/antifouling, particulate matter from sanding/blasting	Low
Sydney City Marine Pty Limited	Boat construction/maintenance (general)	1.0 km (NNW)	TVOCs from painting/antifouling, particulate matter from sanding/blasting	Low
Roads And Maritime Services	Boat construction/maintenance (general)	1.0 km (NW)	TVOCs from painting/antifouling, particulate matter from sanding/blasting	Low
Rozelle Bay Pty Ltd	Boat mooring and storage	1.3 km (NW)	Products of combustion, TVOCs from fuel storage	Low
Sugar Australia Pty Limited	General agricultural processing / Shipping in bulk	1.3 km (NNW)	Particulate matter	Low
White Bay 6 Pty Ltd	Boat construction/maintenance (general)	1.5 km (N)	TVOCs from painting/antifouling, particulate matter from sanding/blasting	Low
Hymix Australia (not currently licenced)	Concrete batch plant	0.3 km (NNE)	Particulate matter	Low

Figure 5 Location of Nearby Industrial Sources



It is noted that the Hanson Construction Materials facility, which is located within the Site, will be relocated prior to the commencement of the Stage 1 works and will no longer operate in the Site. This which will result in reduced particulate concentrations within the Site.

As shown in **Table 6**, considering the separation distances and activity types associated with the identified emission sources, significant cumulative air quality impacts from the identified facilities with the anticipated air emissions from the site are considered unlikely.

2.3 Background Air Quality

The NSW Office of Environment and Heritage (OEH) maintains a network of air quality monitoring stations (AQMS) across NSW. The nearest such OEH station is located at Rozelle, approximately 2.6 km to the northwest of the site (see **Figure 3**).

The Rozelle AQMS was commissioned in 1978 and is located in the grounds of Rozelle Hospital, off Balmain Road, Rozelle. It is situated in a residential area in the Parramatta River valley and is at an elevation of 22 m.

Due to the presence of trees within 20 m of the Rozelle AQMS, the clear sky angle is less than 120°, which means this station does not currently comply with Australian Standard AS/NZS 3580.1.1:2007 - *Methods for sampling and analysis of ambient air - Guide to siting air monitoring equipment*. However, in the absence of any other monitoring data and considering the qualitative nature of this assessment, the Rozelle AQMS data has been adopted for use as a background air quality dataset for this study.

A number of air pollutants and meteorological variables are currently measured by the Rozelle AQMS including:

- Ozone (O_3);
- Oxides of nitrogen (NO, NO_2 & NO_X);
- Sulphur dioxide (SO_2);
- Fine particles less than 10 microns (PM_{10});
- Fine particles less than 2.5 microns ($PM_{2.5}$); and
- Carbon monoxide (CO).

Air pollutant data recorded by the Rozelle AQMS was obtained for the calendar years 2012 - 2016 and is summarised in **Table 7**. To be consistent with the annual NSW compliance monitoring reports, the data for gaseous pollutants are presented in parts per hundred million (pphm) or parts per million (ppm), rather than $\mu g/m^3$ and mg/m^3.

A review of the data shows that exceedances of the 24-hour average PM_{10} criterion were recorded by the Rozelle AQMS in 2013, 2015 and 2016. A review of the compliance monitoring reports for the years 2013 (OEH 2014) and 2015 (OEH 2017) indicate that the exceedances recorded by the Rozelle AQMS were due to a bushfire emergency and as a result of a state-wide dust storm, respectively. For the year 2016 (OEH 2018), the compliance monitoring report states that the increase in the PM_{10} levels across NSW during May '*was due to a number of hazard reduction burns*'.

Exceedances of the 24-hour average $PM_{2.5}$ criterion were also recorded by the Rozelle AQMS in both 2015 and 2016 (the only two years during which $PM_{2.5}$ monitoring was performed by the Rozelle AQMS). Ambient $PM_{2.5}$ concentrations often exceed the 24 hour and annual average criteria set out in the Approved Methods across the Sydney Greater Metropolitan Area.

Ambient concentrations of the gaseous pollutants SO_2, NO_2, and CO were all below the relevant criteria for all years that data are available.

Table 7 Summary of Rozelle AQMS Data (2012 – 2016)

Pollutant	Averaging Period	Criteria	Year	Rozelle AQMS		Units
				Maximum Daily Level	Days Criteria Exceeded	
CO	1-hour	8 ppm	2012	2	0	ppm
			2013	2	0	ppm
			2014	1	0	ppm
			2015	1	0	ppm
			2016	1	0	ppm
NO_2	1-hour	12 pphm	2012	6.2	0	pphm
			2013	7.0	0	pphm
			2014	5.5	0	pphm
			2015	6.0	0	pphm
			2016	5.0	0	pphm
	Annual	3 pphm	2012	1.2	0	pphm
			2013	1.1	0	pphm
			2014	1.1	0	pphm
			2015	1.1	0	pphm
			2016	1.1	0	pphm
PM_{10}	24-hour	50 µg/m^3	2012	41	0	µg/m^3
			2013	59[1]	3	µg/m^3
			2014	44	0	µg/m^3
			2015	60[2]	1	µg/m^3
			2016	59[3]	1	µg/m^3
	Annual	25 µg/m^3	2012	17	0	µg/m^3
			2013	18	0	µg/m^3
			2014	18	0	µg/m^3
			2015	17	0	µg/m^3
			2016	17	0	µg/m^3
$PM_{2.5}$	24-hour	25 µg/m^3	2012	ND	ND	µg/m^3
			2013	ND	ND	µg/m^3
			2014	ND	ND	µg/m^3
			2015	33[4]	1	µg/m^3
			2016	49[5]	5	µg/m^3
	Annual	8 µg/m^3	2012	ND	ND	µg/m^3
			2013	ND	ND	µg/m^3
			2014	ND	ND	µg/m^3
			2015	7.2	0	µg/m^3
			2016	7.4	0	µg/m^3

Pollutant	Averaging Period	Criteria	Year	Rozelle AQMS		Units
				Maximum Daily Level	Days Criteria Exceeded	
SO_2	1-hour	20 pphm	2012	ND	ND	pphm
			2013	ND	ND	pphm
			2014	ND	ND	pphm
			2015	2.8	0	pphm
			2016	2.0	0	pphm
	24-hour	8 pphm	2012	ND	ND	pphm
			2013	ND	ND	pphm
			2014	ND	ND	pphm
			2015	0.5	0	pphm
			2016	0.5	0	pphm
	Annual	2 pphm	2012	ND	ND	pphm
			2013	ND	ND	pphm
			2014	ND	ND	pphm
			2015	0.1	0	pphm
			2016	0.1	0	pphm

Notes:

ND- No data

[1] For 2013, the maximum 24-hour average PM_{10} was recorded on 8 November 2013 at Rozelle AQMS.

[2] For 2015, the maximum 24-hour average PM_{10} was recorded on 6 May 2015 at Rozelle AQMS.

[3] For 2016, the maximum 24-hour average PM_{10} was recorded on 7 May 2016 at Rozelle AQMS.

[4] For 2015, the maximum 24-hour average $PM_{2.5}$ was recorded on 21 August 2015 at Rozelle AQMS.

[5] For 2016, the maximum 24-hour average $PM_{2.5}$ was recorded on 22 May 2016 at Rozelle AQMS.

It is noted that the Port Authority of NSW also runs an air monitoring program in the vicinity of the site. The location of the monitoring site in relation to the site is shown in **Figure 6**. The pollutants being monitored as part of this program are SO_2 and $PM_{2.5}$ only, in addition to the metrological parameters.

The data from this station was not utilised for this report, due to the monitoring location's proximity to the cruise ship terminal and berths. The pollutant concentrations recorded at this monitoring station are affected by emissions from fuel combustion in cruise ships and other industrial activities surrounding the white bay terminal, which are not considered to be a representative of the emission sources at the site.

Figure 6 Location of White Bay Cruise Terminal Monitoring Stations and Berths



Source: PEL 2017

3 Assessment of Impacts

3.1 Products of Combustion due to Fuel Combustion

Ambient air quality monitoring performed in the Sydney area over the last few decades has shown that the city's air quality has improved and is continuing to improve. A major driver of this improvement in urban air quality is the fact that newer vehicles produce significantly less emissions than older vehicles. This is in part as a result of improvements in the quality and composition of fuels as well as improved engine designs and fuel efficiency. According to Trends in Motor Vehicles and their Emissions (EPA 2014), cars built from 2013 onwards emit only 3% of the NO_X emissions compared to vehicles built in 1976, and diesel trucks built from 2011 onwards emit just 8% of the particles emitted by vehicles built in 1996. Thus even as Sydney's population and total vehicle kilometres travelled each year have increased (EPA 2014), key measures of air pollution have dropped significantly and this trend is expected to continue.

The results from the background air quality concentrations show that the monitored concentrations have been below the respective criteria for CO, NO_2 and SO_2 for five years running (2012-2016) (see **Section 2.3**).

Given the nature of the Stage 1 works, it is considered that the emissions generated due to the combustion of fuel in construction plant and machinery will be short term and small compared to the emissions generated by road traffic on Bridge Road. Given the short term and low level of emissions of these pollutants from the site during the Stage 1 works, they are considered unlikely to have significant impacts on local air quality and have not been considered any further in this assessment.

3.2 Dust Impacts from Stage 1 Works

The key potential air pollution and amenity issues associated with fugitive dust emissions from the proposed demolition activities at the Project Site are:

- Annoyance due to dust deposition (soiling of surfaces) and visible dust plumes; and
- Elevated suspended particulate concentrations (PM_{10}).

Modelling of dust from demolition activities is generally not considered appropriate, as emission rates can vary significantly depending on a combination of the activity and prevailing meteorological conditions (i.e., rainfall and wind speed), which cannot be reliably predicted. The following sections therefore present a qualitative assessment of the potential risks to air quality associated with dust from demolition activities at the Project Site. Details of the IAQM methodology used to perform the risk assessment are provided in **Appendix A**.

3.2.1 Step 1 – Screening Based on Separation Distance

The nearest existing residential receptors have been identified as being located approximately 50 m of the Project Site boundary, at the corner of Bridge Road and Wentworth Park Road.

As the sensitive receptors are located within 350 m from the boundary of the site, and within 500 m from the site entrance, further assessment is required.

3.2.2 Step 2a – Assessment of Scale and Nature of the Works

Based upon the above assumptions and the IAQM definitions presented in **Appendix A**, the dust emission magnitudes have been categorised as presented in **Table 8**.

Table 8 Categorisation of Dust Emission Magnitude

Activity	Dust Emission Magnitude	Basis
Demolition	Medium	Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level. *Note: The building volumes for the Hanson concrete batching plant and the former Jones Brothers coal loader are calculated to be approximately 14,400 m^3 (36 m x 20 m x 20 m) and 2,500 m^3 (50 m x 5 m x 10 m). The volume of other buildings on-site is estimated to be approximately 770 m^3 (11 m x 7 m x 10 m). So the total building volume is calculated to be approximately 17,670 m^3. Even though the total building volume is less than 20,000 m^3, the demolition activities are likely to occur at 10-20 m above ground level. Based on this, it is conservatively assumed that magnitude for dust emissions during demolition will be 'medium'.*
Earthworks	Medium	Total site area 2,500 m^2 to 10,000 m^2, moderately dusty soil type (eg silt), 5 to 10 heavy earth moving vehicles active at any one time, formation of bunds 4 m to 8 m in height, total material moved 20,000 t to 100,000 t. *Note: The total concrete pad area to be demolished is approximately 11,500 m^2. Assuming a depth of 1.25 m for the whole pad, the volume of the pad material to be demolished is calculated to be approximately 14,375 m^3. Assuming the average density of material to be 1,500 kg/m^3, the total material moved is estimated to be ~21,500 tonnes. Even though the earthworks area is greater than 10,000 m^2, it is based on conservatively high 1.25 pad depth, therefore the dust emissions magnitude has been categorised based on the total material moved.*
Trackout	Small	Less than 10 heavy vehicle movements per day, surface materials with a low potential for dust generation, less than 50 m of unpaved road length. *Note: The whole surface at the Project Site is paved. Therefore, dust emissions magnitude for track-out is considered to be 'small'.*

3.2.3 Step 2b – Risk Assessment

3.2.3.1.1 Receptor Sensitivity

Based on the criteria listed in **Table A1** in **Appendix A**, the sensitivity of the identified receptors in this study is concluded to be *high* for health impacts and *high* for dust soiling, as they include residential areas where people may be reasonably expected to be present continuously as part of the normal pattern of land use.

3.2.3.1.2 Sensitivity of an Area

Using the classifications shown in **Table A2** in **Appendix A**, the sensitivity of the area to dust soiling is classified as '*medium* and the sensitivity of the surrounding area to health effects (**Table A3** in **Appendix A**) has also been classified as '*medium'*. This categorisation has been made taking into account the individual receptor sensitivities derived above, the annual mean background PM_{10} concentration of 17-18 µg/m^3 recorded at the Rozelle AQMS (see **Table 7**) and the anticipated number of receptors present, i.e 10-100 within 50 m for both dust soiling and health impacts. It is noted that the closest residence identified at the corner of Bridge Road and Wentworth Park Road is a multi-apartment building. It has been assumed that it contains at least ten (10) apartments.

3.2.4 Risk Assessment

Given the sensitivity of the general area is classified as '*medium*' for dust soiling and *'medium'* for health effects, and the dust emission magnitudes for the various construction phase activities as shown in **Table 8**, the resulting risk of air quality impacts is as presented in **Table 9**.

The results indicate that there is a low risk of adverse dust soiling and human health impacts occurring at the off-site sensitive receptor locations, even if no mitigation measures were to be applied to control emissions.

Table 9 Preliminary Risk of Air Quality Impacts from Stage 1 Works (Uncontrolled)

Impact	Sensitivity of Area	Dust Emission Magnitude			Preliminary Risk		
		Demolition	Earthworks	Trackout	Demolition	Earthworks	Trackout
Dust Soiling	Medium	Medium (**Table 8**)	Medium (**Table 8**)	Small (**Table 8**)	Medium Risk	Medium Risk	Negligible Risk
Human Health	Medium				Medium Risk	Medium Risk	Negligible Risk

3.2.5 Step 3 - Mitigation Measures

Table 10 lists the relevant mitigation measures designated as *highly recommended* (H) or *desirable* (D) by the IAQM methodology for a development shown to have a low risk of adverse impacts.

Not all these measures would be practical or relevant to the proposed works at the site, hence a detailed review of the recommendations should be performed as part of the development of the Construction Environmental Management Plan (CEMP) and the most appropriate measures adopted.

Table 10 Site-Specific Management Measures Recommended by the IAQM

	Activity	
1	**Communications**	
1.1	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.	H
1.2	Display the head or regional office contact information.	H
1.3	Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority.	D
2	**Site Management**	
2.1	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	H
2.2	Make the complaints log available to the local authority when asked.	H
2.3	Record any exceptional incidents that cause dust and/or air emissions, either on- or offsite, and the action taken to resolve the situation in the log book.	H

	Activity	
3	**Monitoring**	
3.1	Perform daily on-site and off-site inspections where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the local authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100 m of site boundary.	D
3.2	Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.	H
3.3	Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	H
4	**Preparing and Maintaining the Site**	
4.1	Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	H
4.2	Erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site.	H
4.3	Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.	D
4.4	Avoid site runoff of water or mud.	H
4.5	Keep site fencing, barriers and scaffolding clean using wet methods.	D
4.6	Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover as described below	D
4.7	Cover, seed or fence stockpiles to prevent wind erosion	D
5	**Operating Vehicle/Machinery and Sustainable Travel**	
5.1	Ensure all on-road vehicles comply with relevant vehicle emission standards, where applicable	H
5.2	Ensure all vehicles switch off engines when stationary - no idling vehicles	H
5.3	Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable	H
5.4	Impose and signpost a maximum-speed-limit of 25 km/hr on surfaced and 15 km/hr on un-surfaced haul roads and work areas (if long haul routes are required these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the local authority, where appropriate).	D
6	**Operations**	
6.1	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	H
6.2	Ensure an adequate water supply on the site for effective dust/particulate matter suppression/ mitigation, using non-potable water where possible and appropriate	H
6.3	Use enclosed chutes and conveyors and covered skips	H
6.4	Minimise drop heights from loading shovels and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate	H
6.5	Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	D

	Activity	
7	**Waste Management**	
7.1	Avoid bonfires and burning of waste materials.	H
8	**Demolition**	
8.1	Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).	D
8.2	Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.	H
8.3	Avoid explosive blasting, using appropriate manual or mechanical alternatives.	H
8.4	Bag and remove any biological debris or damp down such material before demolition.	H
9	**Trackout**	
9.1	Use water-assisted dust sweeper(s) on the access and local roads to remove, as necessary, any material tracked out of the site.	D
9.2	Avoid dry sweeping of large areas.	D
9.3	Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	D
9.4	Record all inspections of haul routes and any subsequent action in a site log book.	D
9.5	Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	D

H = Highly recommended; D = Desirable

3.2.6 Step 4 - Residual Impacts

A reappraisal of the predicted unmitigated air quality impacts on sensitive receptors has been performed to demonstrate the opportunity for minimising risks associated with the use of mitigation strategies. These are termed 'residual impacts'. The results of the reappraisal are presented below in **Table 11**.

Table 11 Residual Risk of Air Quality Impacts from Stage 1 Works

Impact	Sensitivity of Area	Earthworks	Construction	Trackout
Dust Soiling	Medium	Low Risk	Low Risk	Negligible Risk
Human Health	Medium	Low Risk	Low Risk	Negligible Risk

The mitigated dust deposition and human health impacts for earthworks, construction activities and trackout are anticipated to be *negligible*. For almost all construction activity, the IAQM Methods notes that the aim should be to prevent significant effects on receptors through the use of effective mitigation and experience shows that this is normally possible.

3.3 Odour Impacts from Stage 1 Works

3.3.1 Risk Assessment

As discussed in **Section 1.5.3**, odours could potentially occur from the decomposition of marine growth on the underwater structures in the event that their off-site transportation is delayed and they are stored on-site. At the time of writing this report, no site-specific details are available that would indicate the likelihood of such odours occurring, such as the type or amount of marine growth expected, the anticipated storage requirements and transportation schedule for these materials etc.

Qualification of the frequency, intensity, duration, offensiveness, and location of odour sources and their emissions is necessary when appraising potential future odour nuisance impacts on sensitive land uses. The following broad "risk based" approach has been adopted.

The integration of sensitivity with impact magnitude is used to derive the predicted significance of that change. The full details of the methodology can be found in **Appendix C**.

3.3.1.1.1 Receptor Sensitivity

The nearest sensitive receptors to the site are located approximately 50 m from the closest boundary (see **Section 1.3**).

With regards to the methodology outlined in **Appendix C**, the sensitivity of the surrounding residential areas to odour emissions generated by the site has been classified as ***high***.

3.3.1.1.2 Magnitude

By addressing the FIDOL (Frequency, Intensity, Duration, Offensiveness and Location) factors, the potential for odour impacts from this source at the sensitive receptors may be determined.

- Frequency – the closest residential areas have the potential to experience impacts whenever the structures with decomposing marine growth are left onsite for long time (such as overnight) and when the wind direction is from between the north and east directions. These conducive winds are likely to occur approximately 28% of the time during the year (see **Section 2.1**), therefore there is a medium likelihood they would experience frequent potential odour impacts.
- Intensity – depending on the amount of decomposing marine growth and the high temperatures, it is conservatively assumed that the intensity of odour generated by the decomposing marine growth is likely to be medium.
- Duration – the duration of a potential odour impact may last as long as the decomposing marine growth is left onsite and for as long as the wind blowing in a direction over the site to the receptors. Given that conductive wind directions only occur approximately 28% of the time, the duration of any odour impacts is likely to be medium.
- Offensiveness – as noted above, emissions from decomposing marine growth, therefore the offensiveness is likely to be high.
- Location – the impact of location on the acceptability of odours from the site has been accounted for by the receptor sensitivity classifications discussed in the preceding section, as high.

Given that three of the FIDOL factors are medium, the magnitude of odour is predicted to be of **moderate** magnitude (i.e. Impact is predicted to possibly cause statutory objectives/standards to be exceeded, **Table C2**).

3.3.1.1.3 Assessment of Odour Impacts

Given the **high sensitivity** of the potentially affected receptors and the **moderate magnitude** of the potential odour impact of the decomposing marine growth, the potential impact significance for the local receptors is concluded to be of ***intermediate significance*** for the closest receptors.

Table 12 Risk Assessment of Odour Impacts – Stage 1 Works

Sensitivity		Substantial Magnitude	Moderate Magnitude	Slight Magnitude	Negligible Magnitude
[Defined by Table C1]	**Very High Sensitivity**	Major Significance	Major/ Intermediate Significance	Intermediate Significance	Neutral Significance
	High Sensitivity	Major/ Intermediate Significance	Intermediate Significance	Intermediate/Minor Significance	Neutral Significance
	Medium Sensitivity	Intermediate Significance	Intermediate/Minor Significance	Minor Significance	Neutral Significance
	Low Sensitivity	Intermediate/Minor Significance	Minor Significance	Minor/Neutral Significance	Neutral Significance

3.3.2 Mitigation Measures

The potential for odours from the decomposing marine growth onsite would be reduced significantly, if:

- the marine growth was removed while the structures are in situ;
- the marine growth was removed as soon as the structures are brought to surface, before they are stored onsite, or
- in the case of non-removal of marine growth, if the on-site storage time of underwater structures is minimised (i.e., they are transported off-site on the day of removal).

The practicalities of the options available to minimise the potential for odours from this source will need to reviewed and the selected measures incorporated into the CEMP. If the removal of marine growth from the structures is anticipated to be too time and labour intensive, then provided the structures are removed within the same day and are not stored overnight, the residual risk of odour impacts would reduce to ***neutral significance***.

4 Conclusions

SLR was commissioned by UrbanGrowth NSW Development Corporation (UrbanGrowth NSW) to perform an Air Quality Impact Assessment (AQIA) for the proposed development of the new Sydney Fish Market (the site). The site is located at the head of Blackwattle Bay between the Pyrmont Peninsula and the foreshore of Glebe, situated less than 2 km west of Sydney's CBD and is partially within the City of Sydney Local Government Area.

This report has been prepared in response to the Secretary's Environmental Assessment Requirements (SEAR's) for Stage 1 of the development of the site, which includes the demolition and site preparation works for the subsequent construction phases of the development.

The main potential sources of air emissions were identified as dust impacts during the demolition works and odour impacts due to the decomposition of marine growth on the underwater structures should they be stored on-site for an extended period.

The potential for off-site dust impacts was assessed using a qualitative risk-based approach prescribed by the Institute of Air Quality Management (IAQM). The results of this assessment indicate that dust impacts due to the Stage 1 works can be adequately managed with the implementation of site-specific mitigation measures, and that the residual impacts are likely to be low for demolition and earthworks activities and negligible for trackout activities.

The potential for off-site odour impacts due to decomposition of marine growth was also assessed using a qualitative risk-based approach. The results of this assessment concluded that these odour impacts can be managed by either removing the marine growth before it is stored or stockpiled on-site, or by ensuring the materials are transported off-site without delay. Assuming these measures are implemented, the residual off-site odour impacts are anticipated to be of neutral significance.

5 References

- BBC 2017, Request for Secretary's Environmental Assessment Requirements to facilitate Preparation of an EIS as part of a State significant Development Application - Concept Development Application, prepared by: BBC Consulting Planners, prepared for: Urbangrowth NSW Development Corporation, 22 November 2017.
- BMT 2011, Management of Marine Growth during Decommissioning, Client: Oil and Gas UK Ltd, report number: A.CON.093, BMT Cordah Limited, 4 October 2011.
- DEC 2006, Technical framework: assessment and management of odour from stationary sources in NSW, Department of Environment and Conservation NSW, November 2006.
- DEWHA 2008, National Pollutant Inventory Emission Estimation Technique Manual for Combustion Engines version 3.0 published by the Department of Environment, Water, Heritage and Arts, June 2008.
- Dr Alvarez M.C. et al 2012, The Institute of Estuarine and Coastal Studies – University of Hull, Causes and Consequences of Odours from Marine Growth Organisms, Report to Oil and Gas UK, Report number: ZBB801-F-2012, 17 December 2012.
- EPA 2014, TP01: Trends in Motor Vehicles and their emissions, Advisory Committee on Tunnel Air Quality, Environment Protection Authority, July 2014.
- EPA 2017, Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales, Environment Protection Authority NSW, January 2017.
- Holman *et al* 2014, *IAQM Guidance on the assessment of dust from demolition and construction,* Institute of Air Quality Management, London. www.iaqm/wp-content /uploads/guidance/dust_assessment.pdf.
- OEH 2014, NSW Annual Compliance Report 2013, National Environment Protection (Ambient Air Quality) Measure, published by Office of Environment and Heritage, OEH 2014/0658, November 2014.
- OEH 2017, NSW Annual Compliance Report 2015, National Environment Protection (Ambient Air Quality) Measure, published by Office of Environment and Heritage, OEH 2017/0211, May 2017.
- OEH 2018, NSW Annual Compliance Report 2016, National Environment Protection (Ambient Air Quality) Measure, published by Office of Environment and Heritage, OEH 2018/0076, February 2018.
- PEL 2017, White Bay Cruise Terminal: Air Quality and Metrological Monitoring Report – December 2017, Port Authority of NSW, Job ID: 20132, 6 February 2017.

APPENDIX A

TAPM AND CALMET MODELLING PARAMETERS

Meteorological Modelling - TAPM

TAPM, developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) of Australia, is a prognostic model which can be used to compile a site-representative meteorological dataset in areas where there is limited observational data available, and has been widely used for meteorological and pollutant dispersion modeling studies throughout Australia. The model allows the user to generate synthetic observations by referencing databases (covering terrain, vegetation and soil type, sea surface temperature and synoptic scale meteorological analyses) which are subsequently used in the model input to generate site-specific hourly meteorological observations at user-defined levels within the atmosphere.

The CSIRO has a global data set of synoptic meteorological data that is required as input to the TAPM model. It is derived from analysis data used by meteorological services for weather forecasting. The synoptic meteorological data used in the modelling has been obtained from the CSIRO for the Asia Pacific region for the years of 2012-2016 (inclusive). **Table A1** details the parameters used in the TAPM meteorological model for this assessment.

TAPM model may assimilate actual local wind observations so that they can optionally be included in a model solution. However, given that TAPM is known to under-predict calm wind conditions, the wind speed and direction observations obtained from the nearest BoM stations have also been used in the subsequent CALMET component of the modelling as described below.

Table A1 TAPM Input Parameters Used in this Study

Parameter	Value
Modelling Period	1 January 2014 to 31 December 2014
Centre of analysis	332750mE 6250232mN (UTM Coordinates)
Number of grid points	35 × 35 × 35
Number of grids (spacing)	4 (30 km, 10 km, 3 km, 1 km)
Data assimilation	Sydney Airport AWS (Station # 66037) Canterbury Racecourse AWS (Station # 66194)
Terrain	AUSLIG 9 second DEM

The three dimensional upper air data from TAPM output was used as input for the diagnostic meteorological model (CALMET).

Meteorological Modelling - CALMET

In the simplest terms, CALMET is a meteorological model that develops wind and temperature fields on a three-dimensional gridded modelling domain. Associated two-dimensional fields such as mixing height, surface characteristics, and dispersion properties are also included in the file produced by CALMET. The interpolated wind field is then modified within the model to account for the influences of topography, as well as differential heating and surface roughness associated with different land uses across the modelling domain. These modifications are applied to the winds at each grid point to develop a final wind field. The final wind field thus reflects the influences of local topography and current land uses.

CALMET modelling was conducted using the 'with Obs' CALMET approach. TAPM generated upper air data and available surface weather observations in the area were used to refine the wind field predetermined by TAPM data. Hourly surface meteorological data from the nearest BoM stations were incorporated in the CALMET modelling. This includes meteorological data collected by the OEH monitoring site at St Marys through the use of the revised meteorological dataset compiled in response to comments from OEH on the Stage 1 AQIA. The use of the St Marys meteorological observational data in the meteorological modelling was shown in the Stage 1 Response to Submissions to not have a material impact on the results of the Stage 1 assessment, but it has been used in this updated modelling study for completeness.

A horizontal grid spacing of 100 m was used to adequately represent the important local terrain features and land use. **Table A2** details the parameters used in the meteorological modelling.

Table A2 CALMET Configuration Used for this Study

Modelling Period	1 January 2013 to 31 December 2013
Centre of analysis	325,362 mE 6,241,993 mN (UTM Coordinates)
Meteorological grid domain (Meteorological grid resolution)	8.2 km x 10.12 km (40 m)
Vertical Resolution (Cell Heights)	10 (0 m, 20 m, 40 m, 80 m, 160 m, 320 m, 640 m, 1200 m, 2000 m, 3000 m, 4000 m)
Data Assimilation	Sydney Airport AWS (Station # 66037) Canterbury Racecourse AWS (Station # 66194) TAPM - upper air data (331,750 mE; 6,248,232 mS)

APPENDIX B

CONSTRUCTION RISK ASSESSMENT METHODOLOGY

Step 1 – Screening Based on Separation Distance

The Step 1 screening criteria provided by the IAQM guidance suggests screening out any assessment of impacts from construction activities where sensitive receptors are located more than 350 m from the boundary of the site, more than 50 m from the route used by construction vehicles on public roads and more than 500 m from the site entrance. This step is noted as having deliberately been chosen to be conservative, and will require assessments for most projects.

Step 2a – Assessment of Scale and Nature of the Works

Step 2a of the assessment provides "dust emissions magnitudes" for each of four dust generating activities; demolition, earthworks, construction, and track-out (the movement of site material onto public roads by vehicles). The magnitudes are: *Large*; *Medium*; or *Small*, with suggested definitions for each category. The definitions given in the IAQM guidance for earthworks, construction activities and track-out, which are most relevant to this Development, are as follows:

Demolition *(Any activity involved with the removal of an existing structure [or structures]. This may also be referred to as de-construction, specifically when a building is to be removed a small part at a time)*:

- ***Large***: Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on-site crushing and screening, demolition activities >20 m above ground level;
- ***Medium***: Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level; and
- ***Small***: Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10m above ground, demolition during wetter months.

In order to provide a conservative assessment of potential impacts, it has been assumed that if at least one of the parameters specified in the 'large' definition is satisfied, the works are classified as large, and so on.

Step 2b – Risk Assessment

Assessment of the Sensitivity of the Area

Step 2b of the assessment process requires the sensitivity of the area to be defined. The sensitivity of the area takes into account:

- The specific sensitivities that identified sensitive receptors have to dust deposition and human health impacts;
- The proximity and number of those receptors;
- In the case of PM_{10}, the local background concentration; and

- Other site-specific factors, such as whether there are natural shelters such as trees to reduce the risk of wind-blown dust.

Individual receptors are classified as having *high*, *medium* or *low* sensitivity to dust deposition and human health impacts (ecological receptors are not addressed using this approach). The IAQM method provides guidance on the sensitivity of different receptor types to dust soiling and health effects as summarised in **Table B1**. It is noted that user expectations of amenity levels (dust soiling) is dependent on existing deposition levels.

Table B1 IAQM Guidance for Categorising Receptor Sensitivity

Value	High Sensitivity Receptor	Medium Sensitivity Receptor	Low Sensitivity Receptor
Dust soiling	Users can reasonably expect a high level of amenity; or The appearance, aesthetics or value of their property would be diminished by soiling, and the people or property would reasonably be expected to be present continuously, or at least regularly for extended periods as part of the normal pattern of use of the land.	Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or The appearance, aesthetics or value of their property could be diminished by soiling; or The people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.	The enjoyment of amenity would not reasonably be expected; or Property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.
	Examples: Dwellings, museums, medium and long term car parks and car showrooms.	*Examples: Parks and places of work.*	*Examples: Playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.*
Health effects	Locations where the public are exposed over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).	Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality objective for PM_{10} (in the case of the 24-hour objectives, a relevant location would be one where individuals may be exposed for eight hours or more in a day).	Locations where human exposure is transient.
	Examples: Residential properties, hospitals, schools and residential care homes.	*Examples: Office and shop workers, but will generally not include workers occupationally exposed to PM10.*	*Examples: Public footpaths, playing fields, parks and shopping street.*

According to the IAQM methods, the sensitivity of the identified individual receptors (as described above) is then used to assess the *sensitivity of the area* surrounding the active construction area, taking into account the proximity and number of those receptors, and the local background PM_{10} concentration (in the case of potential health impacts) and other site-specific factors. Additional factors to consider when determining the sensitivity of the area include:

- any history of dust generating activities in the area;

- the likelihood of concurrent dust generating activity on nearby sites;
- any pre-existing screening between the source and the receptors;
- any conclusions drawn from analysing local meteorological data which accurately represent the area and if relevant, the season during which the works will take place;
- any conclusions drawn from local topography;
- the duration of the potential impact (as a receptor may be willing to accept elevated dust levels for a known short duration, or may become more sensitive or less sensitive (acclimatised) over time for long-term impacts); and
- any known specific receptor sensitivities which go beyond the classifications given in the IAQM document.

The IAQM guidance for assessing the sensitivity of an area to dust soiling is shown in **Table B2**. The sensitivity of the area should be derived for each of activity relevant to the project (ie construction and earthworks).

Table B2 IAQM Guidance for Categorising the Sensitivity of an Area to Dust Soiling Effects

Receptor Sensitivity	Number of receptors	Distance from the source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Note: Estimate the total number of receptors within the stated distance. Only the *highest level* of area sensitivity from the table needs to be considered. For example, if there are 7 high sensitivity receptors < 20m of the source and 95 high sensitivity receptors between 20 and 50 m, then the total of number of receptors < 50 m is 102. The sensitivity of the area in this case would be high.

A modified version of the IAQM guidance for assessing the *sensitivity of an area* to health impacts is shown in **Table B3**. For high sensitivity receptors, the IAQM methods takes the existing background concentrations of PM_{10} (as an annual average) experienced in the area of interest into account and is based on the air quality objectives for PM_{10} in the UK. As these objectives differ from the ambient air quality criteria adopted for use in this assessment (ie an annual average of 20 µg/m^3 for PM_{10}) the IAQM method has been modified slightly.

This approach is consistent with the IAQM guidance, which notes that in using the tables to define the *sensitivity of an area*, professional judgement may be used to determine alternative sensitivity categories, taking into account the following factors:

- any history of dust generating activities in the area;
- the likelihood of concurrent dust generating activity on nearby sites;
- any pre-existing screening between the source and the receptors;
- any conclusions drawn from analysing local meteorological data which accurately represent the area, and if relevant the season during which the works will take place;
- any conclusions drawn from local topography;
- duration of the potential impact; and

- any known specific receptor sensitivities which go beyond the classifications given in this document.

Table B3 IAQM Guidance for Categorising the Sensitivity of an Area to Dust Health Effects

Receptor Sensitivity	Annual mean PM_{10} conc	Number of receptors [a,b]	Distance from the source (m)			
			<20	<50	<100	<350
High	15-22.5 µg/m^3	>100	High	Medium	Low	Low
		10-100	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
	<15 µg/m^3	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Medium		>10	High	Medium	Low	Low
		1-10	Medium	Low	Low	Low
Low		>1	Low	Low	Low	Low

Notes:
(a) Estimate the total within the stated distance (e.g. the total within 350 m and not the number between 200 and 350 m); noting that only the highest level of area sensitivity from the table needs to be considered.
(b) In the case of high sensitivity receptors with high occupancy (such as schools or hospitals) approximate the number of people likely to be present. In the case of residential dwellings, just include the number of properties.

Risk Assessment

The dust emission magnitude from Step 2a and the receptor sensitivity from Step 2b are then used in the matrices shown in **Table B4** (earthworks and construction) and **Table B5** (track-out) to determine the risk category with no mitigation applied.

Table B4 Risk Category from Earthworks and Construction Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible

Table B5 Risk Category from Track-out Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

Table B6 Risk Category from Demolition Activities

Sensitivity of Area	Dust Emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Medium Risk	Low Risk	Negligible

Step 3 - Site-Specific Mitigation

Once the risk categories are determined for each of the relevant activities, site-specific management measures can be identified based on whether the site is a low, medium or high risk site.

Step 4 – Residual Impacts

Following Step 3, the residual impact is then determined after management measures have been considered.

APPENDIX C

ODOUR ASSESSMENT METHODOLOGY

The risk-based assessment takes account of a range of impact descriptors, including the following:

- **Nature of Impact**: does the impact result in an adverse or beneficial environment?
- **Sensitivity**: how sensitive is the receiving environment to the anticipated impacts? This may be applied to the sensitivity of the environment in a regional context or specific receptor locations.
- **Magnitude**: what is the anticipated scale of the impact?

The integration of receptor sensitivity with impact magnitude is used to derive the predicted **significance** of that change.

Nature of Impact

Predicted impacts may be described in terms of the overall effect upon the environment:

- **Beneficial**: the predicted impact will cause a beneficial effect on the receiving environment.
- **Neutral**: the predicted impact will cause neither a beneficial nor adverse effect.
- **Adverse**: the predicted impact will cause an adverse effect on the receiving environment.

Receptor Sensitivity

Sensitivity may vary with the anticipated impact or effect. A receptor may be determined to have varying sensitivity to different environmental changes, for example, a high sensitivity to changes in air quality, but low sensitivity to noise impacts. Sensitivity may also be derived from statutory designation which is designed to protect the receptor from such impacts.

Sensitivity terminology may vary depending upon the environmental effect, but generally this may be described in accordance with the broad categories outlined in **Table C1**, which has been used in this assessment to define the sensitivity of receptors to air quality impacts.

Table C1 Methodology for Assessing Sensitivity of a Receptor to Air Quality Impacts

Sensitivity	Criteria
Very High	Receptors of very high sensitivity to air pollution (e.g. dust or odour) such as: hospitals and clinics, retirement homes, painting and furnishing businesses, hi-tech industries and food processing.
High	Receptors of high sensitivity to air pollution, such as: schools, residential areas, food retailers, glasshouses and nurseries, horticultural land and offices.
Medium	Receptors of medium sensitivity to air pollution, such as: farms, outdoor storage, light and heavy industry.
Low	All other air quality sensitive receptors not identified above.

Magnitude of Impact

Magnitude describes the anticipated scale of the anticipated environmental change in terms of how that impact may cause a change to baseline conditions. **Table C2** outlines the methodology used in this assessment to define the magnitude of the identified potential air quality impacts.

Table C2 Methodology for Assessing Magnitude of Impacts

Magnitude	Description
Substantial	Impact is predicted to cause significant consequences on the receiving environment (may be adverse or beneficial)
Moderate	Impact is predicted to possibly cause statutory objectives/standards to be exceeded (may be adverse)
Slight	Predicted impact may be tolerated.
Negligible	Impact is predicted to cause no significant consequences.

Significance of Impact

The risk-based matrix provided below illustrates how the definition of the sensitivity and magnitude interact to produce impact significance.

Table C3 Impact Significance Matrix

Sensitivity / Magnitude		[Defined by Table C2]			
		Substantial Magnitude	Moderate Magnitude	Slight Magnitude	Negligible Magnitude
[Defined by Table C1]	Very High Sensitivity	Major Significance	Major/ Intermediate Significance	Intermediate Significance	Neutral Significance
	High Sensitivity	Major/ Intermediate Significance	Intermediate Significance	Intermediate/Minor Significance	Neutral Significance
	Medium Sensitivity	Intermediate Significance	Intermediate/Minor Significance	Minor Significance	Neutral Significance
	Low Sensitivity	Intermediate/Minor Significance	Minor Significance	Minor/Neutral Significance	Neutral Significance

ASIA PACIFIC OFFICES

BRISBANE
Level 2, 15 Astor Terrace
Spring Hill QLD 4000
Australia
T: +61 7 3858 4800
F: +61 7 3858 4801

CANBERRA
GPO 410
Canberra ACT 2600
Australia
T: +61 2 6287 0800
F: +61 2 9427 8200

DARWIN
5 Foelsche Street
Darwin NT 0800
Australia
T: +61 8 8998 0100
F: +61 2 9427 8200

MACKAY
21 River Street
Mackay QLD 4740
Australia
T: +61 7 3181 3300

MELBOURNE
Suite 2, 2 Domville Avenue
Hawthorn VIC 3122
Australia
T: +61 3 9249 9400
F: +61 3 9249 9499

NEWCASTLE
10 Kings Road
New Lambton NSW 2305
Australia
T: +61 2 4037 3200
F: +61 2 4037 3201

PERTH
Ground Floor, 503 Murray Street
Perth WA 6000
Australia
T: +61 8 9422 5900
F: +61 8 9422 5901

ROCKHAMPTON
rockhampton@slrconsulting.com
M: +61 407 810 417

SYDNEY
2 Lincoln Street
Lane Cove NSW 2066
Australia
T: +61 2 9427 8100
F: +61 2 9427 8200

TAMWORTH
PO Box 11034
Tamworth NSW 2340
Australia
M: +61 408 474 248
F: +61 2 9427 8200

TOWNSVILLE
Level 1, 514 Sturt Street
Townsville QLD 4810
Australia
T: +61 7 4722 8000
F: +61 7 4722 8001

AUCKLAND
68 Beach Road
Auckland 1010
New Zealand
T: +64 27 441 7849

NELSON
5 Duncan Street
Port Nelson 7010
New Zealand
T: +64 274 898 628

NEW PLYMOUTH
Level 2, 10 Devon Street East
New Plymouth 4310
New Zealand
T: +64 0800 757 695

Appendix 8: Dewatering Management Plan

Dewatering Management Plan – Construction of New Sydney Fish Market (Stage 2)

1A-1C Bridge Road, Glebe and Part of 56-60 Pyrmont Bridge Road, Pyrmont NSW

Prepared for:
Multiplex
22 Bridge Road
Glebe NSW 2037

23 April 2021

Distribution

Dewatering Management Plan – Construction of New Sydney Fish Market (Stage 2),
1A-1C Bridge Road, Glebe and Part of 56-60 Pyrmont Bridge Road, Pyrmont NSW

23 April 2021

Revision	Status	Recipient	Copies
1	Final for issue	Mitch Pelling, Multiplex Anthony Toomeh, Multiplex	1 Microsoft Word Copy

Disclaimer and Limitations

1 *This document is confidential and has been prepared by Senversa for use only by its client and for the specific purpose described in our proposal which is subject to limitations. No party other than Senversa's client may rely on this document without the prior written consent of Senversa, and no responsibility is accepted for any damages suffered by any third party arising from decisions or actions based on this document. Matters of possible interest to third parties may not have been specifically addressed for the purposes of preparing this document and the use of professional judgement for the purposes of Senversa's work means that matters may have existed that would have been assessed differently on behalf of third parties.*

2 *Senversa prepared this document in a manner consistent with the level of care and skill ordinarily exercised by members of Senversa's profession practicing in the same locality under similar circumstances at the time the services were performed.*

3 *Senversa requires that this document be considered only in its entirety, and reserves the right to amend this report if further information becomes available.*

4 *This document is issued subject to the technical principles, limitations and assumptions provided in* ***Section 8.0.***

Senversa Pty Ltd
ABN: 89 132 231 380
Level 5, The Grafton Bond Building, 201 Kent St, Sydney NSW 2000
tel: + 61 2 8252 0000; fax: + 61 3 9606 0074
www.senversa.com.au

Primary Author		Project Manager	
	Zoe Smith Senior Environmental Scientist		**Zoe Smith** Senior Environmental Scientist
Technical Peer Review		Project Director	
	Andrei Woinarski Principal		**Jason Clay** Senior Principal

Contents

List of Acronyms iv

1.0 Introduction 1

1.1 Background and Context 1

1.1.1 Development 1

1.1.2 Environmental Management 1

1.2 DMP Objectives 2

2.0 Environmental Management Requirements 5

2.1 Key Relevant Legislation and Guidelines 5

2.2 Relevant Minister's Conditions of Approval 6

2.3 Other Relevant Conditions 8

3.0 Existing Environment 9

3.1 Site Identification 9

3.2 Site Natural Setting 10

3.2.1 Topography and Hydrology 10

3.2.2 Geology and Soils 10

3.2.3 Acid Sulfate Soils 10

3.2.4 Surface Water and Sediment in Blackwattle Bay 10

3.2.5 Hydrogeology 10

3.3 Contamination 11

3.3.1 Land-Side 11

3.3.2 Marine-Side 12

3.3.3 Other 12

4.0 Dewatering Requirements and Procedure 13

4.1 Proposed Land-Side Groundwater Dewatering 13

4.1.1 Management Options for Dewatered Groundwater 14

4.2 Proposed Marine-Side Dewatering 16

4.2.1 Management Options for Extracted Surface Water 18

5.0 Potential Environmental Impacts and Mitigations 20

5.1 Land-Side Groundwater Dewatering 20

5.2 Marine-Side Surface Water Dewatering 23

6.0 Environmental Compliance and Monitoring 27

6.1 Roles and Responsibilities 27

6.2 Approvals and Licensing 27

6.2.1 Land-side: groundwater dewatering and discharge 27

6.2.2 Marine-side 28

6.3 Training 28

6.4 Monitoring and Inspection 29

6.4.1 Land-Side: Groundwater Dewatering 29

6.4.2 Marine-Side: Coffer Dam Dewatering 30

6.4.3 Sample Collection, Handling and Analysis 31
6.5 Water Quality Objectives 31
6.6 Auditing 33
6.7 Reporting 33
6.8 Non-conformance 33
7.0 Review and Improvement 34
8.0 Principles and Limitations 35

Table 2.1: Key Relevant Legislation, Regulations, Guidelines and Policy 5
Table 2.2: Relevant CoA 6
Table 2.3: Other Conditions 8
Table 3.1: Site Summary Details 9
Table 4.1: Dewatering Requirements and Approach – Land-Side 13
Table 4.2: Dewatered Groundwater Management Options 15
Table 4.3: Dewatering Requirements and Approach – Marine-Side 17
Table 4.4: Extracted Surface Water Management Options 18
Table 5.1: Risks and mitigations from dewatering during construction – land-side 21
Table 5.2: Risks and mitigations from dewatering during construction – marine-side 24
Table 8.1: Dewatering roles and responsibilities 27
Table 8.2: Groundwater dewatering inspection and monitoring schedule 29
Table 8.3: Surface water dewatering inspection and monitoring schedule 30
Table 7.2: Water Quality Objectives - Criteria for Reuse or Discharge 32

Figures

Figure 1: Site Location Plan
Figure 2: Proposed Dewatering Layout

Appendix A: Groundwater Quality Data

Appendix B: Surface Water Quality Data

List of Acronyms

Acronym	Definition
ACM	Asbestos Containing Material
AHD	Australian Height Datum
AIP	Aquifer Interference Policy
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
AS	Australian Standard
ASS	Acid Sulfate Soils
ASSMAC	Acid Sulfate Soil Management Advisory Committee
ASSMP	Acid Sulfate Soil Management Plan
BTEXN	Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene
CEMP	Construction Environmental Management Plan
CLM Act	*Contaminated Land Management Act 1997*
CoA	Minister's Conditions of Approval
CoPC	Contaminant of Potential Concern
CSM	Conceptual Site Model
DA	Development Application
DAWR	Department of Agriculture and Water Resources
DEC	Department of Environment and Conservation
DMP	Dewatering Management Plan
DP	Deposited Plan
DPIE	NSW Department of Planning, Industry and Environment
EC	Electrical Conductivity
EIS	Environmental Impact Statement
EMS	Environmental Management Systems
EPA	Environment Protection Authority (NSW)
EP&A Act	*Environmental Planning and Assessment Act 1979*
EPL	Environment Protection Licence
ESA	Environmental Site Assessment
ESL	Ecological Screening Level
GFA	Gross Floor Area
LGA	Local Government Area
LOR	Limit of Reporting
m	Metre
m^2	Square Metres
m^3	Cubic Metres
m AHD	Metres Australian Height Datum
m bgl	Metres Below Ground Level
MGA	Map Grid of Australia
mg/L	Milligrams per Litre
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
OCP	Organochlorine Pesticides
OPP	Organophosphorus Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PASS	Potential Acid Sulfate Soils
PC	Principal Contractor
PCB	Polychlorinated Biphenyls

Acronym	Definition
POEO	*Protection of the Environment Operations Act 1997*
RAP	Remedial Action Plan
REMP	Remediation Environmental Management Plan
RL	Relative Level
RMS	Roads and Maritime Services
SAC	Site Assessment Criteria
SAR	Site Audit Report
SAS	Site Audit Statement
SEED	Sharing and Enabling Environmental Data
SEPP	State Environment Protection Policy
SSD	State Significant Development
SWL	Standing Water Level
SWMP	Soil and Water Management Plan
TBT	Tributyltin
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
TWA	Trade Waste Agreement
UST	Underground Storage Tank
µg/L	Micrograms per Litre
UFP	Unexpected Finds Procedure
VOC	Volatile Organic Compound
WQMP	Water Quality Management Plan (WQMP)

1.0 Introduction

The NSW State Government engaged Multiplex as the Principal Contractor (PC) to design and construct the new Sydney Fish Market (Stage 2). The project is located at 1A-1C Bridge Road, Glebe and Part of 56-60 Pyrmont Bridge Road, Pyrmont New South Wales (NSW); herein referred to as the 'site' (shown on **Figure 1**).

Senversa has been engaged by Multiplex to prepare a Dewatering Management Plan (DMP) for the New Sydney Fish Market (Stage 2) Project. The DMP forms a sub-plan under the Construction Environmental Management Plan (CEMP[1]) prepared by Multiplex. The DMP is required to document the management procedures and controls to mitigate potential environmental impacts associated with:

- Temporary groundwater dewatering of excavations at the shoreline ("land-side" portion of the site) to allow building construction.
- Temporary lowering of the surface water level within a coffer dam (''marine-side'' portion of the site) to allow building construction works overlying Blackwattle Bay.

1.1 Background and Context

1.1.1 Development

In June 2020, the New Sydney Fish Market was declared a State Significant Development (SSD 8925) under Section 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The development broadly comprises the construction, use and operation of a new Sydney Fish Market, including:

- A three-storey building (with additional underground basement) with a gross floor area (GFA) of 26,751m^2 comprising:
  - Wholesale services, product storage and processing.
  - Retail, business and office premises.
  - Multi-function spaces for events and functions.
  - Staff amenities and end-of-trip facilities.
  - Outdoor seating areas.
  - Basement car park.
- New public domain, including a foreshore promenade and landscaping.
- Marina.
- Pedestrian, cycle and road access.
- Upgrade works to Bridge Road and intersections with Wattle Street and Wentworth Park Road.
- Provision of services, site level adjustments and stormwater management.
- Subdivision of land.

The development will require a coffer dam installed around the construction footprint overlying Blackwattle Bay to enclose the site and enable temporary partial groundwater dewatering to facilitate piling and building construction. Excavation dewatering of a small portion of the site will also be required to facilitate building basement construction.

The development application was approved by the Minister for Planning and Public Spaces on 12 June 2020 subject to conditions of approval (CoA).

1.1.2 Environmental Management

[1] Multiplex (2021), Construction Environmental Management Plan – New Sydney Fish Market. Rev1

The overall Environmental Management System (EMS) for the project is described in Section 2 of the CEMP, and has been designed to align with standards detailed below. The EMS consists of environmental plans, including this DMP, and the procedures, protocols, and tools as set out in the CEMP. The CEMP has been developed to document the overarching environmental management strategies and procedures that will be adopted during construction of the project to meet Australian Standards for:

- Quality Management Systems (AS/NZS ISO 9001)
- Environmental Management Systems (AS/NZS ISO 14001:2015)
- Occupation Health and Safety Management Systems (AS/NZS 4801:2001)

The CEMP applies to all construction works associated with the project and consists of:

- An overview of the EMS.
- Organisation structure for environmental management.
- Legislative requirements.
- Sub-plans to manage processes.
- Processes to monitor and evaluate environmental performance.

The DMP forms part of the Multiplex environmental management framework for the project, as described in Section 2.2 of the CEMP. An outline of the various management sub-plans in the CEMP is provided in **Figure 1-1** (below). Key sub-plans that should be considered when implementing the DMP include:

- Acid Sulfate Soil Management Plan (ASSMP)
- Soil and Water Management Plan (SWMP)
- Water Quality Management Plan (WQMP)
- Unexpected Finds Procedure (UFP)

The preparation and implementation of a Dewatering Plan is a requirement of the CoA – this DMP aims to address this requirement. Preparation and implementation of a DMP also forms a condition of Site Audit Statement (SAS[2]) and associated Site Audit Report (SAR) prepared under the *Contaminated Land Management Act 1997* (CLM Act) for the site. Further discussion of these conditions and requirements is provided in **Section 2.0.**

1.2 DMP Objectives

The objective of this DMP is to document the management responsibilities, controls and procedures to mitigate potential environmental impacts associated with:

- Temporary groundwater dewatering of excavations at the land-side portion of the site to allow building construction.
- Temporary dewatering of surface water within a coffer dam (''marine-side'' portion of the site) to allow building piling and construction works.

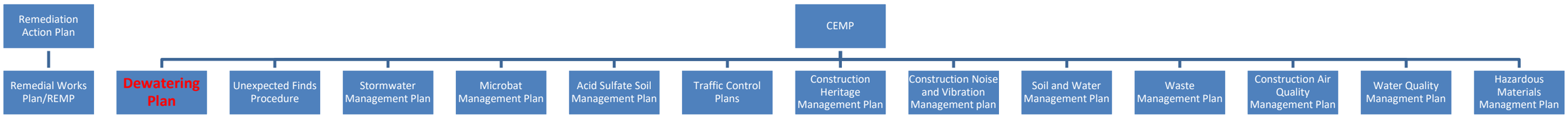
The goal is that the DMP will meet the relevant requirements of CoA (principally conditions B90 and B91) and the SAS/SAR.

This DMP forms part of the CEMP, and should be implemented under the framework of the CEMP with reference to relevant sub-plans managing other environmental aspects including, but not limited to, the ASSMP, SWMP, WQMP and UFP. In particular:

[2] Tom Onus – Ramboll (2020), *Site Audit Statement – Revised Remediation Action Plan, The New Sydney Fish Market, Pyrmont NSW*, dated 13 August 2020.

- The SWMP is intended to include specific requirements to manage and monitor surface water (e.g. within sediment basins) within the construction site – this is not addressed in this DMP.
- The WQMP is intended to include specific requirements to manage and monitor stormwater and erosion, and monitoring of Blackwattle Bay – the monitoring in this DMP should not supersede these requirements.
- The ASSMP includes detailed requirements to manage acid sulfate soils – requirements relevant to dewatering are incorporated into this DMP.

Figure 1-1 – Fish Markets Construction Project EMS



2.0 Environmental Management Requirements

2.1 Key Relevant Legislation and Guidelines

The CEMP (Section 1.8) identified relevant legislation, regulation, guidelines, and approvals, licences and permits, with key references relevant to the DMP listed below.

Table 2.1: Key Relevant Legislation, Regulations, Guidelines and Policy

Reference	
Legislation / Regulation	
Contaminated Land Management Act 1997	*Protection of the Environment Operations Act 1997*
Environmental Planning and Assessment Act 1979	*Water Management Act 2000* (which has largely superseded the Water Act 1912) The Environmental Impact Statement (EIS) stateed that: "*The Water Management Act 2000 controls the extraction of water, the use of water, the construction of works such as dams and weirs and the carrying out of activities in or near water sources in NSW. Works otherwise affected by this Act are to be undertaken. However, approval under this Act is not required for SSD*."
Fisheries Management Act 1994 The EIS stated: "*A permit under Sections 201, 205 or 219 of the Fisheries Management Act 1994 is not required for SSD*."	*Ports and Maritime Administration Act 1995* The EIS stated that "*Under the regulations to this Act approval is required to activities in the harbour including disturbance to the seabed*."
Guidelines and Standards	
Acid Sulfate Soil Management Advisory Committee (ASSMAC) (1998) *Acid Sulfate Soil Manual.*	NSW Department of Primary Industries (2012), *Aquifer Interference Policy* (AIP), Department of Primary Industries
National Environment Protection Council, 1999. National Environment Protection (Assessment of Site Contamination) Measure, amended 2013 (ASC NEPM)	WaterNSW, *Fact sheet - Water access licence exemption for excavation dewatering taking more than 3 ML of groundwater per year*
Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018) (note: these guidelines supersede ANZECC (2000) referenced in CoA)	DAWR (2018) *National Acid Sulfate Soils Guidance: Guidance for the dewatering of acid sulfate soils in shallow groundwater environments*, Department of Agriculture and Water Resources
National Health and Medical Research Council (NHMRC) *Australian Drinking Water Guidelines* (2011), updated August 2018	RMS (2011) *Technical Guideline: Environmental Management of Construction Site Dewatering*, EMS-TG-011, 2 April 2011
NSW DEC (2004) *Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales*. Department of Environment and Conservation	

2.2 Relevant Minister's Conditions of Approval

The CoA relevant to this DMP are listed in **Table 2.2** below. Applicability to land-side and marine-side dewatering is presented.

Table 2.2: Relevant CoA

CoA No.	Condition Requirements	Applicability
B89	*"Prior to the commencement of the final removal of the cofferdam sheet piles, the Applicant must develop a Water Quality Management Plan, setting out monitoring and associated management triggers and actions to address water quality risks. Consideration should be given to including continuous turbidity monitoring at a site immediately outside the silt curtain and at a nearby background site (unaffected by the project) to allow management triggers to be defined based on an increase in turbidity above background levels.* *Prior to the commencement of the relevant works, details demonstrating compliance with the above requirements and a copy of the Water Quality Management Plan must be submitted to the Certifier."*	Not applicable - Multiplex will have established a water quality monitoring regime prior to the works to establish baseline conditions to allow – monitoring after coffer dam removal can then be compared against baseline conditions. This will be documented in the Water quality Management Plan.
B90	*"Prior to the commencement of works, the Applicant must prepare a Dewatering Plan demonstrating that dewatering will not result in the discharge of pollutants at non-trivial levels. The Dewatering Plan must be approved by the EPA and include at a minimum:* *a) A description of the dewatering process, monitoring methods, management triggers and actions, and discharge location;* *b) A characterisation of the expected quality of the proposed discharge in terms of the concentrations and loads of all pollutants present at non-trivial levels;* *c) An assessment of the potential impact of the discharge on the environmental values of the receiving waterway with reference to the relevant Australian and New Zealand Guidelines for Fresh and Marine Quality guideline values; and* *d) Where relevant; details of proposed measures proposed to mitigate any identified impacts."*	Land-side Marine-side (noting this condition appears to be derived from advice from EPA in relation to coffer dam dewatering)
B91	*"If any dewatering of the site is to be undertaken, a bore licence may be required from the NSW Office of Water under the provisions of Part V of the Water Act 1912. The NSW Office of Water licences dewatering to allow excavation for construction for a temporary period, usually 12 months.* *Prior to the commencement of works, details demonstrating compliance with the above requirements and a copy of the Dewatering Plan must be submitted to the Certifier."*	Potentially relevant to land-side only – the EIS states that approval under the *Water Management Act 2000* is not required for SSD. Multiplex do not propose to install wells/bores – however, works including sumps may require licensing if this Act is applicable.
B95	*The Applicant must adhere to the management measures accepted or recommended by the site auditor.*	Refer **Section 2.3** below
C13	*"Any seepage or rainwater collected on-site during construction shall be either re-used or disposed of, so as not to cause pollution. Seepage or rainwater shall not be pumped to the street stormwater system unless separate prior approval is given in writing by the relevant authority."*	Seepage may be relevant to land-side dewatering – however, this is to be addressed in the SWMP
C18	*"Should any new information come to light during demolition or construction works which has the potential to alter previous conclusions about site contamination, the Department must be immediately notified, and works must cease. Works must not recommence on site until the Department confirms works can recommence."*	Relevant to dewatering but managed under the UFP

CoA No.	Condition Requirements	Applicability
C19	*"The Applicant must ensure the proposed development does not result in a change of risk in relation to any pre-existing contamination on the site so as to result in significant contamination [note this would render the Applicant the 'person responsible for the contamination under section 6(2) of the Contaminated Land Management Act 1997]."*	Land-side Marine-side
C30	*"The Applicant must ensure silt curtains are installed throughout the duration of the works to minimise disturbance and mobilisation of sediments and contaminants in the seabed of Blackwattle Bay. The silt curtains must be installed and maintained throughout the duration of works. The silt curtain must extend from the surface of the water to the seabed and ensure that all attachment points for the silt curtains are firmly anchored to avoid gaps and release of contaminants."*	Marine-side
C32	*"All works must be undertaken in a manner that ensures the protection of the water quality objectives and environmental values for Sydney Harbour estuarine waters in accordance with the NSW Water Quality Objectives and the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) for the environmental values under the ANZECC Guidelines[3]."*	Land-side Marine-side
C33	*"No contaminated or treated site waters (surface, collected groundwater or contaminated construction waters) are permitted to be discharged into Sydney Harbour."*	Senversa infer this is intended to apply to land-side and could restrict discharge of clean (i.e. un-contaminated) treated water from dewatering to Blackwattle Bay - however, clarity on the intent via confirmation with DPIE is warranted.
C34	*"No approval is permitted to pollute waters. All water discharge from the site must meet all requirements of the Protection of Environment Operations Act 1997."*	Land-side Marine-side
C35	*"Contaminated groundwater shall not be discharged into Council's stormwater drainage system. Options for the disposal of groundwater include disposal to sewer with prior approval from Sydney Water or off-site disposal by a liquid waste transporter for treatment/disposal to an appropriate waste treatment/processing facility."*	Land-side
C57	*"The Applicant must ensure that any acid sufate soil (ASS) and potential acid sulfate soil (PASS) excavated or other disturbed during construction is managed in accordance with the Acid Sulfate Soils Manual 1988 (NSW Acid Sulfate Soil Management Advisory Committee and the EPA's Waste Classification Guidelines 2014 (Part 4: Acid Sulfate Soils)."*	Land-side Marine-side Note: this is principally addressed in the ASSMP
C58	*"All recommendations contained in the Acid Sulfate Soils Management Plan prepared by JBS&G Australia Pty Ltd dated 4 April 2019 must be implemented throughout the works."*	Land-side Marine-side

[3] ANZECC (2000) guidelines have been superseded by the ANZG (2018) guidelines as detailed in **Section** Error! Reference source not found..

2.3 Other Relevant Conditions

Other requirements or conditions in approved documents relevant to this DMP are listed in **Table 2.3** below – these do not include related requirements under the CEMP or sub-plans (e.g. ASSMP). Applicability to land-side and marine-side dewatering is presented.

Table 2.3: Other Conditions

Reference	Condition or Comment	Applicability
Remediation Action Plan (RAP[4])	The RAP outlined the following requirements of site management and remediation works that have been considered in the development of this DMP: • Section 5.4.2 requires that management is required to control the resuspension of sediments during development works to reduce the risk of mobilisation of contaminants and reduce changes in the sulfate-sulfide equilibrium of the sediments to minimise short-term ecological impacts. • Section 7.5.5 states that *excavation dewater may require treatment prior to disposal, potentially including pH correction, sediment concentrations and potentially treatment of chemical contaminants. The RAP required that procedures for treatment and validation of water be documented in the project Dewatering Management Plan.* • Section 7.5.5 states that in accordance with council (City of Sydney) development controls, *no wastewater, chemicals or other substances harmful to the environment are to be discharged to the council stormwater system. "Only clean, unpolluted water is permitted for discharge". Wastewaters not suitable for discharge to stormwater must be:* ▪ *Treated on-site to address contaminant concentrations prior to stormwater disposal.* ▪ *Disposed of using a licensed liquid waste contractor, or* ▪ *Alternatively directed to a Sydney Water Sewer under a trade waste agreement (TWA). The pre-treatment of wastewater may be a requirement of Sydney Water prior to discharge.*	Land-side Marine-side
SAS/SAR	Comments within the SAR/SAS relevant to the DMP include: • Further assessment and characterisation of sediment, particularly in western area of the site was requested. This has since been addressed in the JBS&G (2021) Sediment Characterisation Assessment. • The auditor variably references requirements for a dewatering plan to be prepared manage dewatering of PASS and sediments and address data gaps..	Land-side Marine-side

[4] JBS&G (2020) Remediation Action Plan, The new Sydney Fish Market, dated 8 July 2020.

3.0 Existing Environment

The site condition, including soil, groundwater, ground gas, and sediment and surface water within Blackwattle Bay has been subject to previous assessment. These were considered in preparation of *The New Sydney Fish Market at Blackwattle Bay Stage 2 Environmental Impact Statement* (EIS[5]) and RAP (JBS&G, 2020). The EIS assessed the impacts of the construction and operation of the project on soil, sediment and water. The EIS also identified the potential direct and indirect impacts on surface water in regard to water quality and changes to surface flow to be considered as part of the project. The RAP documents requirements of management of identified contamination during demolition and construction works as part of the project.

A Section B Site Audit Statement (SAS[6]) and associated Site Audit Report (SAR) were subsequently issued in August 2020 based on the RAP.

The ASSMP was prepared to manage acid sulfate soils at the site (including sediments within Blackwattle Bay). The RAP and SAS/SAR identified a data gap in the assessment of acid sulfate soils (ASS) and potential ASS (PASS) within sediment in Blackwattle Bay. JBS&G (2021)[7] conducted a sediment characterisation assessment in January 2021 to close identified data gaps.

3.1 Site Identification

The site location is shown on **Figure 1**, and proposed site layout during construction, including location of proposed coffer dam and silt curtain, is shown in plans in **Appendix A**. A summary of site details is provided in **Table 3.1** below. For the purposes of the DMP, the site comprises the Lot/DP detailed below and the construction work area (including the coffer dam and silt curtain in Blackwattle Bay) included in the development application as shown in **Appendix A**.

Table 3.1: Site Summary Details

Site Detail	Summary
Lot/DP	Lots 3-5 DP 1064339 Part Lot 107 DP 1076596 Part Lot 1 DP 835794
Address	1A-1C Bridge Road, Glebe NSW and part 56-60 Pyrmont Bridge Road, Pyrmont NSW
Local Government Area (LGA)	City of Sydney Council
Approximate MGA Coordinates (MGA 56)	Easting: 332669.678 Northing: 6250259.919
Current Use	Demolition site (Stage 1) works for the new Sydney Fish Market. Was previously occupied by various commercial and industrial uses including a concrete batching plan and commercial boat hire operation.
Proposed Use	Commercial use as the new Sydney Fish Market
Site Area	Approximately 3.7 hectares (land-side area only)

[5] BBC Consulting (2019), Environmental Impact Statement, New Sydney Fish Market at Wattle Bay – Stage 2 Development Application Main Works, dated 4 October 2019.
[6] Tom Onus – Ramboll (2020), Site Audit Statement – Revised Remediation Action Plan, The New Sydney Fish Market, Pyrmont NSW, dated 13 August 2020.
[7] JBS&G (2021), Sediment Characterisation Assessment, The new Sydney Fish Market, dated 12 January 2021.

3.2 Site Natural Setting

3.2.1 Topography and Hydrology

The site is positioned on a reasonably flat terrain with an elevation of approximately 2 metres Australian Height Datum (m AHD).

Site surface water runoff is anticipated to be via direct overland flow to Blackwattle Bay. An existing stormwater culvert at the north of the site drains the surrounding area.

3.2.2 Geology and Soils

Historical reports listed within the RAP identified approximately 3 m of fill overlaying a sandy clay profile between 5.5-13.4 metres below ground level (m bgl) above sandstone bedrock. Much of the filling of the site is related to historical reclamation of the area from Blackwattle Bay.

The 1:100,000 Geological Map of Sydney (1983) shows a lithology of silty to peaty quartz sand, silt and clay with shell layers overlying Hawksbury Sandstone.

3.2.3 Acid Sulfate Soils

A review of ASS risk was conducting on the NSW Government Department of Planning, Industry and Environment (DPIE) Sharing and Enabling Environmental Data (SEED) in NSW database (https://geo.seed.nsw.gov.au/Public_Viewer/index.html?viewer=Public_Viewer&locale=en-AU&runWorkflow=AppendLayerCatalog&CatalogLayer=SEED_Catalog.106, accessed 24 February 2021). The site is shown to be in an area of high probability of having ASS. Historical investigations identified within the RAP and JBS&G (2021) have identified fill on site as not containing PASS and not requiring ASS management. Underlying natural sandy clay within the land portion of the site and sediments within Blackwattle Bay have been identified as PASS and requiring management under the ASSMP within the CEMP.

3.2.4 Surface Water and Sediment in Blackwattle Bay

JBS&G (2021) sediment characterisation assessment described sediments within Blackwattle Bay as comprising gravelly clayey silt (mud). The sediment was also described as having varying levels of coal, ash, seashells, organic matter and metal fragments. Sediments were sampled up to a depth of 2 metres from top of harbour bed. The depth to bedrock within Blackwattle Bay is likely variable.

3.2.5 Hydrogeology

The RAP identified that groundwater monitoring within the extent of the site as part of previous investigations has identified:

- Site groundwater to have reported total dissolved solids (TDS) concentrations consistent with saline waters.
- Standing water levels correspond with tidal surface water levels of Blackwattle Bay in which site groundwater is anticipated to discharge.

A review of the WaterNSW Real Time Database (realtimedata.waternsw.com.au, accessed 24 February 2021) indicated that there were 14 registered bores within a 500 m radius of the site. The RAP identified that the closest wells (approximately 250 m south-west of site) were constructed for monitoring purposes and were reported to contain a standing water level of approximately 0.6 m within shallow fill materials.

3.3 Contamination

The RAP identified that the site and Blackwattle Bay were originally reclaimed between 1836 and 1891, and used for various industrial and commercial purposes from 1900 that included timber merchants, abattoirs, garbage collectors, coal loading, cement batching and boat hire operations. The site formerly had five underground storage tanks (USTs) which were removed in 1995.

On the basis of the site history, the RAP has identified the following contaminant of potential concern (CoPCs) to be present both land and/or marine-side on site based historical site use:

- Total recoverable hydrocarbons (TRH).
- Benzene, toluene, ethylbenzene, xylene, and naphthalene (BTEXN).
- Polycyclic aromatic hydrocarbons (PAHs).
- Heavy metals.
- Organochlorine pesticides (OCPs) and organophosphorus pesticides (OPPs).
- Asbestos.
- PASS.

It is noted that the JBS&G (2021) sediment characterisation report also identified the following additional CoPC's within sediments in Blackwattle Bay:

- Volatile organic compounds (VOCs).
- Tributyltin (TBT)
- Polychlorinated biphenyls (PCBs)

A summary of known contamination presented within the conceptual site model (CSM) in the RAP and within results of JBS&G (2021) is presented below.

3.3.1 Land-Side

Soil

Historical investigations have shown concentrations of CoPCs within soil have been below the adopted health-based criteria. One sample was shown to contain a single fragment of asbestos containing material (ACM). The auditor also identified within the SAR that there is potential for further ACM to be identified within fill based historical site use and filling activities and this should be addressed/managed within the CEMP and remediation environmental management plan (REMP).

Elevated concentrations of TRH above ecological screening criteria have historically been identified within fill on site. It was identified that this material was not suitable as a growing media and this should be considered if reused on site. However, as the site is sealed with hardstand, elevated concentrations have not been considered significant with respect to site suitability within the RAP.

The RAP and the SAR identified a data gap in the soil characterisation of the land-based eastern portion of the site (where current Sydney Fish Market is located). It was also noted that on demolition of the electrical substation that further assessment of PCBs and PAHs was required of soil below substation footprint.

As detailed in **Section 3.2.3**, within the land portion of the site, PASS materials were encountered within saturated marine sediments underlying the placed fill material at depths ranging from approximately 3.5-5.5 m below ground surface (bgs). All fine-grained soils and sediments at an approximate depth of >2 m bgs comprise PASS and require management in accordance with the ASSMP.

Groundwater

Elevated concentrations of copper, lead, and zinc were observed above ecological screening criteria. Elevated PAH compounds in groundwater were found to marginally exceed the adopted ecosystem criteria at a single location (PBMWH2) within the central portion of the site, but were less than the limit of reporting (LOR) in the subsequent data gap assessment. The RAP considered that these did not require management or remediation and considered these concentrations representative of background conditions.

It is noted that oxidation of PASS in natural sediments could occur if groundwater is lowered and sediments are exposed and, as such, has been considered within this DMP.

Ground gases and vapour

The RAP reported that monitoring of ground gasses indicated low risk conditions. Sub-slab concentrations of VOCs were below LOR, indicating no potentially significant health risks for future occupants of the proposed new Fish Market building associated with vapour intrusion.

3.3.2 Marine-Side

Sediment

The RAP reported that heavy metals, total PAH, (limited) total PCBs and TRH contaminated sediments in the extent of the development site, and that the sediments of Blackwattle Bay had significant metal and nutrient contamination, indicative of highly disturbed conditions. On this basis, the RAP concluded that elevated contaminant concentrations reported in sediments within the subject site were likely reflective of conditions throughout the extent of Blackwattle Bay as a result of historical industrial activities along the foreshore of the bay.

Elevated concentration of heavy metals, total PAHs, total PCBs, TRH and TBT were observed above site assessment criteria (SAC) within sediments in the more recent JBS&G (2021) characterisation report. Asbestos fibres were also reported within a number of sediment samples in this report.

As detailed in **Section 3.2.3**, PASS is present in sediments on-site and should be managed in accordance with the ASSMP within the CEMP. It is noted that oxidation of PASS in sediments could occur if surface water is lowered and sediments are exposed and, as such, has been considered within this DMP.

Surface Water

There were limited surface water quality data available in the RAP and SAS/SAR. Historical surface water sampling data at two locations were assessed as part of the JBS&G (2019[8]) Environmental Site Assessment (ESA). Surface water results showed elevated concentration of copper and zinc above the SAC. These conditions were reported to be reflective of background conditions from stormwater discharge and surface water run-off to Blackwattle Bay. All organic constituents (PAHs, TPH, BTEX and VOCs) were reported at concentrations below the laboratory LOR. However, the SAS/SAR raised an issue with uncertainty in the quality of these data.

Baseline surface water geochemical parameters have not been presented within the ESA or RAP – a program of sampling to assess baseline conditions is required under the WQMP.

3.3.3 Other

The RAP and SAR identified that a '*Site Search for Schedule 11 Hazardous Chemicals on Premises*' through SafeWork NSW has not been conducted as part of historical investigations. Based on this gap in data and known historical activities on site, there is the potential for additional underground storage tanks (USTs) to be present. These UST's and any associated potential contamination are to be managed through an unexpected finds procedure identified within the CEMP and REMP.

[8] JBS&G (2019), Environmental Site Assessment – The new Sydney Fish Market, dated 4 April 2019.

4.0 Dewatering Requirements and Procedure

An overview of the construction dewatering requirement and method is provided in the following tables. The potential environmental impacts and mitigation measures associated with these works are described in the following sections.

The DMP applies to:

- Land-side: Temporary dewatering of an excavation at the shoreline to facilitate construction of the building basement adjoining Blackwattle Bay. Dewater will comprise groundwater and marine water.
- Marine-side: Lowering the marine water level within the coffer dam, following sediment level adjustment and piling, to enable building basement construction.

4.1 Proposed Land-Side Dewatering

A box dam will be constructed to facilitate excavation and construction of the building basement along a portion of the shoreline of the site. Approximately half of the box dam will be within Blackwattle Bay and half within the land portion of the site. Temporary construction dewatering of groundwater within the box dam will be required to facilitate building construction as outlined in the table below. It is expected that dewater will comprise of portion of marine water and a portion of groundwater within the intertidal and zone of influence of the Bay.

The sequence of works for the box dam excavation and dewatering is planned to comprise:

1. Land-based shoring (piling) installation.

2. Sediment reprofiling and marine-side coffer dam installation.

4. Excavation of soils within land-based box dam.

5. Commence dewatering of land-based box dam.

There could also be minor groundwater ingress into trench or footing excavations in localised areas where shallow perched water is present. These are expected to be of minor nature and minimal interference with the aquifer, and will be managed under the SWMP.

Table 4.1: Dewatering Requirements and Approach – Land-Side

Aspect	Summary
Dewatering nature and extent	A box dam with an area of approximately 2,260 m^2 is to be constructed as shown on **Figure 2**. The box dam construction shall comprise a concrete piled wall with the seaward wall likely to be sheet pile. Water within this box dam is proposed to be temporarily lowered from approximately 1.5 m RL to -2.0 m RL to facilitate excavation of soils. There is potential for drawdown of surrounding groundwater depending on the specific extraction method, the rate of seepage through the box dam walls/floor and tidal stage. Primary dewatering of water within the box dam is proposed to be conducted over a period of several days, with ongoing maintenance of water level at a low rate over a period of 4-12 weeks.
Estimated dewatering take	Multiplex estimates that a volume of approximately 7,900 m^3 groundwater will be removed from within this area. This does not account for any potential surface water ingress during construction (which will be controlled under the SWMP).
Dewatering method	The groundwater extraction method will be designed in detail and installed by an excavation contractor, but broadly, will likely comprise extraction from a sump or spearpoints within the box dam via a pump, piping and manifold system.

Aspect	Summary
Extracted water management	Extracted groundwater is proposed to be managed via one or more of the following options: • Temporary storage and monitoring to demonstrate the water meets the discharge water quality objectives. • On-site reuse, discharge or disposal as outlined below. Extracted water quality will be assessed via sampling prior to discharge. However, as an indicator, groundwater quality data presented in the RAP are provided in **Appendix B**.
Monitoring	Monitoring of the dewatering system, surrounding groundwater levels, groundwater discharge volume/rate and quality will be conducted – refer to **Section 6.4.1**.
Approvals and Permitting	The required approvals and licences to undertake dewatering will be obtained prior to commencement of dewatering – refer to **Section 6.2.1**.

4.1.1 Management Options for Dewatered Groundwater

Extracted groundwater is proposed to be managed via one or more of the following options:

- Temporary storage and monitoring to demonstrate the water meets the reuse or discharge water quality objectives.
- On-site re-use of suitable water (e.g. dust suppression).
- Discharge of treated water to stormwater or sewer subject to approval, in accordance with the *POEO Act 1997*. Senversa notes that discharge of dewater of suitable quality to Blackwattle Bay (i.e. that would not cause pollution of Blackwattle Bay per CoA C34 and C35), rather than to stormwater or sewer, could be environmentally acceptable given the origin of the water extracted (a mix of marine water and groundwater within the intertidal zone), but appears likely to be restricted under CoA C33.
- Contingency for on-site treatment and discharge for water that does not meet the water quality objectives/approvals conditions – this could, for example, be applicable to low rates of water seepage that could occur during excavation and dewatering of PASS within the box dam.

The decision to either re-use, discharge or dispose of groundwater will be made in accordance with the decision process outlined below. Discharge of dewatered groundwater is not permitted until the Environment Manager or nominated representative has signed a discharge form.

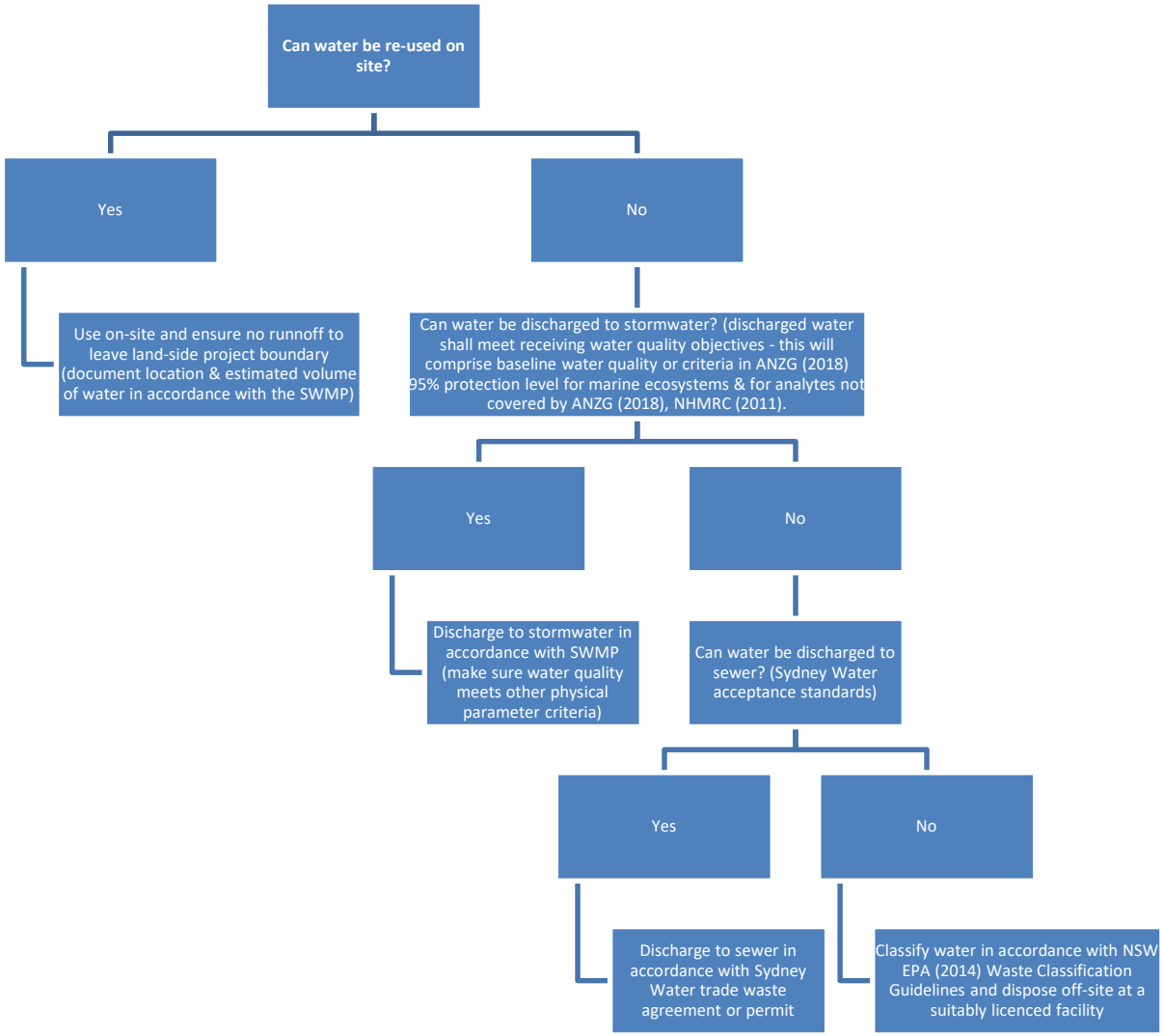


Figure 4-1: Decision tree for re-use, discharge or disposal of dewatered groundwater

Groundwater which complies with the project's water quality criteria, and which will not pollute the receiving environment, may be re-used or discharged to stormwater / sewer only once a Dewatering and Discharge Permit has been issued by a person recognised by the site Environment Manager.

Table 4.2: Dewatered Groundwater Management Options

Aspect	Summary
On-site reuse	On-site re-use of groundwater ingress into excavations should be considered as a priority for all dewatering activities. Dewatered groundwater from areas with low potential for contamination may be re-used on site. Example re-use options include use for dust suppression, to assist with compaction, re-injection or for watering landscaped areas. A visual inspection for oil or grease and pH testing must be undertaken as a minimum and water must meet requirements as set out in the SWMP. Re-used water must never be discharged in a manner that exceeds the capacity of sediment controls and/or generates runoff with the potential to discharge from construction site, which will be considered an unauthorised discharge from site. Groundwater from these areas which does not meet the project's re-use water quality criteria may be treated prior to assessment of discharge / disposal options in accordance with the SWMP. There should be no re-use of extracted groundwater that has the potential to have been impacted by exposure and oxidation of acid sulfate soils – these waters require sampling and analysis to demonstrate they are suitable for reuse and will not impact site condition prior to reuse.

Aspect	Summary
Discharging water to stormwater or sewer	Discharge to stormwater or sewer must be in accordance with the SWMP, this DMP, and any applicable discharge permits, licences or trade waste agreements. The discharged water quality must be such that it does not cause pollution as defined under *POEO Act 1997* – this shall be evaluated by sampling discharged water and comparison to criteria protective of the water quality objectives of the receiving body/works. Discharged groundwater to stormwater shall meet water quality criteria in: • ANZG (2018) for 95% protection level for marine ecosystems; and • for analytes not covered by the guidelines, NHMRC (2011); or • other NSW EPA made or approved guidance. Discharged groundwater to sewer shall be as approved by Sydney Water and meet: • Sydney Water trade waste acceptance standards. If the discharge criteria in discharge permits, licences or trade waste agreements are different to the above, then the criteria in the permits, licences or agreements take precedence. The discharge must be monitored throughout to ensure that the water being syphoned or pumped: • complies with the discharge criteria; • does not come into contact with any soil or exposed surfaces before discharging; and • does not mix with any sediment laden/untested water at either the inlet or outlet. Water quality criteria are presented in **Section 6.5**.
Disposal off-site	Waste water disposed off-site will be classified in accordance with the NSW EPA (2014) *Waste Classification Guidelines* and NSW waste regulations. A licensed transporter will be used to transport material to an appropriately licensed NSW EPA waste facility and disposed water will be tracked using the project's waste tracking system.

4.2 Proposed Marine-Side Dewatering

As part of the project, temporary lowering of the surface water level within a coffer dam installed around the construction area in Blackwattle Bay will be required to facilitate building construction. The lowering of surface water levels will be via transferring marine water from within the box dam to outside the box dam (but within the development construction area). Once the building is constructed, the surface water level will be returned to ambient conditions.

The sequence of marine works is important to understand as there are other works that have the potential to impact the dewatering process – principally, sediment reprofiling and piling works. The planned sequence for marine-based works is planned to comprise:

1. Land-based shoring (piling) installation.
2. Sediment reprofiling.
3. Marine-based building pile installation.
4. Installation of coffer dam.
5. All plant and machinery exits coffer dam.
6. Close coffer dam.
7. Commence dewatering of marine coffer dam.

Management of sediment disturbance activities (e.g. reprofiling, piling) is documented in other plans under the CEMP (e.g. the ASSMP) and is not included in this DMP. However, for context the following is noted:

- As part of the project, adjustment of sediment levels in localised areas, mostly in the southern portion, is required - the ASSMP assessed environmental risks and mitigation measures to manage these. The primary management techniques proposed comprise:



  - the minimisation of disturbance to the extent practicable and maintaining sediments containing acid sulfate soils in a wet or submerged state such that they are not drained and/or exposed to the air; and
  - construction of the coffer dam structure to eliminate the potential for ASS impacts beyond the site works extent as there will be no opportunity for mixing of on-site and off-site soil/sediment/water.
- The ASSMP also proposed within the coffer dam, application of industry best practice measures including adoption of measured excavation procedures, management of overlying water level depths and use of dedicated double silt curtains, etc will be required to contain any disturbance activities that may cause acid generation.
- For areas where piling activities may result in localised re-suspension of sediments, the ASSMP proposed dedicated silt curtains surrounding individual works areas to be adopted to minimise the spread of any suspended sediment and ensure its minimisation.
- Besides protecting against water ingress/egress, the coffer dam will also help to contain potential impacts from disturbance caused by ground slab preparations and general site run-off from land-side.

A description of the coffer dam dewatering approach is provided in the following table.

Table 4.3: Dewatering Requirements and Approach – Marine-Side

Aspect	Summary
Dewatering nature and extent	A temporary coffer dam with an area of approximately 23,200 m^2 is to be constructed within the site at the limits of the development works area prior to construction activities that will isolate the construction works footprint from the balance of Blackwattle Bay to facilitate construction of the building basement overlying the Bay. The proposed alignment of the coffer dam is presented on **Figure 2**. Within the coffer dam, the main works that represent the greatest risk of disturbance of sediments and impact on water quality (sediment reprofiling and piling) will occur prior to closure of the coffer dam and dewatering. Management of sediment disturbance activities (e.g. reprofiling, piling) is documented in other plans under the CEMP (e.g. the ASSMP). Surface water levels within the coffer dam are proposed to be reduced from approximately 1.5 m RL (high tide) to -4.0 m RL (or just above the sediment surface) for a period, in the order of, 6-12 months.
Estimated dewatering take	Multiplex estimates that a volume of approximately 127,600 m^3 of surface water to be pumped out of the coffer dam, not allowing for potential surface water ingress into the coffer dam throughout works. It is proposed to initially close the coffer dam at low tide to reduce the quantity of water required to be pumped from within this area.
Dewatering method	As stated above, dewatering will occur after the main sediment disturbance activities (sediment reprofiling and piling) have been effectively completed, giving time for any significant disturbance of sediments to settle – thereby reducing the risk of impact on quality of water outside the coffer dam during dewatering. The water extraction method will be designed in detail by a contractor, but will comprise (refer pump layout on **Figure 2**): • Closure of the coffer dam at low tide. • Initial bulk extraction from two pumps within the coffer dam until the target drawdown is reached, taking care to place intakes and maintain rates so to minimise sediment disturbance and not entrain sediments, and maintain levels to keep sediments submerged per the ASSMP. • Ongoing extraction of surface water that seeps into the coffer dam.
Extracted water management	Extracted surface water is proposed to be managed via: • Transfer and discharge outside the coffer dam but inside the silt curtain within the site – refer discharge point layout on **Figure 2**. The discharge point would include a diffuser device at a level to mitigate risk of disturbance of sediments. • This concept is considered appropriate as the water is simply being transferred within the same water body and site – however, appropriate mitigation of environmental risks

Aspect	Summary
	associated with exposure and disturbance of sediments, entrainment within extracted water and impact on receiving water is required. Surface water within Blackwattle Bay will be sampled to assess baseline conditions prior to dewatering, as required in the WQMP. Monitoring during and following dewatering will be used via compared against baseline conditions to assess performance of environmental mitigations. However, as an initial indicator, surface water quality data presented in the RAP are provided in **Appendix C**.
Monitoring	The EIS proposed that water quality monitoring will be undertaken at all discharge locations into the bay. Given the water is from the same water body and sediment disturbance activities will have already occurred, Senversa considers this is most applicable to land-side discharges. Monitoring of water discharge volume/rate, sediment exposure within the coffer dam, and water quality inside and outside the silt curtain in Blackwattle Bay will be conducted – refer to **Section 6.2.2**. In order to facilitate monitoring, the baseline water quality is proposed to be assessed prior to commencement of dewatering via sampling surface water under a range of tide/rainfall conditions (refer to **Section 6.2.2**).
Approvals and Permitting	The required approvals and licences to undertake dewatering will be obtained via review and approval of this DMP by EPA, Site Auditor, and any other relevant regulators.

4.2.1 Management Options for Extracted Surface Water

Extracted surface water from within the coffer dam is proposed to be managed via one or more of the following options:

- Transfer and discharge of suitable water within the silt curtain boundary of the development construction area.
- Contingency for on-site treatment and discharge, or disposal in accordance with the *POEO Act 1997* and relevant NSW waste regulations, for untreated water that cannot be discharged – this could be applicable to low rates of water seepage that could occur near the sediment interface once the water level is lowered.

Extracted water from the coffer dam which complies with the project's water quality criteria, and which will not pollute the receiving environment, may be discharged within the boundary of the silt curtain only once a Dewatering and Discharge Permit has been issued by a person recognised by the site Environment Manager.

Table 4.4: Extracted Surface Water Management Options

Aspect	Summary
Discharging water to outside the coffer dam	Discharge must be in accordance with the WQMP, this DMP, and any applicable permits, licences or approvals. The discharged water quality must be such that it does not cause pollution as defined under *POEO Act 1997* – this shall be evaluated by sampling discharged water and comparison to baseline conditions and criteria protective of the water quality objectives of the receiving body/works. Discharged water shall meet water quality criteria in: • baseline water quality of Blackwattle Bay; or if there is excessive uncertainty, • ANZG (2018) for 95% protection level for marine ecosystems; and • for analytes not covered by the guidelines, NHMRC (2011); or • other NSW EPA made or approved guidance. If the discharge criteria in permits, licences or approvals are different to the above, then the criteria in the permits, licences or approvals take precedence. The discharge must be monitored throughout to ensure that the water being syphoned or pumped: • complies with the discharge criteria; and

Aspect	Summary
	• does not mix with any sediment laden/untested water at either the inlet or outlet. Water quality criteria are presented in **Section 6.5**.
Disposal off-site	Waste water disposed off-site will be classified in accordance with the NSW EPA (2014) *Waste Classification Guidelines* and NSW waste regulations. A licensed transporter will be used to transport material to an appropriately licensed NSW EPA waste facility and disposed water will be tracked using the project's waste tracking system.

5.0 Potential Environmental Impacts and Mitigations

The EIS and CEMP have assessed potential environmental hazards and risks, and general management measures, including in relation to dewatering. Groundwater dewatering guidance from WaterNSW also details environmental aspects that require consideration when assessing potential impacts from aquifer interference. These identified potential environmental impacts and associated environmental management measures to mitigate the associated risks to low levels are provided in the sections below.

This DMP has taken into consideration aspects and impacts to the environment associated with dewatering during construction only. All other risks and mitigations associated with other activities and potential impacts and management of groundwater, surface water, soil and sediments should be covered in other sub-plans in the CEMP, in particular:

- Specific procedures and controls to manage acid sulfate soils (including marine sediments) in the ASSMP.
- Specific procedures and controls to manage erosion and runoff on land-side in SWMP.
- Overarching water-quality management procedures and monitoring requirements in WQMP.

These environmental risks and mitigation should be re-assessed if site conditions or project works change, new information becomes available or as an outcome of inspection and monitoring.

5.1 Land-Side Groundwater Dewatering

The key environmental risks associated with groundwater dewatering are considered related to impacts from water table drawdown and exposure of acid sulfate soils, and inappropriate discharge of extracted water. It is important to note that the dewatering will occur in a zone of mixing of marine water and groundwater, with a significant portion of seepage into the box dam likely to comprise marine water.

The key risk mitigations are to avoid or substitute the extent or duration of dewatering – this will be achieved via the proposed dewatering system design using a box dam to minimise take and drawdown, and stormwater and erosion control measures in the SWMP to control potential runoff into excavations. Other key mitigations relate to management of water quality via controls in the ASSMP, treatment prior to discharge (if needed) and administrative controls (discharge approval, monitoring).

These identified potential environmental impacts and associated environmental management measures to mitigate the risks to low levels are provided **Table 5.1** below.

Table 5.1: Risks and mitigations from dewatering during construction – land-side

Aspect	Possible Impact	Risk		Mitigation	Residual Risk
Recharge	Increase in aquifer recharge within site	Low	The site is currently paved. The construction works will require removal of pavements, which could result in a temporary increase in recharge. However, the construction is temporary with a building to overly the site. Potential impacts related to an increase of impervious surfaces are considered minor and temporary.	None required.	Low
Water table / head and flow	Increase in water table on upgradient side of excavation causing waterlogging of street.	Low	Groundwater occurrence is shallow – JBS&G (Mar 2019) reported the depth to groundwater ranged from 1.46 m (PWMW4A) to 2.50 m (PBMW2A) below top of casing. The box dam, if appropriately designed and installed, is anticipated to control seepage into the excavation, but has the potential to cause mounding on the upgradient side. However, the site setting with proximity to Blackwattle Bay and associated tidal effects, expected low average hydraulic gradient, and relatively small portion of the shoreline intersected by the box dam, suggest that there should be minimal mounding, though this has not specifically been assessed.	Appropriate design of the box dam to minimise seepage ingress but mitigate potential upgradient mounding – this could be via maintaining a permeable layer around the box dam walls if needed. Monitoring of groundwater levels if required.	Low
	Decrease in pressure due to water table drawdown from dewatering causing geotechnical stability issues and impact on structures.	Moderate	There are no buildings in proximity to the box dam, which suggest potential risks to existing buildings from excessive drawdown are low. However, there could potentially be impact to adjoining roads or major services. While the risk is somewhat mitigated on the basis of the nature of reclaimed fill/sediments to be dewatered, and expected normal tidal fluctuation of water levels, this should be assessed and/or measures to minimise drawdown implemented.	Design and construct box dam, and dewatering method within the box dam, to minimise drawdown of surrounding groundwater table to an acceptable level that will not cause adverse impacts on existing structures. Minimise drawdown and duration of dewatering. Monitoring of groundwater levels.	Low
	Decrease in water table due to drawdown from dewatering causing reduced flow to groundwater dependent ecosystem or water supply works.	Low	The RAP did not identify existing bores in the vicinity of the site used for extractive and beneficial use – there is unlikely to be an impact on this basis. There is potential for a reduction in flow of groundwater to Blackwattle Bay due to ongoing dewatering take – other measures to control this will mitigate this. The impact is considered to be minor on the basis that the site is inferred to be within the tidally-affected zone and aquifer is of low value (based on elevated total dissolved solids), the small portion of the shoreline to Blackwattle Bay and the temporary nature of works.	None required.	Low

Aspect	Possible Impact	Risk		Mitigation	Residual Risk
Water quality	Change in flow direction cause a detrimental redistribution of groundwater contamination	Low	The RAP did not identify site-related groundwater contamination – low level concentrations of some metals (copper, lead and zinc) exceeded adopted assessment criteria, however, these were considered likely to be representative of natural background conditions in the urban city environment. The RAP concluded that site groundwater is not considered to require management or remediation with respect to making the site suitable for the proposed development.	Minimise drawdown and duration of dewatering. Implementation of the UFP within the CEMP.	Low
	Ingress of impacted stormwater runoff	Moderate	There is potential for ingress of stormwater runoff and entrained sediments into the excavation during construction. This could impact the quality and increase the volume of water extracted.	Implement stormwater and erosion control measures to control potential ingress into excavations in the SWMP. Management of fuels, oils, chemicals, construction materials and concrete works discharge in CEMP.	Low
	Impact to receiving water works (e.g., sewer or stormwater system) - **d**egradation of water quality due to inappropriate discharge.	Moderate	Discharge of contaminated groundwater could cause: • Pollution of the receiving water body (Blackwattle Bay) – this would be assessed via screening against baseline water quality of Blackwattle Bay to be assessed under the WQMP, and *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018). • Be non-compliant with approved discharge criteria – this would be assessed via comparison against (depending on the discharge method): ▪ Sewer - Sydney Water acceptance criteria. ▪ Stormwater - *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018) or other NSW EPA made or approved criteria if none available.	Identify and obtain required approvals and licenses to conduct dewatering discharge. Conduct inspection and monitoring of dewatering. Treat and sample water prior to discharge to ensure discharge quality meets the appropriate water quality criteria of the receiving works. Implementation of the UFP within the CEMP	Low
Acid sulfate soils	Decrease in water table causing oxidation of PASS and degrading water quality (acidification and mobilisation of metals)	Moderate	Drawdown of the water table and exposure of PASS outside the dam box could occur. This could result in oxidation of PASS, if exposed to the atmosphere for a sufficient time, and acidification and mobilisation of metals in groundwater. A portion of excavated materials from the box dam will likely comprise PASS and could result in localised acidification and mobilisation of metals into extracted water if not appropriately managed, or may require treatment. Gravel platform and concrete capping slab over the top of the sediments aims to cap off the sediments inside the box dam as a mitigation measure.	ASS management procedures and controls in ASSMP. Design and construct box dam to minimise drawdown outside the excavation extent to the natural tidal range. Minimise drawdown and duration of dewatering. Monitoring and treatment (if required) of extracted water prior to discharge.	Low

5.2 Marine-Side Surface Water Dewatering

The key environmental risks associated with surface water dewatering within the coffer dam are considered related to entrainment of sediments and exposure of acid sulfate soils, and inappropriate discharge of extracted water. Multiplex plans to conduct works which have the highest risk of sediment disturbance and mobilisation into the water column (sediment reprofiling and piling) prior to dewatering, with an intervening short time period to allow any significant disturbance to settle. This will be a key method (i.e. a form of elimination) to mitigate environmental risks associated with dewatering.

The key risk mitigations are to avoid or substitute the extent or duration of dewatering – this will be achieved via the proposed dewatering system design using a coffer dam and closure at low tide to minimise take, control of levels to ensure sediments remain submerged and specific acid sulfate soil management procedures in the ASSMP. Maintenance of a silt curtain around the outside of the work zone and administrative controls (inspection and monitoring) will further mitigate environmental risks.

These identified potential environmental impacts and associated environmental management measures to mitigate the risks to low levels are provided in the table below.

Table 5.2: Risks and mitigations from dewatering during construction – marine-side

Aspect	Possible Impact	Risk		Mitigation	Residual Risk
Change in water flow[9]	Impact on biodiversity	Low	The EIS assessment concluded there would be no direct or indirect impacts to threatened aquatic species, populations or ecological communities or their habitat as a result of the project. However, the EIS made several recommendations for mitigation measures are recommended to minimise the risk of impact during construction.	Prior to closing coffer dam and dewatering a visual check for marine life will be completed to ensure large marine wildlife is free of the construction area. Submersible pump heads should be covered in a filter to prevent fauna being sucked into the pump. Pumps must also be of a suitable size and capacity with a slow enough velocity to allow fish to escape during any dewatering process.	Low
Water quality	Impact to Blackwattle Bay water quality from inappropriate discharge	High	Surface water extracted from the coffer dam is proposed to be transferred to outside the coffer dam but within the boundary of the silt curtain and site. There is potential that there could be local and temporary degradation of water quality within this zone during water transfer if sediments are entrained, there is degradation of water quality from exposure of PASS or following rainfall events. However, the silt curtain is proposed to be maintained to mitigate impact of Blackwattle Bay. The principal potential impact is considered to be degradation of water quality within Blackwattle Bay off the site and outside the silt curtain. This is most likely to occur if sediments are disturbed and entrained in extracted water, or oxidation of PASS in sediments results in acidification and mobilisation of metals in water, or the rate of discharge is excessive. It is considered appropriate to assess degradation of water quality within Blackwattle Bay via: • Screening against baseline water quality of Blackwattle Bay reported in the EIS and RAP, and as part of further baseline sampling under the WQMP; or if not conducted. • *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018).	Schedule works so that potential significant sediment disturbance from sediment reprofiling and piling is allowed to settle prior to the initial primary dewatering. Appropriate design and installation of the coffer dam to minimise ongoing seepage from Blackwattle Bay and groundwater prior to sediment disturbance and dewatering works. Appropriate installation and maintenance of the silt curtain at the construction works perimeter as required by the CEMP. Closure of the coffer dam at low tide to minimise dewatering volume. Careful control of dewatering levels so sediments remain submerged. Careful control of dewatering rates and intake to minimise sediment erosion and entrainment. Control of stormwater runoff from the site to minimise ingress to the coffer dam as required under the SWMP. Install and maintain pump intake with a filter and at a level to minimise potential for sediment entrainment.	Low

[9] Senversa has not assessed aspects relating to hydrodynamics of Blackwattle Bay

Aspect	Possible Impact	Risk		Mitigation	Residual Risk
				Sampling of Blackwattle Bay under a range of tide and rainfall conditions to establish baseline water quality prior to dewatering works. Operational monitoring of levels within the coffer dam, take, and discharge water quality (turbidity, pH). Compliance monitoring of surface water in Blackwattle Bay outside the silt curtain and sentinel site as required under the WQMP.	
	Ingress of impacted stormwater runoff	Low	There is potential for ingress of stormwater runoff and entrained sediments from the site into the coffer dam during construction. This could impact the quality and increase the volume of water extracted. Senversa understands that the coffer dam design has considered stormwater egress into Blackwattle Bay - the coffer dam alignment does not appear to extend to the stormwater drain outlets. The existing culverts flow unimpeded into Blackwattle Bay and will not enter the coffer dam.	Implement stormwater and erosion control measures to control potential ingress into excavations in the SWMP. Management of fuels, oils, chemicals, construction materials and concrete works discharge in CEMP. Stormwater drains from Bridge Road will be diverted to drain water outside of coffer dam to reduce risk of surface water run-off refilling coffer dam.	Low
	Disturbance and redistribution of contaminated sediments	Moderate	The RAP concluded sediments within the site are impacted by heavy metals, PAH, PCBs, TRH and PASS, but that they are similar to those within Blackwattle Bay and likely reflective of conditions throughout the extent of Blackwattle Bay as a result of historical industrial activities along the foreshore of the Bay. On this basis, redistribution of sediments within the site is not likely to result in impact from chemical contamination – however, management of impacts from PASS is required (refer below). Sediment reprofiling and piling will occur prior to dewatering, however, potential residual disturbance and resuspension of sediments in the water column could impact water quality (principally turbidity) of Blackwattle Bay if dewatered and not appropriately managed.	Mitigation measures for potential impacts to Blackwattle Bay water quality (above) and acid sulfate soils (below).	Low
Acid sulfate soils	Decrease in water level exposing sediments and causing oxidation of PASS, with	Moderate	Adjustment of sediment levels within the coffer dam, and drawdown of the water level and exposure of sediments within the coffer dam, could result in oxidation of PASS, if exposed to	Management controls and monitoring in the CEMP (including ASSMP) during sediment reprofiling and	Low

Aspect	Possible Impact	Risk		Mitigation	Residual Risk
	subsequent degradation of water quality (acidification and mobilisation of metals)		the atmosphere for a sufficient time, and acidification and mobilisation of metals in water. The ASSMP assessed environmental risks and propose a series of mitigation measures for this work. The ASSMP concluded that given the high buffering capacity of salt water within the Bay, the proposed mitigation measures are considered sufficient to minimise the risk of acid generation during the adjustment works. However, there is further potential for local impact from transfer of water from within the coffer dam to outside the coffer dam, but within the silt curtain, during sediment adjustment and dewatering works.	piling that will occur prior to dewatering – refer to the ASSMP. ASS management procedures and controls in ASSMP related to dewatering, principally: • Maintain sediments in a submerged state so they are not drained and/or exposed to air. Assess water quality (principally, turbidity and pH) prior to primary bulk dewatering of coffer dam.	

6.0 Environmental Compliance and Monitoring

6.1 Roles and Responsibilities

In addition to those detailed in the CEMP, SWMP and ASSMP, the roles and responsibilities presented in **Table 6.1** are relevant to the DMP.

Table 6.1: Dewatering roles and responsibilities

Role	Responsibility
Suitably qualified and experienced hydrogeologist	Assess nature and extent of dewatering required. Assess design requirements to mitigate impacts on groundwater and surface water flow. Prepare this DMP.
Environmental Consultant	Assess dewatering discharge water quality objectives and treatment requirements. Assess requirements to mitigate impacts on groundwater and surface water contamination. Assess inspection and monitoring data, and provision of recommendations for any changes.
Foreman and Environmental Officer	Inspect construction dewatering and mitigation systems. Monitor water extraction rates and water quality throughout dewatering during Stage 2 construction works.
Civil/Marine Contractor	Design and install box dam. Design and install coffer dam. Design, install and maintain silt curtain(s). Design and operate water extraction and discharge system(s).
Multiplex	Ensure this DMP (and other sub-plans under CEMP) are implemented. Approvals and licensing.

6.2 Approvals and Licensing

6.2.1 Land-side: groundwater dewatering and discharge

Approval for groundwater dewatering may be required under the *Water Management Act 2000*, with CoA B91 stating a bore license may be required. Approvals could include a water access licence, a water supply work approval and a water use approval. However, the EIS states that approval under the *Water Management Act 2000* (which has largely superseded the *Water Act 1912*) is not required for SSD. This should be clarified with WaterNSW prior to installing works (e.g. pumps, sumps, bores).

In any case, there are exemptions for these approvals under certain scenarios – including the WaterNSW *Fact sheet: Water access licence exemption for excavation dewatering taking more than 3 ML of groundwater per year*. The CEMP also states an exemption from a dewatering licence is only available if:

- Abstraction is from the water table aquifer.
- Abstraction is solely for the purpose of removing groundwater to facilitate construction.
- Abstraction pump rate does not exceed 10 L/sec over a period of 30 consecutive days.
- The volume of water taken over the 30 days period does not exceed 25,000 kL.

If approval is required, the proposed land-side groundwater dewatering does not likely meet these exemption conditions on the basis that the duration will be longer than 30 days. However, confirmation

with WaterNSW on the conditions and suitability of the general exemption for construction dewatering should be obtained prior to commencement of dewatering. Irrespective, a water supply work approval (e.g. for the dewatering pumps/sumps) may be required from WaterNSW prior to commencement of groundwater dewatering.

It is an offence under section 120 of the *POEO Act 1997* to pollute waters – careful management, monitoring and obtaining required approvals/licences is required to prevent this. Approval or licensing of disposal of dewatered groundwater may be required depending on the method used:

- On-site reuse of suitable water (e.g. for dust suppression) – no approval/licence required provided the re-used water does not cause pollution.
- Sewer – discharge of contaminated wastewater approved by Sydney Water.
- Stormwater – discharge of uncontaminated or treated groundwater to the Bay or stormwater system approved by City of Sydney.

Alternatively, disposal of dewatered groundwater may require a license under the *POEO Act 1997* for discharge of water from a point source.

6.2.2 Marine-side

It is an offence under section 120 of the *POEO Act 1997* to pollute waters – careful management and monitoring is required to prevent this.

Senversa notes that the EIS or CoA do not identify specific approvals, permits or licences required for marine-side dewatering – it is inferred this has been approved via the project approval subject to the CoA and this DMP (and associated sub-plans under the CEMP).

6.3 Training

Additional to that detailed in the CEMP, relevant employees, contractors and utility staff working on site will undergo site induction training relating to soil, sediment and water management issues outlined in the DMP and related- CEMP sub-plans (in particular, the ASSMP and SWMP). The induction training will address elements related to soil, sediment and water management including:

- Existence and requirements of this sub-plan.
- Relevant legislation.
- Roles and responsibilities for dewatering management.
- The location of PASS or contamination.
- Identification of PASS or contamination.
- Water quality management and protection measures.
- Monitoring requirements.

Targeted training in the form of toolbox talks or specific training will also be provided to personnel with a key role in soil and water management. Examples of training topics include:

- ERSED (erosion and sediment) control installation methodology and maintenance.
- Dewatering, including dewatering of acid sulfate soils (or sediments).
- Emergency response measures in high rainfall events.
- Lessons learnt from incidents and other event (e.g. high rainfall/flooding).

6.4 Monitoring and Inspection

Monitoring and inspection will be conducted in accordance with Section 9 and Section 13.3.3 of the CEMP along with following the below requirements associated with dewatering – the monitoring program may be revised to suit the specific construction works, dewatering method and schedule by a Suitably qualified and experienced hydrogeologist or Environmental Consultant. The objective of the inspection and monitoring is to ascertain whether dewatering is being conducted in accordance with this DMP and that the mitigations are effective in protecting the receiving works/body.

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

- Pre-construction (baseline monitoring).
- Construction Phase (i.e. during dewatering).

Requirements for monitoring of Blackwattle Bay are to be documented in the WQMP – the monitoring requirements set out below aim to compliment, and not supersede, these. If there are any deviations, the WQMP should take precedence.

6.4.1 Land-Side: Groundwater Dewatering

Groundwater captured during construction will be tested, treated, discharged recorded and reported to meet the requirements of the project discharge licence, permit or approvals. A proposed inspection and monitoring schedule is provided in the table below – this should be reviewed and amended (if needed) once the details of the specific dewatering system design and discharge/disposal options are confirmed.

Table 6.2: Groundwater dewatering inspection and monitoring schedule

Project Stage	Attribute	Monitoring Type			Comment
		Inspection	**Water Level / Flow**	**Water Quality**	
Baseline (prior to dewatering)	Locations	-	Existing monitoring wells	Existing monitoring wells	Refer also to existing water level and quality data in RAP and data gap assessment (JBS&G, Mar 2019)
	Method	-	Gauging monitoring wells installed between the box dam and existing structures prior to commencement of dewatering.	Sampling monitoring wells and analysis for CoPC in RAP prior to commencement of dewatering.	
	Frequency	-	Event **–** if there is potential for non-minimal effect	Event **–** if there is potential for non-minimal effect.	
Construction Dewatering	Locations	System, excavation	System, monitoring wells **–** if there is potential for non-minimal effect.	Discharge, monitoring wells **–** if there is potential for non-minimal effect.	-
	Method	Inspect dewatering system, ASS indicators, discharge	Gauge water level in monitoring wells continuously or daily until steady state condition observed, then reduced frequency. Record flow rate and total volume of extracted water and discharged water.	Grab sample extracted water prior to discharge in accordance with permit/licence/approval. The primary focus should be on pH, turbidity and EC, with other CoPC secondary **(**such as metals and other ASS indicators, and other CoPC in the RAP). Sample monitoring wells (if any) and analysis for pH, TDS, metals and other CoPC in RAP on completion of dewatering.	
	Frequency	Daily for initial period, then weekly	Daily for flow/volume. Daily for gauging levels for initial period until steady state condition observed, then reduced frequency (weekly).	Field measurement by probe daily or per batch discharge (if longer) for pH, turbidity and EC. Grab sample and analysis daily or per batch discharge as required by permit/approval during initial period, periods of	

Project Stage	Attribute	Monitoring Type			Comment
		Inspection	Water Level / Flow	Water Quality	
				exposure of ASS, or low pH / high turbidity recorded - once steady state conditions observed, then reduced frequency.	

Results and actions of monitoring and inspection are to be recorded as specified within the CEMP.

The key triggers and decisions from monitoring will be:

- Whether discharge rate and quality of discharged water complies with the water quality objectives criteria.
- Surrounding drawdown is within acceptable limits.

If these are triggered, then the environmental risk should be reviewed and dewatering and water management system adapted accordingly.

6.4.2 Marine-Side: Coffer Dam Dewatering

Inspection and monitoring of surface water quality will be conducted at the coffer dam, the dewater discharge zone, as shown on **Figure 2**, and in Blackwattle Bay outside the project works area. A key step is to assess baseline water quality conditions in Blackwattle Bay under a range of representative conditions – these data will be used as a benchmark to assess the suitability of surface water from the coffer dam to be discharged.

The WQMP will outline baseline and ongoing monitoring requirements of Blackwattle Bay during project construction (not just dewatering).

A proposed inspection and monitoring schedule is provided in the table below – this should be reviewed once the details of the specific sediment adjustment method, dewatering system design and discharge options are confirmed.

Table 6.3: Surface water dewatering inspection and monitoring schedule

Project Stage	Attribute	Monitoring Type			
		Inspection	Water Level / Flow	Water Quality	
Baseline (prior to marine construction works)	The WQMP will document the requirements to assess baseline water quality conditions in Blackwattle Bay under a range of representative conditions – these data will be used as a benchmark to assess the suitability of surface water from the coffer dam to be discharged.				
Construction Dewatering	Locations	System, coffer dam, discharge point.	System, coffer dam, discharge point.	Discharge	Blackwattle Bay
	Method	Inspect dewatering system, sediment exposure, discharge flow and observations (e.g. visible sediment plumes).	Record flow rate and/or volume of extracted water and discharged water.	Grab sample of extracted water prior to discharge. The primary focus should be on pH **and** turbidity, with other indicator constituents (e.g. EC and dissolved oxygen) and CoPC secondary such as metals and other ASS indicators, and other CoPC in the RAP.	Monitoring pH and turbidity via probe/logger or grab sampling Blackwattle Bay outside the silt curtain per WQMP. Additional sampling and analysis of CoPC if turbidity and/or pH exceed water quality objective criteria.

Project Stage	Attribute	Monitoring Type		
		Inspection	**Water Level / Flow**	**Water Quality**
	Frequency	Daily for initial period, then weekly.	Daily for flow/volume.	Field measurement of pH, turbidity via probe and/or Secchi disc/tube on a daily basis of all flows/locations. Grab sample and analysis daily or per batch discharge during initial period, periods of exposure of ASS, or low pH / high turbidity recorded - once steady state conditions observed, then reduced frequency (weekly or monthly depending on variability in reported water quality).

Results and actions of monitoring and inspection are to be recorded as specified within the CEMP.

The key triggers and decisions from monitoring will be:

- Whether the water level is maintained above sediments.
- Whether extraction and transfer of water to outside the coffer dam has been conducted in a manner to minimise sediment disturbance and entrainment.
- Whether the quality of discharged water complies with the water quality objectives criteria at the point of discharge and outside the silt curtain within Blackwattle Bay is maintained to be consistent with the range of baseline conditions – this is to be conducted as part of broader project environmental management under the WQMP.

If these are triggered, then the environmental risk should be reviewed, and sediment level adjustment controls, dewatering and water management system adapted accordingly.

Results and actions of monitoring and inspection are to be recorded as specified within the CEMP.

6.4.3 Sample Collection, Handling and Analysis

Sampling should be conducted by a person suitable trained and experienced using methods made or endorsed by NSW EPA, including DEC (2004) *Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales*.

Field meters and probes should be calibrated daily or each time sampling is conducted in accordance with the manufacturer's instructions, with calibration records retained.

All samples scheduled for analysis should be analysed at a laboratory accredited by National Association of Testing Authorities.

6.5 Water Quality Objectives

Water quality criteria to be adopted and their application to assess suitability for reuse or discharge for selected constituents is provided in the table below. As discussed above, monitoring should primarily focus on pH and turbidity, and screening against baseline surface water or groundwater conditions. Exceedances of these should trigger:

- Review of data by an Environmental Consultant with respect to baseline data and the magnitude and frequency/duration of exceedance(s).
- Consideration of the ANZG (2018) and ASC NEPM criteria, as relevant.

- Increase frequency of sampling and/or broader analytical suite.
- Review of dewatering systems and mitigations.

These criteria are consistent with:

- Requirement to consider ANZG (2018) in CoA C32.
- ASSMP monitoring requirement to screen against baseline water quality in Blackwattle Bay.
- Criteria adopted in the *Flooding and Water Quality Assessment Report* in the EIS.
- Criteria adopted in the RAP and previous environmental assessments (e.g. JBS&G, Mar 2019).

Table 6.4: Water Quality Objectives - Criteria for Reuse or Discharge

Constituent / Property	Surface Water or Groundwater		Groundwater		Sewer
	1. Blackwattle Bay Baseline – 80th Percentile and Average *(to be assessed prior to start of Stage 2 works)*	**2. ANZG (2018) 95% species protection (marine water) for toxicants**	**3. Site Baseline Condition – Concentration Range** (after JBS&G (Mar 2019) *Data Gap Assessment*)	**4. ASC NEPM - Health-Based Criteria** (for recreational exposure after JBS&G (Mar 2019) *Data Gap Assessment*)	**5. Acceptance Standards in Sydney Water Trade Waste Agreement**
Application	Discharge to Blackwattle Bay or stormwater		On-site reuse		Sewer discharge
Physicochemical Parameters					
pH (pH units)	*tbc*	8 - 8.5	6.6-8.1	6.5-8.5	*tbc*
Turbidity (NTU)	*tbc*	10	-	-	*tbc*
Total suspended solids (mg/L)	*tbc*	-	-	-	*tbc*
Dissolved Oxygen (% saturation)	*tbc*	90 - 110	<1 - 50	-	*tbc*
Salinity (mS/cm)	*tbc*	50	20-52	-	*tbc*
Dissolved Metals (µg/L)					
Arsenic	*tbc*	2.3	<LOR - 4	100	*tbc*
Cadmium	*tbc*	0.7	<LOR	20	*tbc*
Chromium (VI)	*tbc*	4.4	<LOR	500	*tbc*
Copper	*tbc*	1.3	<LOR - 6	20000	*tbc*
Lead	*tbc*	4.4	<LOR - 11	100	*tbc*
Manganese	*tbc*	80	-	5000	*tbc*
Mercury	*tbc*	0.4	<LOR	10	*tbc*
Nickel	*tbc*	70	<LOR - 2	200	*tbc*
Zinc	*tbc*	15	<LOR - 67	-	*tbc*
Nutrients (µg/L)					
Total Nitrogen (as N)	*tbc*	120	*tbc*	-	*tbc*
Total Phosphorus (as P)^	*tbc*	25	*tbc*	-	*tbc*
Ammonia (as N)	*tbc*	910	*tbc*	-	*tbc*
Petroleum Hydrocarbons (µg/L)					
Oil and grease	*tbc*	No sheens, oil and grease observed	Not observed	No sheens, oil and grease observed	*tbc*
TPH F1	*tbc*	-	<LOR	6000	*tbc*
TPH F2	*tbc*	-	<LOR	No limit	*tbc*

***Note**: The analytes presented above are some possible common constituents of potential concern – the analytes and associated criteria should be reviewed and revised based on possible contamination issues identified as part of the CEMP, ASSMP and SWMP. ^General water quality objectives based on physical stressors. Tbc – to be confirmed.*

6.6 Auditing

Internal and external audit requirements will be conducted as outlined within Section 10.1 of the CEMP.

6.7 Reporting

Reporting will be conducted as outlined within Section 12 of the CEMP.

6.8 Non-conformance

Non-conformances will be managed as outlined in Section 10.2 of the CEMP.

7.0 Review and Improvement

This plan may be updated or revised if required. The procedure for review and approval of any updates or revisions will be in accordance with the procedure described in the CEMP.

8.0 Principles and Limitations

The following principles are an integral part of site contamination assessment practices and are intended to be referred to when resolving any ambiguity or exercising such discretion as is accorded the user or site assessor.

Area	Principle and Limitation
Elimination of Uncertainty	Some uncertainty is inherent in all site investigations. Furthermore, any sample, either surface or subsurface, taken for chemical testing may or may not be representative of a larger population or area. Professional judgment and interpretation are inherent in the process, and even when exercised in accordance with objective scientific principles, uncertainty is inevitable. Additional assessment beyond that which was reasonably undertaken may reduce the uncertainty.
Failure to Detect	Even when site investigation work is executed competently and in accordance with the appropriate Australian guidance, such as the National Environment Protection (Assessment of Site Contamination) Amendment Measure ('the NEPM'), it must be recognised that certain conditions present especially difficult target analyte detection problems. Such conditions may include, but are not limited to, complex geological settings, unusual or generally poorly understood behaviour and fate characteristics of certain substances, complex, discontinuous, random, or heterogeneous distributions of existing target analytes, physical impediments to investigation imposed by the location of services, structures and other man-made objects, and the inherent limitations of assessment technologies.
Limitations of Information	The effectiveness of any site investigation may be compromised by limitations or defects in the information used to define the objectives and scope of the investigation, including inability to obtain information concerning historic site uses or prior site assessment activities despite the efforts of the user and assessor to obtain such information.
Chemical Analysis Error	Chemical testing methods have inherent uncertainties and limitations. Senversa routinely seeks to require the laboratory to report any potential or actual problems experienced, or non-routine events which may have occurred during the testing, so that such problems can be considered in evaluating the data.
Level of Assessment	The investigation herein should not be considered to be an exhaustive assessment of environmental conditions on a property. There is a point at which the effort required to obtain information is outweighed by the time required to obtain that information, and, in the context of private transactions and contractual responsibilities, may become a material detriment to the orderly conduct of business. If the presence of target analytes is confirmed on a property, the extent of further assessment is a function of the degree of confidence required and the degree of uncertainty acceptable in relation to the objectives of the assessment.
Comparison with Subsequent Inquiry	The justification and adequacy of the findings of this investigation in light of the findings of a subsequent inquiry should be evaluated based on the reasonableness of judgments made at the time and under the circumstances in which they were made.
Data Useability	Investigation data generally only represent the site conditions at the time the data were generated. Therefore, the usability of data collected as part of this investigation may have a finite lifetime depending on the application and use being made of the data. In all respects, a future reader of this report should evaluate whether previously generated data are appropriate for any subsequent use beyond the original purpose for which they were collected, or are otherwise subject to lifetime limits imposed by other laws, regulations or regulatory policies.
Nature of Advice	The investigation works herein are intended to develop and present sound, scientifically valid data concerning actual site conditions. Senversa does not seek or purport to provide legal or business advice.

Specific uncertainties and limitations noted for dewatering volumes, rates and drawdowns are as follows:

- The report has been prepared based on information provided to Senversa including environmental site condition, contaminant concentrations and proposed work methods. This information has been used *prima facie*.
- The information provided in this report is based on available data on water quality and other relevant data at the site taken at certain locations and times. The advice tendered in this report is not warranted in respect to the conditions that may be encountered across the site at other than these locations and times.
- Water quality and flow is often highly variable, and it is possible that the data used for the assessment may not reflect the conditions that may be encountered elsewhere on the site. Senversa has not undertaken field test work to obtain data or to verify the data provided.
- It is emphasised that the actual characteristics of the subsurface and surface materials may vary significantly between adjacent test points and sample intervals and at locations other than where observations, explorations and investigations have been made. Sub-surface conditions, including ASS, groundwater levels, and quality, composition and contaminant concentrations in water and sediments can change in a limited time. This should be borne in mind when assessing the data. The responsibility for the accuracy of such data remains with the issuing authority, not with Senversa.
- It should be noted that because of the inherent uncertainties in the sub-surface evaluations, changed or unanticipated sub-surface conditions may occur that could affect the project. Senversa does not accept responsibility for the consequences of significant variances in the groundwater level, water flow and/or water quality conditions. Should additional data be provided at a later time, Senversa reserves the right to amend this report to reflect the new information.
- Senversa has not assessed potential geotechnical impacts, such as settlement or stability, from dewatering.

Figures

Figure 1: Site Location Plan

Figure 2: Proposed Dewatering Layout



Path: S:\01_Jobs\1.NSW_Jobs\S18417_MULTIPLEX_FISH MARKETS_REDEVELOPMENT\S18417_003.aprx

This Drawing is Subject to COPYRIGHT. No portion of this drawing may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa.

senversa
Address: Level 5, 201 Kent Street, Sydney NSW 2000
Phone: (02) 9994 8016
Website: www.senversa.com.au

Legend

- Approximate Seawall Extent
- Stormwater Discharge
- Heritage Stormwater Channel
- Site Boundary
- Property Cadastre

Notes:
Cadastre and road data sourced from land.vic.gov.au (DELWP)
Aerial imagery sourced from Nearmap Pty Ltd

Designed:	Z. Smith	Date:	3/03/2021
Drawn:	C. Smith	Revision:	0
Checked:	.	Scale:	1:1,750 (A3)
File:	S18417_003_F001		

0 40 80 120 Metres

Datum GDA 1994, Projection MGA Zone 55

Figure No: 1

Title: Site Location Plan

Project: New Sydney Fish Market (Stage 2) – Dewatering Management Plan

Location: 1A-1C Bridge Road, Glebe and Part of 56-60 Pyrmont Bridge Road, Pyrmont NSW

Client: Multiplex



Path: S:\01_Jobs\1.NSW_Jobs\S18417_MULTIPLEX_FISH MARKETS_REDEVELOPMENT\MXDs\1_Working MXDs\003_Dewatering_Plan\S18417_003_F002_Dewatering_Layout.mxd

This Drawing is Subject to COPYRIGHT. No portion of this drawing may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa.

senversa
Address: Level 5, 201 Kent Street, Sydney NSW 2000
Phone: (02) 9994 8016
Website: www.senversa.com.au

Legend

- Silt Curtain - Phase 1
- Silt Curtain - Phase 2
- Silt Curtain - Phase 3
- Gate
- Approximate Seawall Extent
- Heritage Stormwater Channel
- Stormwater Discharge
- Pump
- Box Dam
- Coffer Dam
- Marine Water Discharge Zone
- Dewatering Discharge Zone
- Site Boundary

Notes:
Aerial imagery (06/12/2020) sourced from Nearmap Pty Ltd

Designed:	A. Woinarski	Date:	29/04/2021
Drawn:	M. Sari	Revision:	0
Checked:	A. Woinarski	Scale:	1:2,000 (A3)
File:	S18417_003_F002_Dewatering_Layout		

0 10 20 40 60 80 100 Metres
Datum GDA 1994, Projection MGA Zone 56

Figure No: 2

Title: Proposed Dewatering Layout

Project: New Sydney Fish Market (Stage 2) - Dewatering Management Plan
Location: 1A-1C Bridge Road, Glebe & Part of 56-60 Pyrmont Bridge Road, Pyrmont NSW
Client: Multiplex

Appendix A: Groundwater Quality Data

Table B: Historical Groundwater Analytical Results

		Heavy Metals									Petroleum Hydrocarbons					TRHs (NEPC 2013)						Non-Metallic Inorganics				Major Cations			Volatile Organic Contaminants (VOCs)2									
		Arsenic (As III)	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Phenolics (Total)	C6-C9	C10-C14	C15-C28	C29-C36	Total TPHs (C10-C36)	C6-C10 Fraction	>C10-C16 Fraction	>C16-C34 Fraction	>C34-C40 Fraction	C6 - C10 less BTEX (F1)	>C10 - C16 less Naphthalene (F2)	Nitrate & Nitrite (as N)	Total Nitrogen (as N)	Phosphorus	Total Kjeldahl Nitrogen (as N)	Calcium	Potassium	Magnesium	Benzene	Toluene	Ethyl Benzene	Total xylenes	o-xylene	m+p-xylene	Isopropylbenzene	n-Propylbenzene	tert -Butylbenzene	sec - Butylbenzene
Unit		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR		0.001	0.0001	0.001	0.001	0.001	0.0001	0.001	0.001	0.001	0.01	0.05	0.1	0.1															0.001	0.001	0.001	0.003	0.001	0.002	0.001	0.001	0.001	0.001
ANZAST 2018 (95% Eco Marine Waters or as discussed i		0.023	0.0007	0.0044	0.0013	0.0044	0.00001	0.007	0.015																				0.5	0.18	0.005		0.35	0.75				
NEPC (2013) HSL Vapour intrusion											6000	NL																	5000	NL	NL	NL	NL	NL				
NHMRC (2011) (as amended December 2014) (Factor 10) – Health																													0.001	0.8	0.3							
Sample ID	Date																																					
PB (2009)																																						
MW01	12/01/2009	**<0.02**	<0.0002	**<0.005**	<0.01	0.001	<0.0001	**<0.01**	0.186	-	<0.05	<0.05	<0.2	<0.05	-	-	-	-	-	-	-	-	-	-	-				<0.001	<0.001	<0.001	-	<0.002	<0.001	-	-	-	-
PBMW02a	12/01/2009	**<0.02**	<0.0001	**<0.005**	<0.01	<0.001	**<0.0005**	**<0.01**	<0.01	-	<0.05	<0.05	<0.2	<0.05	-	-	-	-	-	-	-	-	-	-	-				<0.001	<0.001	<0.001	-	<0.002	<0.001	-	-	-	-
PBMW03a	12/01/2009	**<0.02**	<0.0002	**<0.005**	<0.01	0.002	<0.0001	**<0.01**	0.041	-	<0.05	<0.05	<0.2	<0.05	-	-	-	-	-	-	-	-	-	-	-				<0.001	<0.001	<0.001	-	<0.002	<0.001	-	-	-	-
PBMW04a	12/01/2009	**<0.02**	<0.0002	**<0.005**	<0.01	<0.001	<0.0001	**<0.01**	<0.01	-	<0.05	<0.05	<0.2	<0.05	-	-	-	-	-	-	-	-	-	-	-				<0.001	<0.001	<0.001	-	<0.002	<0.001	-	-	-	-
JBS&G (2015)																																						
HHMW01	14/09/2015	0.005	<0.0001	<0.001	0.002	<0.001	<0.0001	0.001	<0.005	-	<0.02	<0.05	<0.1	<0.1	<0.1	<0.02	<0.05	<0.1	<0.1	<0.02	<0.05	<0.05	11	2.2	11	300	310	1300	<0.001	<0.001	<0.001	<0.003	<0.001	<0.002	-	-	-	-

Table B: Historical Groundwater Analytical Results

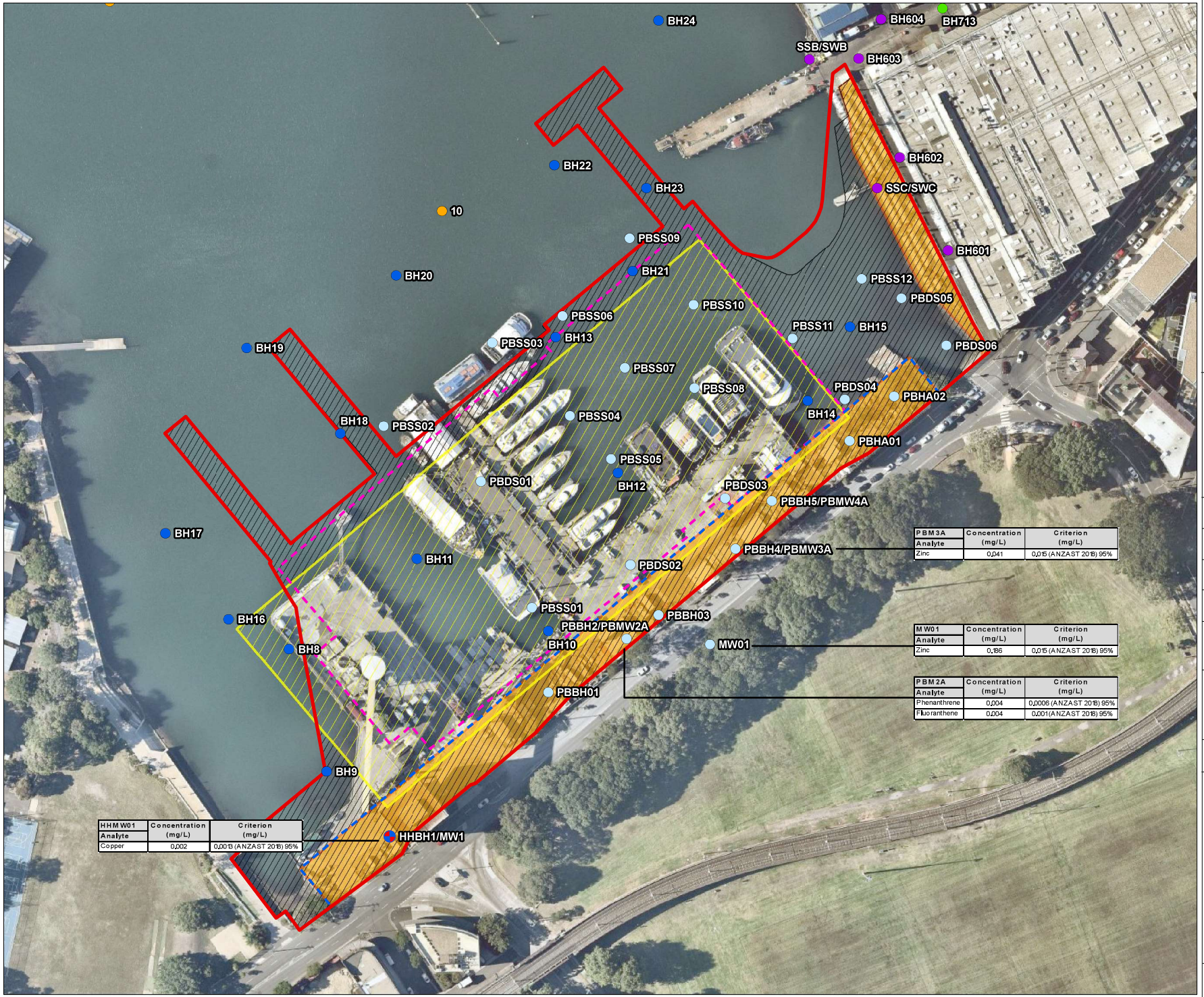
				Polycyclic Aromatic Hydrocarbons (PAHs)																						Chlorinated Alkanes											
		n-Butylbenzene	Total VOCs	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(a)pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Benzo(b+k)fluoranthene	Benzo(k)fluoranthene	Benzo(b,j)fluoranthene	Benzo(g,h,i)perylene	Dibenz(a,h)anthracene	Indeno(1,2,3-c,d)pyrene	Total PAHs	Hardness	Total Cyanide	Oil and Grease	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,2,3-trichloropropane	1,2-dibromo-3-chloropropane	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	2,2-dichloropropane	bromodichloromethane
Unit		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L		mg/L				mg/L	mg/CaCO3/l	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR		0.001	0.001	0.001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002						-	1	0.005	5												
ANZAST 2018 (95% Eco Marine Waters or as discussed i				0.05				0.0006	0.0001	0.001				0.0001																							
NEPC (2013) HSL Vapour intrusion				NL																																	
NHMRC (2011) (as amended December 2014) (Factor 10) – Health														0.0001																				0.03				2.5
Sample ID	Date																																				
PB (2009)																																					
MW01	12/01/2009	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.002			<0.001	<0.001	<0.001	-	-	-	-											
PBMW02a	12/01/2009	-	-	<0.001	<0.001	<0.001	<0.001	**0.004**	<0.001	**0.004**	0.003	<0.001	<0.001	<0.001	-	-	<0.002			<0.001	<0.001	<0.001	0.011	-	-	-											
PBMW03a	12/01/2009	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	0.003			<0.001	<0.001	<0.001	0.003	-	-	-											
PBMW04a	12/01/2009	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.002			<0.001	<0.001	<0.001	-	-	-	-											
JBS&G (2015)																																					
HHMW01	14/09/2015	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.0001	0.0001	0.0001	0.0001	0.0001	-	-	-	0.0001	0.0001	0.0001	<0.00001	<0.00001	0.0008	6100	-	-	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	-	<0.001

Table B: Historical Groundwater Analytical Results

										Chlorinated Alkenes												Chlorinated Benzenes					Monocyclic Aromatic Hydrocarbons												
		Carbon tetrachloride	Chloroethane	Chloroform	Chloromethane	dibromochloromethane	Dichlorodifluoromethane	Dichloromethane	Trichlorofluoromethane	1,1,2,2-tetrachloroethylene	1,1-Dichloroethene	1,1-dichloropropene	2-chlorotoluene	3-chloropropene	4-chlorotoluene	cis-1,2-dichloroethene	cis-1,3-dichloropropene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	Trichloroethene	Vinyl Chloride	1,2,3-trichlorobenzene	1,2,4-trichlorobenzene	1,2-Dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	1,2,4-trimethyl benzene	1,3,5-trimethyl benzene	4-isopropyl toluene	Bromobenzene	Isopropylbenzene	n-butyl benzene	n-propyl benzene	sec-butyl benzene	Styrene	Tert-butyl benzene	1,2-dibromoethane	2-Butanone (MEK)
Unit		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR																																							
ANZAST 2018 (95% Eco Marine Waters or as discussed i																																							
NEPC (2013) HSL Vapour intrusion																																							
NHMRC (2011) (as amended December 2014) (Factor 10) – Health		0.03		2.5		2.5		0.04		0.5	0.3										0.2[1]	0.003			15		0.4									0.3		0.01	
Sample ID	Date																																						
PB (2009)																																							
MW01	12/01/2009																																						
PBMW02a	12/01/2009																																						
PBMW03a	12/01/2009																																						
PBMW04a	12/01/2009																																						
JBS&G (2015)																																							
HHMW01	14/09/2015	<0.001	<0.001	<0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	-	-	-	<0.001	-	<0.001	<0.001

Table B: Historical Groundwater Analytical Results

		Miscellaneous Hydrocarbons							
		2-Propanone (Acetone)	4-Methyl-2-pentanone (MIBK)	Bromoform	Bromomethane	Cyclohexane	Dibromomethane	Iodomethane	Carbon disulfide
Unit		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
LOR									
ANZAST 2018 (95% Eco Marine Waters or as discussed i									
NEPC (2013) HSL Vapour Intrusion									
NHMRC (2011) (as amended December 2014) (Factor 10) – Health				2.5	0.01				
Sample ID	Date								
PB (2009)									
MW01	12/01/2009								
PBMW02a	12/01/2009								
PBMW03a	12/01/2009								
PBMW04a	12/01/2009								
JBS&G (2015)									
HHMW01	14/09/2015	-	<0.001	<0.001	<0.001	-	<0.005	<0.001	<0.001



PBM3A	Concentration (mg/L)	Criterion (mg/L)
Analyte		
Zinc	0.041	0.015 (ANZAST 2018) 95%

MW01	Concentration (mg/L)	Criterion (mg/L)
Analyte		
Zinc	0.186	0.015 (ANZAST 2018) 95%

PBM2A	Concentration (mg/L)	Criterion (mg/L)
Analyte		
Phenanthrene	0.004	0.0006 (ANZAST 2018) 95%
Fluoranthene	0.004	0.001 (ANZAST 2018) 95%

HHMW01	Concentration (mg/L)	Criterion (mg/L)
Analyte		
Copper	0.002	0.0013 (ANZAST 2018) 95%

Legend:

- New Sydney Fish Market Development Footprint
- Approximate Land Area
- Approximate Seawall Extent

Proposed Landuse

- Fish Market Building Envelope
- Public Domain
- Approximate Fish Market Basement Footprint

Sample Locations

- BAYS MARKET DISTRICT - EIS (2017)
- BAYS MARKET DISTRICT - EIS (2010b)
- BAYS MARKET DISTRICT - EIS (2010c)
- BAYS MARKET DISTRICT - PB (2009)
- BAYS MARKET DISTRICT - Umwelt (2008)
- Soil Sampling / Monitoring Well - JBS&G 2015

JBS&G

Job No: 54578

Client: UrbanGrowth NSW

Version: R01 Rev 3 | Date: 08-Apr-2019

Drawn By: RF | Checked By: JR

Scale 1:2,000

0 25 50

metres

Coor. Sys. GDA 1994 MGA Zone 56

1A-1C Bridge Road, Glebe, and part 56-60 Pyrmont Bridge Road, Pyrmont, NSW

GROUNDWATER EXCEEDANCES

FIGURE 4A

File Name: 54578_04A
Reference: Near Map - http://www.nearmap.com.au/. Imagery - 18-01-2018.

Table B: Groundwater Analytical Results
Project Number: 54578
Project Name: New Sydney Fish Markets

		Metals & Metalloids								TPHs (NEPC 1999)					TRHs (NEPC 2013)							BTEX					
		Arsenic (Total) (Filtered)	Cadmium (Filtered)	Chromium (Total) (Filtered)	Copper (Filtered)	Lead (Filtered)	Mercury (Inorganic) (Filtered)	Nickel (Filtered)	Zinc (Filtered)	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 Fraction (Total)	>C10-C16 Fraction	>C16-C34 Fraction	>C34-C40 Fraction	>C10-C40 Fraction (Total)	>C10-C16 less Naphthalene (F2)	C6-C10 Fraction	C6-C10 less BTEX (F1)	Benzene	Ethylbenzene	Toluene	Xylene (o)	Xylene (m & p)	Xylene (Total)
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.10	0.10	0.10	0.05	0.10	0.10	0.10	0.05	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
ANZG 2018 MW 95%			0.0055		0.0013	0.0044	0.0004	0.07	0.015													0.7					
NEPM 2013 Groundwater HSL D for Vapour Intrusion - Sand 2 to <4m																			NL		6	5	NL	NL			NL
NHMRC (2011) (as amended December 2014) (Factor 10) – Health		0.1	0.02		20	0.1	0.01	0.2														0.01	3	8			6
Field_ID	**Sampled_Date-Time**																										
MW1	3/11/2018	0.004	<0.0002	<0.001	0.002	<0.001	<0.0001	<0.001	0.008	<0.02	<0.05	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.05	<0.02	<0.02	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003
PBMW 2A	26/10/2018	0.001	<0.0002	<0.001	<0.001	<0.001	<0.0001	0.001	<0.005	<0.02	<0.05	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.05	<0.02	<0.02	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003
PBMW 3A	26/10/2018	0.001	<0.0002	<0.001	0.004	<0.001	<0.0001	<0.001	0.011	<0.02	<0.05	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.05	<0.02	<0.02	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003
PBMW 4A	26/10/2018	<0.001	<0.0002	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005	<0.02	<0.05	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.05	<0.02	<0.02	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003
SBMW 01	25/10/2018	<0.001	<0.0002	<0.001	0.003	<0.001	<0.0001	0.002	0.032	<0.02	<0.05	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.05	<0.02	<0.02	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003
QW01 (duplicate pair SBMW01)	25/10/2018	<0.001	<0.0002	<0.001	0.003	<0.001	<0.0001	0.002	0.032	<0.02	<0.05	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.05	<0.02	<0.02	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003
QW01A (triplicate pair SBMW01)	25/10/2018	<0.001	<0.0001	<0.001	0.006	<0.001	<0.00005	0.002	0.039	<0.01	<0.05	<0.1	<0.1	-	<0.05	<0.1	<0.1	-	<0.05	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	<0.002	-
SBMW 02	25/10/2018	0.001	<0.0002	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005	<0.02	<0.05	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.05	<0.02	<0.02	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003
SBMW 03	26/10/2018	0.001	<0.0002	<0.001	0.004	<0.001	<0.0001	<0.001	0.013	<0.02	<0.05	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.05	<0.02	<0.02	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003
SBMW 04	26/10/2018	0.002	<0.0002	<0.001	0.004	0.011	<0.0001	0.002	0.073	<0.02	<0.05	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.05	<0.02	<0.02	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003
SBMW05	3/11/2018	0.002	<0.0002	<0.001	0.003	0.001	<0.0001	0.002	0.024	<0.02	<0.05	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.05	<0.02	<0.02	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003
SBMW06	3/11/2018	<0.001	<0.0002	<0.001	0.002	0.001	<0.0001	0.002	0.067	<0.02	<0.05	<0.1	<0.1	<0.1	<0.05	<0.1	<0.1	<0.1	<0.05	<0.02	<0.02	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003

Table B: Groundwater Analytical Results
Project Number: 54578
Project Name: New Sydney Fish Markets

		Polycyclic Aromatic Hydrocarbons																				Ionic Balance			
		Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(a)pyrene TEQ (WHO)	Benzo(b,j)fluoranthene	Benzo(g,h,i)perylene	Benzo(b,j+k)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	PAHs (Total)	Total Positive PAHs	EC_Lab	Total Alkalinity (as CaCO3)	pH_Lab	Electrical Conductivity
		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µS/cm	mg/L	ph Units	µS/cm
EQL		0.00	0.00	0.00	0.00	0.00		0.00	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		1.00	5.00	0.10	
ANZG 2018 MW 95%				0.0001		0.0001								0.001			0.07	0.0006							
NEPM 2013 Groundwater HSL D for Vapour Intrusion - Sand 2 to <4m																	NL								
NHMRC (2011) (as amended December 2014) (Factor 10) – Health						0.0001																			
Field_ID	**Sampled_Date-Time**																								
MW1	3/11/2018	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	0.00003	<0.00001	<0.00001	<0.00001	0.00003	0.00004	0.0001	-	46,000	1800	7.8	-
PBMW 2A	26/10/2018	0.00006	<0.00001	0.00003	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	0.00038	0.00006	<0.00001	<0.00001	0.0001	0.00046	0.00109	-	23,000	1300	8.1	-
PBMW 3A	26/10/2018	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	50,000	190	7.7	-
PBMW 4A	26/10/2018	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	52,000	470	7.7	-
SBMW 01	25/10/2018	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	49,000	220	7.4	-
QW01 (duplicate pair SBMW01)	25/10/2018	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	49,000	190	7.6	-
QW01A (triplicate pair SBMW01)	25/10/2018	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0005	-	<0.0001	<0.2	-	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0002	<0.0001	<0.0001	-	0	-	170	6.9	45,000
SBMW 02	25/10/2018	0.00003	<0.00001	0.00002	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	0.00004	0.00002	<0.00001	<0.00001	0.00008	0.00005	0.00024	-	51,000	270	7.8	-
SBMW 03	26/10/2018	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	50,000	160	7.8	-
SBMW 04	26/10/2018	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	0.00002	<0.00001	<0.00001	<0.00001	<0.00001	0.00006	0.00008	-	49,000	180	7.6	-
SBMW05	3/11/2018	<0.00001	<0.00001	0.00008	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	0.0003	<0.00001	<0.00001	<0.00001	0.00014	0.00038	0.0009	-	46,000	140	7.4	-
SBMW06	3/11/2018	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	<0.00001	<0.00001	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	48,000	180	7.3	-



SBMW04		Concentration (mg/L)	Criteria (mg/L)
Analyte	Date		
Copper	26/10/2018	0.004	0.0013 ANZEC MW 95%
Lead	26/10/2018	0.011	0.0013 ANZEC MW 95%
Zinc	26/10/2018	0.073	0.0013 ANZEC MW 95%

SBMW03		Concentration (mg/L)	Criterion (mg/L)
Analyte	Date		
Copper	26/10/2018	0.004	0.0013 ANZEC MW 95%

PBMW3A		Concentration (mg/L)	Criteria (mg/L)
Analyte	Date		
Copper	26/10/2018	0.004	0.0013 ANZEC MW 95%

QW01A (SBMW01)		Concentration (mg/L)	Criteria (mg/L)
Analyte	Date		
Copper	25/10/2018	0.006	0.0013 ANZEC MW 95%
Zinc	25/10/2018	0.039	0.0013 ANZEC MW 95%

SBMW06		Concentration (mg/L)	Criteria (mg/L)
Analyte	Date		
Copper	25/10/2018	0.002	0.0013 ANZEC MW 95%
Zinc	25/10/2018	0.067	0.0013 ANZEC MW 95%

SBMW05		Concentration (mg/L)	Criteria (mg/L)
Analyte	Date		
Copper	25/10/2018	0.003	0.0013 ANZEC MW 95%
Zinc	25/10/2018	0.024	0.0013 ANZEC MW 95%

MW1		Concentration (mg/L)	Criteria (mg/L)
Analyte	Date		
Copper	3/11/2018	0.002	0.0013 ANZEC MW 95%

Legend:

- Approximate Site Boundary
- Cadastral Boundary
- New Fishmarket Building Envelope

Sample Locations

- Soil Sample Location
- Soil Sample Location (Hand Auger)
- Groundwater and Ground Gas and Soil
- Groundwater and Ground Gas
- Sub-Slab Vapour Sample Location
- ACM Observed

JBS&G

Job No: 54578

Client: UrbanGrowth NSW

Version: R05 Rev A | Date: 01-Mar-2019

Drawn By: RF | Checked By: CB

Scale 1:1,200

0 20 40

metres

Coord. Sys. GDA 1994 MGA Zone 56

1A-C Bridge Road
Pyrmont, NSW

EXCEEDANCES IN GROUNDWATER FOR DATA GAP ASSESSMENT

FIGURE 5

Document Path: \\JBSG-NSW-FS01\Company Data\Projects\UrbanGrowth NSW\54578 Fishmarkets BMD DA RAP ASSMP CEMP\GIS\Maps\R05 Rev A\54578_05.mxd
Reference: www.nearmap.com - Imagery 20180415

Appendix 9: Soil and Water Management Plan

Soil and Water Management Plan

Document. No.: 18-3-003 – New Sydney Fish Markets
Document Revision.: 0.1
Revision Date: 31/03/2021

Approvals

	Name	Title	Signature	Date
Prepared by:	Robert Mitchell	Senior HSEQ Advisor		31/03/2021
Reviewed by:	Tanya Liddle	HSEQ Manager		31/03/2021
Approved by:	Ivan O'Connor	Construction Manager		31/03/2021

Table of Contents

1.0 Context 3
2.0 Scope 3
3.0 Objective 3
4.0 References 4
5.0 General 5
5.1 Vegetation Clearing 5
5.2 Construction Corridor Definition 5
5.3 **Translocation of Native Grass/Sod Material/Plants** 5
5.4 Soil Stripping 5
5.5 **Stabilisation** 6
5.6 Design Activities 6
5.7 Construction Activities 6
5.8 Topsoil Handling 7
5.9 **Matting Overlay Materials** 8
5.10 **Reinstatement of Improvements** 8
5.11 **Revegetation** 8
5.12 Creek Crossings 8
5.13 Dewatering 8
5.14 Severe Weather Preparedness 8
5.15 Off site stormwater flows 9
6.0 Potentially and/or Known Contaminated Sites 9
6.1 Site History Review and Preliminary Site Investigation 9
6.2 Site Assessment 10
6.3 Risk Assessment 10
6.4 Remediation 10
6.5 Validation 10
7.0 Unexpected Contamination 10
7.1 Segregation 10
7.2 Storage 11
8.0 Acid Sulphate Soils 11
8.1 Introduction 11
8.3 Segregation and Storage 12
8.4 Treatment 13
8.5 Sampling 13
8.6 Testing 13
8.7 Transportation of Acid Sulphate Soils 14
9 Transportation of non-Acid Sulphate Soils 14
10 Monitoring 15
11 Reporting 16
12 Revision History 16

1.0 Context

The New Sydney Fish Markets (nSFM) will be purpose built to expand and improve the functions of the existing Sydney Fish Market, which is the largest of its kind in the Southern Hemisphere. The new facility will be located within an improved public domain at the head of Blackwattle Bay, adjacent to the existing market, and provide linkages to surrounding areas and public transport.

In essence, the nSFM development comprise a 4-story structure, surrounded by several external precincts. These precincts include new foreshore promenades, wharves, outdoor dining areas, integrated public domain spaces and road upgrade works to bridge road.

The building itself will house a range of retail premises, wholesale facilities, auction rooms, offices and commercial space, the Sydney Seafood School, and various back-of-house facilities including car, truck, and coach parking spaces. The nSFM will be supported by state-of-the-art back-of-house plant and recycling/waste management facilities.

Throughout the course of the project, the existing Sydney Fish Market must continue to operate and trade without disruption. Due consideration will also need to be given to the various stakeholder and environmental sensitivities, as well as the significant authority interface and approvals requirements.

Ferrycarrig has been engaged to undertake the design and construction of an 11kV feeder route and temporary power, stormwater, culvert extensions and revetment works, combined services, service relocations, and Bridge Road upgrade works.

As part of the project a Soil and Water Management Plan is required to be prepared to address the construction stages involved in the works and be updated as required (as conditions change).

2.0 Scope

This SWMP details the environmental practices to be implemented to ensure that water pollution and erosion and sedimentation are avoided on the Project. The objective is to control sediment and erosion of soil materials and ensure no discharge of untreated sediment laden or contaminated water to catchment areas or stormwater drains. This procedure also details the practices used to ensure that contaminated land and other contaminated materials are managed correctly in the event they are known to be present on site or are unexpectedly discovered during works.

3.0 Objective

The objectives of this SWMP are to:

- Ensure appropriate soil conservation practices (management of erosion and sedimentation) are implemented and that stormwater runoff is effectively controlled.
- Minimise potential for erosion and subsequent sedimentation of water courses / bodies.
- Ensure adequate drainage and pollution control measures are implemented to manage runoff from disturbed areas of the site.
- Ensure materials that have the potential to be contaminants (including ASS/PASS soils) are not released to any waters either in a direct or indirect manner because of construction activities.
- Provide appropriate management measures required to handle contaminated soils and minimise the potential impact on the environment caused by any potential disturbance of contaminated soils.
- To ensure that:
  - Project sites are investigated to establish the presence of contamination
  - No unnecessary disturbance occurs to contaminated sites or potentially contaminated sites

- The construction processes do not cause contamination of the site.
- All contaminated material uncovered is managed in accordance with legal requirements
- Appropriately manage potential risks to human health and the environment.

4.0 References

Legislation:

- Protection of the Environment Operations Act (1997) and associated regulations
- Catchment Management Authorities Act 2003
- Contaminated Land Management Act 1997
- Contaminated Land Management Regulation 2008
- Coastal Protection Act 1979
- National Parks and Wildlife Act 1974
- National Parks and Wildlife Amendment Act 2010
- Native Vegetation Act 2003
- Plant Diseases Act 1924
- Plantations and Reafforestation Act 1999
- Biodiversity Conservation Act 2016
- Catchment Management Authorities Act 2003
- Noxious Weeds Act 1993
- Soil Conservation Act 1938
- Sydney Water Act 1994
- Sydney Water Catchment Management Act 1998
- Water Management Act 2000
- Environmental Planning and Assessment Act 1979 (EP&A Act)
- Environmental Planning and Assessment Regulation 2000
- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)
- Maritime Services Act 1935
- National Environment Protection Council (NSW) Act 1995
- Protection of the Environment Operations Act (Underground Petroleum Storage Systems)
- Work Health and Safety Act 2011 (WHS)
- Work Health and Safety Regulation 2011

Other:

- Acid Sulfate Soils Management Advisory Committee (ASSMAC) Acid Sulfate Soil Manual 1998
- Acid Sulphate Soils Remediation Guidelines for Coastal Floodplains in NSW 2007
- The NSW Acid Sulphate Soil Management Guidelines (ASSMAC,2009)
- Queensland Acid Sulphate Soil Technical Manual (QASSMAC 2009)
- SA EPA Guidelines Site Contamination – acid sulfate soil materials (Nov 2007)
- Water Quality Management Guidelines 2002
- Erosion and Sediment Control Standard Version 9 2000
- ANZECC Water Quality Guidelines for Fresh and Marine Waters (ANZECC, 2002)
- Water Quality Sampling Manual Third Edition 1999 Environment Protection Agency
- NSW Waste Classification Guidelines
- National Environmental Protection Council Schedule B: Guideline for the Investigation of Soil and Groundwater
- ANZECC/NHMRC 1992 Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites.
- Australian Government Department of Sustainability, Environment, Water, Population and Communities 2009

- National Environment Protection (Assessment of Site Contamination) Measure, National Environment Protection Council 2013
- RMS Guideline for the Management of Contamination September 2013 Page 20 National Health and Medical Research Council (NHMRC) 2011 Australian Drinking Water Guidelines (ADWG), 2011.
- Managing Urban Storm water, Soils and Construction, The Blue Book (4th Edition, Landcom 2004)

5.0 General

Contamination is defined as: 'the condition of land or water where any chemical substance or waste has been added at above background level and represents, or potentially represents, an adverse health or environmental impact' (NEPM, 2013).

5.1 Vegetation Clearing

All vegetation to be retained is to be clearly identified prior to clearing operations taking plant. Areas which are not to be disturbed are to be clearly delineated with a minimum delineation of temporary fencing.

No storage of materials, plant or equipment will be permitted under the dripline of trees to be retained.

Only vegetation required for the completion of the works will be removed. All suitable weed free (no camphor laurel, privet, etc.) vegetation will be chipped for use in landscaping activities.

Tree removal and management shall be in accordance with the project's Arborist tree management procedure.

5.2 Construction Corridor Definition

Prior to work, the construction corridor will be identified and established by clearly visible delineation. Following this, vegetation removal can occur (pending fauna spotter requirements). Re-instatement of areas will follow completion of all construction and will remain in place until re-instatement is completed. Mapping of vegetation assemblages along the project route will be undertaken prior to clearing or construction commencing. Sensitive vegetation areas will be fenced off.

5.3 Translocation of Native Grass/Sod Material/Plants

For some projects in sensitive environments, it may be necessary to relocate native grasses or plants. This will require the development of:

- A harvesting technique
- Delineation of suitable weed free zones
- Recipient location sites to be identified.

The extent and design of the translocation of grasses or plants are to be agreed upon with the client prior to work commencing.

5.4 Soil Stripping

Prior to any earthworks on site, an Excavation Permit is required to be completed. The clearing and stripping works will be staged so this work is carried out immediately prior to excavations and earthwork. Near water courses, excavation works will be undertaken at times of low flow.

Wherever possible, cleared surface will be left in a rough condition to assist the reduction of surface

runoff. Where topsoil materials are to be stripped, stockpile topsoil to assist in rehabilitation. Stockpiles are to be managed accordingly:

- Stockpiles of materials must do not exceed 4m in height
- Stockpiles of material are constructed and maintained to prevent cross contamination
- Suitable erosion and sediment controls are in place for stockpiles
- No stockpiles of soil or other materials shall be placed on footpaths or nature strips unless prior approval has been obtained
- All stockpiles of soil or other materials shall be placed away from drainage lines, gutters or stormwater pits or inlets;
- All stockpiles of soil or other materials likely to generate dust or odours shall be covered
- All stockpiles of contaminated soil shall be stored in a secure area and be covered if remaining more than 24 hours.
- Replace subsoil layers in reverse order to original stripping and to the prescribed depths and compaction.

5.5 Stabilisation

Vegetation is an ideal and usually inexpensive method of stabilisation because it reduces soil erosion hazards by:

- Absorbing the impact of raindrops
- Reducing volume and velocity of run-off
- Binding the soil with roots
- Protecting the soil from wind erosion.

To ensure rehabilitation progresses adequately:

- Ensure that no vehicle traffic occurs over weed infested areas (where this is unavoidable it may be necessary to set up a wheel wash facility at the project site on exit from weed infested areas)
- Cut trees to be removed and grind stumps to ground level to minimise soil disturbance
- Segregate inappropriate vegetation (weed species) prior to chipping/mulching and reuse.

5.6 Design Activities

The proposed stormwater disposal and drainage for the development will be designed in accordance with:

(i) Australian Rainfall and Runoff-A Guide to Flood Estimation, Volumes 1 and 2 (1987)

(ii) (ii) SA/NZS 3500.3.2 National Plumbing and Drainage Part 3.2: Stormwater Drainage - Acceptable Solutions;

5.7 Construction Activities

Construction activities will be programmed to minimise the area of disturbed ground that is exposed to erosion at any time. Works will be staged to minimise exposure of soils to erosion. Vegetation shall be retained as much as possible. No clearing will be allowed outside the limits of the works. Works shall limit as far as practical the disturbance to water ways and drainage lines. Disturbed areas will be progressively re-vegetated as soon as practicable.

All soil erosion and sediment controls will be planned and installed prior to the start of any works that will disturb soils. Erosion and Sediment Controls will be covered in Ferrycarrig EWMS, Inductions and will be communicated to all site personnel prior to starting on site. Erosion and sediment controls are required for all project areas where soil erosion and sedimentation impacts are potential.

Measures such as temporary storage, filter barriers, dissipaters, silt fences, straw bales and kerb filter socks shall be installed on all road drains and around access points. Erosion and sediment controls at waterway crossings (i.e. waterway barrier works) will include silt fencing and straw bales along waterways in a multibarrier system, to prevent sediment reaching waterways.

Construction barrier bunds shall be constructed to divert water around disturbed work areas. Pumping of water around construction zones may be necessary for significant water flows. Where water is pumped around the construction zone precautions should be taken to avoid scour and turbidity at the discharge point (e.g. in shallow water affix geofabric to bed at discharge point).

Sediment controls shall be installed in accordance with relevant guidelines and standards for the installation of such controls. These shall be continuously maintained to filter sediment from site runoff. Sediment shall be removed from all sediment controls where the accumulated sediment has reduced the capacity of the structure by 30% or more. Sediment controls shall be maintained regularly, and controls replaced immediately when deteriorated or damaged.

The sediment removed will be disposed of in such locations that the sediment will not be conveyed back into watercourses. These areas include subsoil stockpiles, trenches, backfill batters etc. Suitable access to sedimentation control structures will be maintained to allow cleaning out in all weather conditions.

Rock rumble/shaker grids or equivalent will be provided at all site access/egress points where there is a risk of dust/dirt/mud being tracked onto public roads. Concrete truck washouts will occur greater than 50m from any watercourse or drainage line and waste concrete materials will be removed to concrete recyclers.

Sediment and erosion controls shall not be removed from their respective locations until rehabilitation is completed.

All relevant controls will be further developed or updated as required upon further development of the design and construction methodology.

5.8 Topsoil Handling

Reuse topsoil material within 1 week of stripping, where possible. If it is to be stored for longer than 1 week, covers may be considered to prevent wind and rain erosion for stockpiles. Cover with a sterile crop if stockpiled for longer than 3 months. Cover crops that may typically be applied are shown in Table 1 as are the rates that may be applied.

Table 1 – Cover Crops

Description	Species Composition	Sowing Rate
Pasture Grass	Lolium, Festuca, Phalaris, Trifolium spp	75 kg/ha (hydro) 50 kg/ha (direct)
Road Verge	Lolium, Festuca, Phalaris, Trifolium spp	75 kg/ha (hydro) 50 kg/ha (direct)
Sterile Cover Crop	Jap Millet, Rye Corn	100 kg/ha (hydro) 50 kg/ha (direct)

5.9 Matting Overlay Materials

These materials are to be used in channel sections where creek channels are to be crossed. The material is to be 100% coconut fibre of similar organic product.

Matting is to be pegged at 1 metre centres with at least 150mm overlap on the vertical sections and 300mm overlap on the horizontal sections.

5.10 Reinstatement of Improvements

All damaged improvements such as lawns, driveways, paths and plantings shall be negotiated with the landowner, the relevant road authority and the local relevant council prior to disturbance. In general the areas should be reinstated back to the pre-disturbance status. No trees shall be planted over pipelines without the approval of the asset owner.

Weeding and management of the reinstated areas shall continue for the duration of contract's warranty period.

5.11 Revegetation

Revegetation is best carried out under qualified supervision taking into consideration the following: Stockpile Management

Stockpile all soil materials in separate horizons as they are removed. Stockpiles are to be no greater than 3 metres in height and should be re-spread as soon as possible – maximum 3 months placement. If stockpiles are to be in place longer than 3 months, a crop cover (as per section 4.7) may be required.

Stockpiles are to be protected from erosion by wind and rain. Temporary sediment control fences will be installed on the downslope side and diversion drains on the upslope side of all stockpile sites.

Stockpiles will not be placed in drainage channels, creek lines (within 1 in 5 year flood line), or within 2 metres of roads, fences or closer than 5 metres to any vegetation that is to be retained.

5.12 Creek Crossings

At all crossing points, maintain creek flow during construction where possible. Rehabilitate areas as soon as works are completed. Replace rock and creek line vegetation to ensure the environment is returned as close to possible to its pre existing condition.

5.13 Dewatering

Where dewatering is required, refer to 'Dewatering Procedure 10-3-001**'.**

5.14 Severe Weather Preparedness

In the event of/or forecast of severe weather the following precautions should be implemented at a minimum:

- Severe Weather Identification – Identification of the weather system approaching and identification of potential outcome of the weather system (i.e. high winds, heavy rains, lightning etc.). This identification should be made with the support of the latest available information from the Bureau of Meteorology (BOM).
- Site specific plans will be incorporated on site when weather forecasts are reviewed to manage stormwater and flood flows for small and large sized events, including but not limited to 1 in 1-year ARI, 1 in 5-year ARI and 1 in 100-year ARI.
- Risk Evaluation – Based on the identification of the weather system and latest information from BOM, a risk evaluation should be completed for the site and a determination of appropriate treatments should be formulated.

- Weather Treatments – A list of weather treatments formulated in the process of the risk evaluation should include immediate short term, mid-term, and long-term measures where appropriate to ensure the stability of the site and the protection of the environment to the greatest extent practicable based upon the type of severe weather anticipated. Measures should include appropriate controls to effectively mitigate risks to; pavement or hardstand areas, earthworks and excavations, batters or embankments, culverts and stormwater inlets, drainage systems, surface waters, and general environmental protection. Such controls would include:
    - Sediment controls to prevent surface erosion and surface runoff to stormwater and the bay.
    - Battering of excavations and slopes to prevent stockpile run off.
    - Implementation of FIFM controls as agreed with Sydney Water.
    - Temporary back fill of excavations to minimise ponding on site.
    - Laydown areas of equipment and materials etc to positioned on high ground above flood mark.

- Rectification and Recovery – Following a return to site, rectification of site environmental controls and a recovery of site to acceptable environmental standards shall occur prior to the re-commencement of works.
- Contact Personnel – A list of responsible persons for the project found in the CEMP for the project shall be available onsite in an accessible location so that all personnel on site are aware of whom to contact and able to do so.

5.15 Offsite - Stormwater flows

The existing stormwater networks consists of stormwater inlets on bridge road, the stormwater network on bridge road connects to the culverts which discharge to Blackwattle Bay.
The stormwater inlets will be protected from potential stormwater runoff from site.
Stormwater runoff from site will be controlled through sediment and erosion controls and where possible will be contained on site where FC dewatering procedure will be followed. A detailed sediment control methodology for offsite flow will be developed as required upon further development of the stormwater design.

6.0 Potentially and/or Known Contaminated Sites

6.1 Site History Review and Preliminary Site Investigation

The first stage of contaminated site assessment involves establishing a site history of Potentially Contaminating Activities (PCAs). This Site History Review involves the collation of information, from various sources, to determine if the site is, or may have hosted, or is likely to have been impacted by, a potentially contaminating activity. Where a site history review clearly demonstrates that site activities have been non-contaminating this information can be used to justify not progressing with further assessment.

However, where there is an indication that the land may potentially be contaminated, because of current or past PCAs, a Preliminary Site Investigation (PSI) should be conducted by a suitably qualified and experienced consultant. A PSI usually includes a desktop study to identify the site characteristics (site location, site layout, building construction, geological setting, historical land uses and activities at the site and on adjacent sites) and a site inspection (including interviews with site representatives).

The PSI should be sufficient to determine contaminants of concern and identify areas of potential contamination, including all areas of potential contamination sources. The PSI may also include

initial sampling to provide a preliminary assessment of site contamination and need for further investigation.

6.2 Site Assessment

The investigations work done to date include extensive utility locating and potholing along the 11kv feeder route on bridge road. Soil samples have been taken and sent for laboratory testing to determine soil classification along the route.

Further site investigations are still to be conducted as required once possession of the fish markets site is taken.

The site assessment should:

- be undertaken in accordance with the NEPM; and
- be undertaken by professionals who have the relevant qualifications, competencies and experience for the site contamination issues under investigation.

6.3 Risk Assessment

A risk assessment is undertaken to establish baseline risks and to determine whether site remediation or other action is required and to determine a tolerable level of contaminants that can remain in place whilst adequately protecting health and ecological values. Site specific response levels are determined for contaminants of concern at the site and compared with laboratory results. If results are lower than the response levels no further action will be required. If results are higher than response levels a Remediation Plan must be developed.

6.4 Remediation

Remediation is to be undertaken as per an approved Remediation Plan. This plan is to be approved by the QHSE Manager and be developed in line with the site and risk assessments. The Remediation Plan is a site-specific document.

6.5 Validation

At the completion of site remediation, validation sampling will be undertaken and compared with the appropriate investigation or response levels to determine remediation success. A Remediation Validation Report is then prepared.

7.0 Unexpected Contamination

7.1 Segregation

Where unexpected contamination is encountered, the area of suspected contamination will be delineated and further testing to confirm contamination and type of contamination will be conducted.

Once an area containing contaminated soil is fully delineated the soil is to be removed in layers corresponding to it classification. To ensure all the contaminated soil is removed 50-100mm of clean soil vertically and horizontally is to be included in the excavated contaminated soil. It must be noted that this mixing of layers will always result in the material being classified as the highest classified substance within the stockpile, as a result, mixing of profiles in any other circumstances is not recommended.

7.2 Storage

If the storage of contaminated soil is permitted on site by the landowner and relevant environmental approval (EIS, REF, SEE, EA etc.) the following will apply:

- The contaminated soil must be placed on a fully bunded pad that is covered.
- Preliminary testing of the contaminated soil may be required before stockpiling and potential treatment occurs, the Project Engineer is to be contacted prior to stockpiling for confirmation
- Untreated contaminated soil must be removed from site as soon as practicable.
- Stockpiles are to be no greater than 4m in height at any time
- Drains are to be constructed upslope of the treatment area to divert water away from the contaminated soil stockpile.

8.0 Acid Sulphate Soils

8.1 Introduction

Acid Sulphate Soils (ASS) and Potential Acid Sulphate Soils (PASS) are naturally occurring sediments which may be found in low lying areas near waterways swamps and wetlands. Environmental risk is associated with Potential Acid Sulphate Soils relates to when it is exposed to air by either excavating or the lowering of water tables the soil profile can oxidize to generate sulphuric acid. The acid generation and subsequent mobilization of metals can cause fish kills, vegetation death, contamination of groundwater and corrosion of concrete and metal infrastructure.

8.2 Identification

ASS is predominantly located around coastal lying areas. Before construction works begin site supervisors are to review the contents of the CEMP as previous testing may have identified existing ASS conditions. If the CEMP details the presence of ASS, the location and depth is to be clearly pegged/ marked onsite by the project Engineer. A site-specific ASS Management plan should be developed and followed as preference.

If no testing has occurred, the site supervisor should contact the QHSE Manger to ensure no further testing is required. If testing is required, no excavation works are permitted until testing has been conducted.

In all circumstances including where no further testing is required the site supervisor and Project Engineer are to remain vigilant for the following signs of ASS.

1. *Mottling of the profile. This is the combination of two profiles in a blotched or mottled arrangement. This is usually present in the B horizon (second layer form the surface). This is commonly associated with acid sulphate soils.*



2. *Strong Organic "sulphurous smell" (similar to rotten eggs), sulphur is the main active element which causes the disassociation of Hydrogen to produce an acid, as a result sulphur is commonly smelt initially when ASS is encountered.*

3. *The presence of marine sediments or shells, despite the fact that shells will have a neutralising effect on the acid producing soil, shell and items commonly found in marine environment are key indicators which are also commonly associated with ASS.*

If no further testing was recommended for the site and the above signs are noticed works are to stop and the Project Engineer & MPX personnel informed.

If testing areas have been identified by previous ASS testing and signs of ASS are identified outside the designated area, excavation is to halt and MPX personnel and the Ferrycarrig HSEQ called for further instruction.

8.3 Segregation and Storage

Once the area containing ASS soil is fully delineated the soil is to be removed in layers corresponding to it classification. To ensure all ASS is removed 50-100mm of clean soil vertically and horizontally is to be included in the excavated ASS. It must be noted that this mixing of layers will always result in the material being classified as the highest classified substance within the stockpile, as a result mixing of profiles in any other circumstances is not recommended.

If the storage of ASS soil is permitted on site by the landowner the following will apply:

- ASS soil must be placed on a fully bunded pad that is covered with a minimum of 5 kg lime/m^2 prior to soil stockpiling (pending the strength of the ASS/PASS greater applications may be required).
- The treatment pad must be fully bunded with sufficient free board in the bund to contain rainfall from storm events without risk of overflow. Both the pad and the bunding should be limed at a rate of no less than 5 kg/m^2 pending the strength of the ASS/PASS. The area should not be placed in flood prone zones where and when possible. In low lying areas the bund height should be sufficient to not be inundated by flooding events.
- Preliminary testing of the PASS may be required before stockpiling and treatment occurs, the Project Engineer is to be contacted prior to stockpiling for confirmation.
- ASS soil treatment pad must contain a sump in the lowest point of the area to catch all runoff from the pad. The water collected within the sump can only be pumped out if water is within ph6.5-8.5, turbidity is less than 20ntu and all other water quality requirements stated in the CEMP are met.
- Untreated ASS soil must be treated within 3 days and covered overnight.
- Stockpiles are to be no greater than 4m in height.

- Drains are to be constructed upslope of the treatment area to divert water away for the site.

Segregation and storage methods of ASS will be further developed or updated as required upon further development of the construction methodology.

8.4 Treatment

ASS soil is to be treated with fine grade agricultural lime at the rates specified by the laboratory testing, site engineers may be required to convert liming rates to simplified ratios based on the size of the excavator's bucket. Operators are to be tool boxed on these rates to ensure over or under dosing of lime does not occur.
Treatment is to occur by leveling the stockpile to no thicker than 500mm and applying lime at the specified rate. Once distributed the lime is to be worked into the soil until uniform mixing is achieved.

Soil is not to be reused or taken from site until validation testing has been undertaken by a trained person and the material is confirmed to be neutralized.

Treatment methods of ASS will be further developed or updated as required upon further development of the construction methodology.

8.5 Sampling

1. Collecting Samples: All equipment is to be clean and dry.

   Note: Trace amounts of sulfuric material from previous sampling may contaminate a sample that has no sulfides present, resulting in a false positive test.

2. Sample from the treated material a sample size 40 grams at a minimum of once per 50 cubic meters or 4 samples for any project having less than 50m3 in total. (See ASSMAC guideline located in the IMS for further details). Sample from top of pile, mid and lower sections of pile.

3. Remove large shells, stones and fragments of wood, charcoal and record removed contents. Small roots must be removed, as they contain sulfides and will contaminate the sample.

4. Place in a leak proof, temperature tolerant container and minimise the samples contact with air and moisture. Label with date time location and depth. Place in a cooler with dry ice or frozen bricks, preferably at 4oc or below.

5. Field Tests are preferentially done within 24 hours. If not, samples are to be frozen until dispatch.

6. Field tests are to be taken once every 50 cubic meters. See below for details.

8.6 Testing

ASS screening test (pH f)

Weigh 10 g of soil and mix with 40 ml of distilled water (use scientific scales 0.01gm accuracy)

- Stir for 30 seconds to create a homogenous mixture.
- Insert calibrated pH probe and record results

PASS screening test (pH fox)

- Weigh 10g of soil

- Check the pH of the 30% Hydrogen Peroxide solution is between 4.5-5.5, raising or lowering the pH can be done using either NaOH or HCL.
- Next with an eyedropper place two ml of a 30% solution of Hydrogen Peroxide on the 10 gm of soil
- Stir soil for 30 seconds to create a homogenous mixture
- Allow at least 30 minutes for the reaction to finish, keep longer if reaction processes such as fizzing are still evident
- Mix soil with 40ml of distilled water
- Insert pH probe and record the result

After addition of peroxide make note of temperature and colour changes, commonly reactions will emit heat and gases. Reaction intensity and odour must be recorded as the reaction takes place.

Results will be analysed based on

- **Parent material/ soil description**
- **initial moisture content**
- **presence of buffering material such as shells**
- **reaction intensity/odours/temp change/gas emissions and colour change**
- **pH change**

Soil is considered treated if pH (f) >5.5 and the pH (fox) is between pH 5.5-8.5. If the results fall outside these values untreated soil or additional lime will be added and retested before the soil is taken offsite.

The results will then be recorded in hardcopy

If deemed necessary by the client, 1:10 samples will be sent to the laboratory for confirmatory analysis by SPOCAS.

8.7 Transportation of Acid Sulphate Soils

Vehicles transporting ASS/PASS are to be fully covered when operating on public roads, onsite transportation uncovered may be allowed if approval is given by the Project Manager.

- Trucks are to be clean and free of debris when transporting ASS offsite.
- Preference is given onsite treatment and reuse. However, if ASS soil must be removed from site it can only be taken offsite after the soil has been treated and verified.
- Disposal can only be undertaken at licensed ASS handling landfills
- Prior to transportation offsite the project manager is to check with the QHSE Manager if any transportation license is required.
- Soil classified as contaminated and ASS will need to be classified for contamination and disposed of as per its contamination classification, i.e., Hazardous/ASS.

9 Transportation of non-Acid Sulphate Soils

Vehicles transporting contaminated soil are to be fully covered when operating on public roads, onsite transportation uncovered may be allowed if approval is given by the Environmental Representative.

- Trucks are to be clean and free of debris when transporting contaminated soil offsite.

- Disposal can only be undertaken at licensed waste handling landfills
- Prior to transportation offsite the project manager is to check with the Environmental Representative if any transportation licenses are required.
- Soil classified as contaminated will need to be classified for contamination and disposed of as per its contamination classification, i.e. hazardous.

10 Monitoring

Site inspections will be carried out by the Environment Representative and the Site Supervisor during excavation, storage and transport of contaminated materials. The works shall be monitored on an ongoing basis.

The results of all inspections and monitoring activities shall be recorded. Regular inspections of the site (including plant and construction activities) in respect of possible ground contamination will also be done and recorded.

Water quality monitoring for pH and turbidity shall be conducted in all nearby water bodies on a weekly basis or after a rainfall event exceeding 10mm in a 24 hour period. Results are to be recorded. Testing of the water quality (suspended solids, turbidity and contaminants) prior to discharging from the site to be in compliance with Managing Urban Stormwater - Soils and Construction Volume 1 (4lh Edition March 2004) and Conditions C24, C25 and C26 of SSD-8925.

Environmental auditing will be undertaken from time to time by the HSEQ Manager who will assess compliance to this procedure.

The Project Engineer and the Site Supervisor will monitor erosion and sediment control to ensure that water bodies adjacent the work site are well protected, and the findings recorded**.** Erosion and pollution controls will be inspected after rainfall events exceeding 10mm in 24 hours, and during periods of prolonged rain. Water discharge limits shall be in accordance with ANZECC Water Quality Guidelines for Fresh and Marine Waters (ANZECC, 2002).

The frequency and type of monitoring under this SWMP is shown below in Table 2.

Table 2 - Monitoring Frequency

Control Parameter	Monitoring Frequency	Responsibility	Target Level	Record
Soil stripping/ stockpiling	Regular site inspections. European and aboriginal heritage monitors as required	Project Engineer/Site Supervisor/ Foreman	Stockpile locations and heights as per ECP **14-3-003** Soil stripping as per ECP **14-3-003** Possible European and aboriginal heritage monitors as required for initial earthworks in first 100mm of soil in any area of work.	Daily Site Diary
Silt fences/	Weekly and after periods of heavy rain	Project Engineer/Site	To ensure no pollution of water courses.	Daily Site Diary

Control Parameter	Monitoring Frequency	Responsibility	Target Level	Record
erosion controls	(>10mm in 24 hours),	Supervisor.		
Water Quality	pH, turbidity and oil and grease (visual). One background sampling instance per week in the waterway (downstream and upstream of the Project) and after rainfall exceeding 10mm in 24 hours. Every dewatering instance. ***Note: Background monitoring sample must be collected at least 100m from the nearest point of works.***	Project Engineer/Site Supervisor.	pH 6.5 – 8.5 Turbidity <20ntu No visible oil and grease Turbidity and pH can be tested with litmus paper or turbidity tubes or meters if meters are used Calibration is to be performed monthly on all pH and turbidity meters. Please refer to the Instruction Manual Folder in the IMS. For further details contact the FC QHSE Manger.	Background Monitoring Log Dewatering permit
Dirt/Mud on Roads	Visual monitoring during work hours	Site Supervisor	No mud tracked on to roads	Daily Site Diary
Rehabilitation	Weekly inspection of reinstated areas or following rain greater than 10mm per 24 hours	Project Engineer/Site Supervisor.	Cover factor of at least 50% to be maintained. Weeds to be controlled.	Daily Site Diary

11 Reporting

In the event of a breach of this SWMP, an improvement opportunity or non-conformance can be raised by anyone in the organization.

All complaints / incidents regarding erosion and sediment control and the management of water quality shall be reported to MPX, the Ferrycarrig Project Manager, the Ferrycarrig HSEQ Manager and an Incident Report shall be completed.

12 Revision History

Rev	Date	Description of Change	Approved
0.1	31/03/2021	- First Document Version	Y

Appendix 10: Hazardous Materials Management Plan

Hazardous Materials Management Plan

New Sydney Fish Market (Stage 2) Construction Works

Prepared for:
Multiplex
22 Bridge Road
Glebe NSW 2037

11 March 2021

Distribution

Hazardous Materials Management Plan,
New Sydney Fish Market (Stage 2) Construction Works

11 March 2021

Revision	Status	Recipient	Copies
0	Final	Mitch Pelling Senior Project Engineer Multiplex	PDF/ Hard Copy

Disclaimer and Limitations

1 *This document is confidential and has been prepared by Senversa for use only by its client and for the specific purpose described in our proposal which is subject to limitations. No party other than Senversa's client may rely on this document without the prior written consent of Senversa, and no responsibility is accepted for any damages suffered by any third party arising from decisions or actions based on this document. Matters of possible interest to third parties may not have been specifically addressed for the purposes of preparing this document and the use of professional judgement for the purposes of Senversa's work means that matters may have existed that would have been assessed differently on behalf of third parties.*

2 *Senversa prepared this document in a manner consistent with the level of care and skill ordinarily exercised by members of Senversa's profession practicing in the same locality under similar circumstances at the time the services were performed.*

3 *Senversa requires that this document be considered only in its entirety, and reserves the right to amend this report if further information becomes available.*

4 *This document is issued subject to the technical principles, limitations and assumptions provided in* ***Section 10.0.***

Senversa Pty Ltd
ABN: 89 132 231 380
Level 5, The Grafton Bond Building, 201 Kent St, Sydney NSW 2000
tel: + 61 2 8252 0000; fax: + 61 3 9606 0074
www.senversa.com.au

Primary Author	**Zoe Smith** Senior Environmental Scientist	Project Manager	**Emma Walsh** Senior Associate Environmental Scientist
Technical Peer Review	**Alex Latham** Principal	Project Director	**Jason Clay** Senior Principal

Contents

List of Acronyms iv

1.0 Introduction 1

1.1 Background and Context 1

1.1.1 Development 1

1.1.2 Environmental Management 1

1.2 HMMP Objective 2

2.0 Environmental Management Requirements 4

2.1 Key Relevant Legislation and Guidelines 4

2.2 Relevant Conditions of Approval 5

2.3 Other Relevant Conditions 6

3.0 Potential Hazardous Material Characteristics 8

3.1 Hazardous Building Material Overview 8

3.2 Asbestos Containing Material 8

3.3 Lead based Paint 9

3.4 Synthetic Mineral Fibres 9

3.5 Polychlorinated Biphenyls 9

3.6 Ozone Depleting Substances 9

4.0 Offsite Disposal 10

5.0 Removal Works Management 11

6.0 Asbestos Management Plan 12

6.1 Asbestos Removal Control Plan 12

6.2 Management of Asbestos Removal Process 12

6.2.1 Defining the work area 12

6.2.2 Notification 12

6.2.3 Plant Performance 12

6.2.4 Removal Procedure 12

6.2.5 Air Monitoring and Exposure Standards 13

7.0 Storage and Handling of Hazardous Chemicals 15

7.1 Spills 15

8.0 Environmental Control Measures and Compliance 16

8.1 Roles and Responsibilities 16

8.2 Human Health 16

8.3 Training 17

8.4 Site Access Controls 17

8.5 Monitoring and Inspection 17

8.6 Auditing 17

8.7 Reporting 17

8.8 Non-conformance 17

9.0 Review and Improvement 18

10.0 Principles and Limitations of Investigation 19

Table 2.1: Key Relevant Legislation, Regulations, Guidelines and Policy 4

Table 2.2: Relevant CoA 5

Table 2.3: Other Conditions 6

Table 8.1: Roles and responsibilities 16

Figures

Figure 1: Site Location Plan

Appendix A: JBS&G (2020) Hazardous Materials Survey and Photos of Southern Land Portion of the Site

List of Acronyms

Acronym	Definition
ACM	Asbestos Containing Material
AMP	Asbestos Management Plan
ARCP	Asbestos Removal Control Plan
AS	Australian Standard
ASS	Acid Sulfate Soil
ASSMP	Acid Sulfate Soil Management Plan
ANZECC	Australian and New Zealand Environment and Conservation Council
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CEMP	Construction Environmental Management Plan
CoA	Conditions of Approval
CoPC	Contaminant of Potential concern
CLM Act	*Contaminated Land Management Act 1997*
DMP	Dewatering Management Plan
EMS	Environmental Management System
EPA	Environment Protection Authority (NSW)
HBM	Hazardous Building Materials
HMMP	Hazardous Materials Management Plan
HMRMP	Hazardous Materials Removal Management Plan
LP	Lead Paint
NEPC	National Environment Protection Council
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
OCP	Organochlorine Pesticides
ODS	Ozone Depleting Substances
OPP	Organophosphorus Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PC	Principal Contractor
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethene

Acronym	Definition
PFAS	Per- and Polyfluoroalkyl Substances
PPE	Personal Protective Equipment
RAP	Remedial Action Plan
RPD	Relative Percentage Difference
SAR	Site Audit Report
SAS	Site Audit Statement
SDS	Material Safety Data Sheet
SWMP	Soil and Water Management Plan
SMF	Synthetic mineral fibres
SWMS	Safe Work Method Statements
UFP	Unexpected Finds Protocol
UST	Underground Storage Tank
WMP	Waste Management Plan

1.0 Introduction

The NSW State Government engaged Multiplex as the Principal Contractor (PC) to construct the new Sydney Fish Market (Stage 2). The project is located at 1A-1C Bridge Road, Glebe and part of 56-60 Pyrmont Bridge Road, Pyrmont NSW; herein referred to as the 'site' (shown on **Figure 1**).

Senversa has been engaged by Multiplex to prepare a Hazardous Materials Management Plan (HMMP) for the New Sydney Fish Market (Stage 2) project. The HMMP forms part of the Construction Environmental Management Plan (CEMP[1]) prepared by Multiplex. The HMMP documents management procedures and controls to remove, handle and dispose of hazardous building materials from all buildings/above ground structures and from on-site soil as part of the Fish Market Stage 2 project.

1.1 Background and Context

1.1.1 Development

In June 2020, the New Sydney Fish Market was declared a State Significant Development (SSD 8925) under Section 5.1 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The development broadly comprises the construction, use and operation of a new Sydney Fish Market.

The development application was approved by the Minister for Planning and Public Spaces on 12 June 2020 subject to conditions of approval (CoA), further discussed in **Section 2.2**.

1.1.2 Environmental Management

The overall Environmental Management System (EMS) for the project is described in Section 2 of the CEMP and has been designed by Multiplex to align with the standards noted below. The EMS consists of environmental plans, including this HMMP, and the procedures, protocols, and tools as set out in the CEMP. The CEMP has been developed to document the overarching environmental management strategies and procedures that will be adopted during construction of the project to meet:

- Quality Management Systems (AS/NZS ISO 9001)
- Environmental Management Systems (AS/NZS ISO 14001:2015)
- Occupational Health and Safety Management Systems (AS/NZS 4801:2001)

The CEMP applies to all construction works associated with the project and consists of:

- An overview of the EMS.
- Organisation structure for environmental management.
- Legislative requirements.
- Sub-plans to manage processes.
- Processes to monitor and evaluate environmental performance.

The HMMP forms part of the Multiplex environmental management framework for the project, as described in Section 2.2 of the CEMP. An outline of the various management sub-plans in the CEMP is provided in **Figure 1-1** (below).

[1] Multiplex (2021), Construction Environmental Management Plan – New Sydney Fish Market, undated.

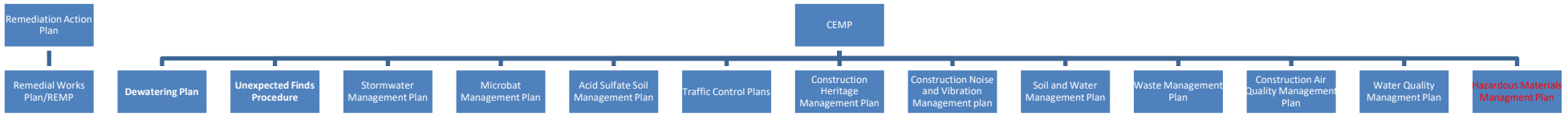
The preparation and implementation of a HMMP is a CoA (refer Section 2.2). Preparation and implementation of the HMMP also forms a condition of Site Audit Statement (SAS[2]) and associated Site Audit Report (SAR) prepared under the *Contaminated Land Management Act 1997* (CLM Act) for the site. Further discussion of these conditions and requirements is provided in **Section 2.0**.

1.2 HMMP Objective

The HMMP aims to mitigate potential environmental and human health impacts associated with hazardous materials that may be encountered during construction works.

[2] Tom Onus – Ramboll (2020), Site Audit Statement – Revised Remediation Action Plan, The New Sydney Fish Market, Pyrmont NSW, dated 13 August 2020.

Figure 1-1 – Fish Market Construction Project EMS



2.0 Environmental Management Requirements

2.1 Key Relevant Legislation and Guidelines

The CEMP (Section 1.8) identified relevant legislation, regulation, guidelines and approvals, licences and permits, with key references relevant to the HMMP listed below.

Table 2.1: Key Relevant Legislation, Regulations, Guidelines and Policy

Reference	
Legislation	
• *Contaminated Land Management Act 1997.*	• *Protection of the Environment Operations Act 1997.*
• *Environmental Planning and Assessment Act 1979.*	• *Ozone Protection Act 1989.*
• *Waste Avoidance and Resource Recovery Act 2001.*	
Guidelines and Standards	
• *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG, 2018) (note: these guidelines supersede ANZECC (2000) referenced in CoA).	• NSW EPA (2014) Waste Classification Guidelines.
• National Environment Protection Council, 1999. National Environment Protection (Assessment of Site Contamination) Measure, amended 2013 (ASC NEPM).	• Safe Work Australia, 2018. Code of Practice: How to safely remove asbestos.
• NSW EPA (1995) Contaminated Sites: Sampling Design Guidelines, September 1995.	• NSW EPA – Transport and Tracking Waste Guidance.

2.2 Relevant Conditions of Approval

The CoA relevant to this HMMP are listed in **Table 2.2** below.

Table 2.2: Relevant CoA

CoA No.	Condition Requirements	Applicability
B80	*"(b) provide details demonstrating compliance with the relevant legislation, particularly with regard to the removal of asbestos and hazardous waste, the method of containment and control of emission of fibres to the air."*	Applies to all works across the site .
B93	*"Prior to the commencement of works, the Applicant must engage an EPA-accredited Site Auditor to prepare interim audit advice which comments on:* *(a) The Data Gap Assessment- The New Sydney Fish Market 1A to 1C Bridge Road, Glebe NSW, Revision A (dated 12 March 2019) prepared by JBS&G Australia Ply Ltd for UrbanGrow1h NSW Development Corporation which comments on the appropriateness of the assessment and the assessment's conclusions.* *(b) Whether the characterisation of the site is sufficient to ensure any asbestos containing materials in soils and at ground surface are managed appropriately; NSW Government Department of Planning, Industry and Environment 23 New Sydney Fish Market - Stage 2* *(SSD 8925).* *(c) Whether the Hazardous Materials Management Plan, prepared by JBS&G (dated 8 April 2019), requirements for managing asbestos at ground surface and in soils are appropriate."*	Applies to all works across the site.
B95	*"The Applicant must adhere to the management measures accepted or recommended by the site auditor."*	Refer to Section 2.3 below.
B96	*"Prior to the commencement of demolition works, an updated Hazardous Materials Management Plan (HMMP) prepared by a suitably qualified person, shall be submitted to the Certifier. The HMMP must be prepared in consultation with the EPA and SafeWork NSW. The HMMP must:* *a) ensure the development complies with the NSW Occupational Health and Safety Regulation 2001 and Part 7 of the Protection of the Environment Operations (Waste) Regulation 2014;* *b) be consistent with Safe Work Australia's codes of practice How to Safely Remove Asbestos 2011 and How to Manage and Control Asbestos in the Workplace 2011;* *c) identify any known or potential areas of concern on site for hazardous and asbestos containing materials;* *d) outline the procedures for identification, handling and disposal of hazardous materials:* *e) include an Asbestos Management Plan:* *f) ensure that all hazardous materials would be handled and disposed of by suitably qualified and licensed experts in accordance with the relevant guidelines and legislation:* *g) ensure an induction process is in place for site workers and visitors regarding the identification of hazardous and asbestos containing materials and the formal procedures to be followed if such materials are identified on site:* *h) include a suitable airborne asbestos fibre monitoring program for all asbestos removal works areas: and* *i) outline the procedures for validation and inspection following the completion of asbestos removal works and issuing of asbestos clearance certificates* *j) be guided by the processes and procedures outlined in the Hazardous Materials Management Plan, prepared by JBS&G, dated 8 April 2020 and the SEPP 33 Assessment, prepared by RiskCon Engineering, dated 18 April 2019.* *Prior to the commencement of works, details demonstrating compliance with the above requirements (Condition B77 (a)-(j)) must be submitted to the Certifier. A copy of the HMMP must be submitted to the Certifier, EPA, Safework NSW and the Planning Secretary.* *Prior to the commencement of works, a copy of the HMMP must be submitted to the EPA, SafeWork NSW and the Department."*	Applies to all works across the site.

CoA No.	Condition Requirements	Applicability
B97	*"The Applicant shall comply with any notification requirements to SafeWork NSW concerning the handling and removal of any asbestos."*	Applicable where asbestos is identified.
C18	*"Should any new information come to light during demolition or construction works which has the potential to alter previous conclusions about site contamination, the Department must be immediately notified, and works must cease. Works must not recommence on site until the Department confirms works can recommence."*	Applies to all works across the site.
C36	*"Any hazardous materials, including asbestos, must be identified before demolition work commences and be removed in a safe manner."*	
C37	*"Removal of asbestos and other hazardous building materials must be undertaken by a suitably licensed contractor and an asbestos clearance certificate must be provided before waste classification, disposal or site validation is undertaken."*	Applies to all works across the site.

2.3 Other Relevant Conditions

Other requirements or conditions in approved documents relevant to this HMMP are listed in **Table 2.3** below – these do not include related requirements under the CEMP or sub-plans (e.g. UFP).

Table 2.3: Other Conditions

Reference	Condition Requirements	Applicability
Remediation Action Plan (RAP[3])	The RAP outlined the following requirements of site management and remediation works that have been considered in the development of this HMMP: • *Prevent exposure of contaminated soil, sediment and groundwater to the human population whilst occupying, working on or using the site.* • *Appropriately manage and/or dispose of soil, water and sediment waste disturbed during development activities in accordance with relevant EPA guidelines.* • *Removal of potential ongoing sources of environmental contamination (unexpected finds such as historical sub-surface petroleum storage, if encountered);* • *Given asbestos in soil has not currently been identified during limited intrusive investigation activities, should asbestos be identified, its occurrence will be assessed and managed via application of the Unexpected Finds Protocol outlined in Section 8.6* (of the RAP). • Validation assessment requires *Assessment and close out of any Unexpected Finds assessments.* • *There is the potential that one or more USTs may be encountered during demolition of the pavements or subsequent earthworks. In the event of such an occurrence, the Unexpected Finds Protocol as presented in the RAP will be implemented and remedial actions defined EPA (2014b)[4] implemented.* • *In the event that oily materials are encountered, the provisions outlined in the unexpected finds protocol will be implemented, comprising inspection, testing and appropriate action as advised by the Remediation Consultant.* • *The sampling frequency of the identified substance/materials shall meet the minimum requirements outlined in EPA (1995[5]) in addition to those outlined in the RAP.*	Applies to all works across the site.

[3] JBS&G (2020) Remediation Action Plan, The new Sydney Fish Market, dated 8 July 2020.
[4] NSW EPA (2014b), Technical Note: Investigation of Service Station Sites, dated April 2014.
[5] NSW EPA (1995) Contaminated Sites: Sampling Design Guidelines, September 1995

Reference	Condition Requirements	Applicability
SAS or SAR	Comments within the SAR and conditions within the SAS relevant to the HMMP include: • Raised concerns regarding review of historic reports and potential for additional underground storage tanks (USTs) and other unexpected finds to be identified during demolition and construction works. • Further assessment and characterisation of sediment, particularly in western area of the site was requested. This has since been addressed in JBS&G (2021) Sediment Characterisation Assessment. No unexpected finds or changes to the RAP were identified during this investigation. • Further assessment of soil on the eastern portion of the site (below current active Sydney Fish Market) to characterise material within this area were requested during demolition and construction. No intrusive investigations have been conducted in this area to date and there is potential for unexpected finds due to site history. • Polychlorinated biphenyls (PCB) and polycyclic aromatic hydrocarbons (PAH) to be analysed on decommissioning of substation. HMMP needs to be revised if ozone depleting substances are identified. • Only one fragment of asbestos has been identified in soil during investigation works. The auditor noted that there was potential for further asbestos to be identified during demolition works based on site history. Further assessment of asbestos was requested when demolition is occurring.	Applies to all works across the site, however data gaps identified particularly below the substation and within the eastern landside area of the site.

3.0 Potential Hazardous Material Characteristics

3.1 Hazardous Building Material Overview

Historically there have been a range of materials used across Australia for the construction of industrial and residential buildings that are now considered 'hazardous building materials' (HBM). These include:

- Asbestos containing material (ACM) within buildings on site (demolished during Stage 1 works).
- Lead based paints (LP).
- Synthetic mineral fibres (SMF).
- Polychlorinated Biphenyls (PCB).
- Ozone depleting substances (ODS).

Management and removal of these materials are regulated as detailed in **Section 2.1** to reduce risk of contamination migration and potential harm to human health and the environment.

JBS&G produced a Hazardous Materials Removal Management Plan (HMRMP, 2020[6]) that included a pre-demolition HBM survey of the site. The survey identified HBM used in the construction of the Hanson Batch Plant, wharf, and associated infrastructure, including those listed above. The JBS&G (2020) hazardous material register, and site photos are provided in **Appendix A**. It is noted that building infrastructure presented in the HMRMP has since been removed from the southern land portion of the site. A survey of HBM within the eastern land potion of the site (location of current Fish Market) has yet to be conducted. Further assessment of HBM within this portion of the site will need to be conducted prior to any demolition works occurring within this area.

3.2 Asbestos Containing Material

Respirable asbestos fibres can pose risks to human health when inhaled. As such, management of ACM in building material and soil is of primary concern. The management of ACM within waste must also be considered, such that waste is to be appropriately classified, transported, and disposed at a suitably licenced waste facility.

One ACM fragment was observed within soil during preliminary site investigations presented within the RAP. The SAR notes that there is the potential for further ACM to be present within soil on site and this is to be managed under the Unexpected Finds Protocol (UFP) within the CEMP. As noted in **Section3.1**, many of the buildings identified within the HMRMP to contain HBM have been demolished during stage 1 works. The soil below and surrounding this infrastructure are identified as areas of increased potential for unexpected asbestos finds.

Asbestos fibres have been identified in sediment samples within the Sediment Characteristic Report (JBS&G, 2121[7]). When sediments remain submerged, management of asbestos is not considered a concern. If sediments are dredged and exposed to air, the risk of asbestos dust should be considered. Dewatering and management of potential acid sulfate soil (ASS) within sediment is further discussed within the ASS Management Plan (ASSMP) and Dewatering Management Plan (DMP) within the CEMP.

[6] JBS&G (2020), Hazardous Materials Removal Management Plan – New Sydney Fish Markets, dated 8 July 2020
[7] JGS&G (2021), Sediment Characteristic Report – new Sydney Fish Market, 12 January 2021.

3.3 Lead based Paint

Lead paint was identified within a number of the on-site buildings that have since been demolished. Raised concentrations of lead have previously been reported in soil within the RAP. Minimising the generation of lead dust should be considered to reduce exposure of lead during construction works. Dust suppression and appropriate PPE can be applied to manage potential risks to human health. If lead contaminated soil is to be reused during construction, it will not be suitable as a growing medium for plants if lead concentrations are above ecological guidelines within the RAP.

3.4 Synthetic Mineral Fibres

Removal of these materials should be conducted whilst wearing PPE, primarily a P2 dust mask or respirator and coveralls. This material is likely to have been removed during stage 1 demolition works, however if there is any residual contamination from SMF within soil, these should be managed through dust suppression and PPE should they be required.

3.5 Polychlorinated Biphenyls

PCBs can be present in electrical capacitors and transformers. No detailed inspection of PCBs was conducted as part of the HMRMP. The SAR stipulated that an assessment of soil for PCB is to be conducted below the substation post demolition. If PCB concentrations are found to exceed applicable health investigation levels identified within the RAP, soil within this area is to be appropriately classified, transported and disposed at a licenced waste facility.

PCBs have been identified above ecological guideline criteria within sediments in Blackwattle Bay. Disturbance of sediments should be minimised where possible to reduce risk of dispersing PCBs within the water column. Management of sediments within Blackwattle Bay is discussed further in the CEMP, DMP and the soil and water management plan (SWMP), If sediments are to be removed as part of the works, they will need to be appropriately classified and disposed at a licenced waste facility.

3.6 Ozone Depleting Substances

ODS generally comprise refrigerant gases used in air conditioners, cool rooms/refrigerators and firefighting infrastructure. No ODS were identified in the HMRMP, however they may be present within the current Fish Market and should be considered prior to demolition of remaining building.

4.0 Offsite Disposal

All waste on site is to be classified in accordance with NSW EPA (2014) Waste Classification Guidelines. Hazardous waste is to be transported by a licenced waste transported and tracked (with WasteLocate where necessary) to a licenced waste facility. All waste, including hazardous waste is to be disposed as described in the Waste Management Plan (WMP) within the CEMP.

5.0 Removal Works Management

As buildings have been demolished within the southern land portion of the site during stage 1 works, it is likely that the majority of HBM has been removed within this area prior to commencing stage 2 works. However, there is the potential for residual contamination from the HBM to be observed within soil. If uncovered these should be managed as an unexpected find and if significant, this management plan should be updated to reflect required management strategies.

Management of sediment and soil during all works should be conducted in accordance with the SWMP, construction air quality management plan, WMP, ASSMP, and DMP within the CEMP.

As detailed in **Section 3.1**, further assessment of HBM within the current Fish Market is required prior to demolition of building in the eastern portion of the site. This plan should be updated to reflect details in the updated HBM survey of this area of the site.

Safe work method statements (SWMS) are to be prepared and followed considering the risks associated with HBM on site should they potentially be encountered. If unexpected HBM finds are uncovered, SWMS are to be updated to reflect potential hazards.

6.0 Asbestos Management Plan

6.1 Asbestos Removal Control Plan

Asbestos in soil on-site is proposed to be managed as an unexpected find during Stage 2 works until further survey of HBM within the current Fish Market building has been conducted. As such, an asbestos removal control plan (ARCP) has not been prepared as part of the asbestos management plan (AMP). If handling or removal of asbestos is required, an ARCP is to be prepared by a suitable licenced company prior to the removal of any asbestos on site.

6.2 Management of Asbestos Removal Process

It is the responsibility of Multiplex to provide training in the identification and proposed asbestos management procedures. Training is to include correct use of respirators.

6.2.1 Defining the work area

Any area where asbestos handling or removal is being conducted is to appropriately delineated (i.e. the work area), taking the following into consideration:

- Condition and form of asbestos.
- Potential activities and exposure of others in adjacent areas outside of the work area.
- Method of asbestos removal.
- Barriers around asbestos area to exclude non-trained personnel.
- Quantity of asbestos to be removed.
- Appropriate signage including asbestos warning signs at entry and exit points of the work areas.

6.2.2 Notification

In accordance with NSW Work Health Safety Regulation 2017, Multiplex's licenced asbestos removalist is to notify SafeWork NSW no less than 5 days prior to commencing asbestos removal works. Multiplex to receive written approval from SafeWork NSW to commence work prior to starting asbestos removal works.

In addition, consultation between Multiplex and any stakeholders (i.e. neighbours and on-site workers) potentially affected by the asbestos removal should be conducted prior to works commencing.

6.2.3 Plant Performance

All plant used within asbestos removal area is to be checked by Multiplex that they are appropriately sealed to prevent dust exposure to operators.

6.2.4 Removal Procedure

- Commission suitably licenced asbestos removalist to prepare an ARCP and notify SafeWork NSW.
- Gain approval to remove asbestos from SafeWork NSW.
- Multiplex site supervisor to review all SWMS for works being conducted within asbestos removal area to ensure that all works consider appropriate management of asbestos.
- Establish boundaries and signage taking into consideration details in **Section 6.2.1**.
- Identify location of decontamination point.
- Identify site facilities and emergency assembly areas.

- Set environmental management controls as outlined within the CEMP.
- Establish location of haul roads to be used for asbestos waste removal trucks.
- Ensure appropriate PPE is available for those working within asbestos removal areas.
- All ACM and associated waste to be wet down and/or covered during removal works.
- Asbestos removal trucks to be double lined with plastic and appropriately sealed prior to leaving site.
- All asbestos waste to be appropriately classified, transported, tracked with WasteLocate and disposed at a licenced waste facility in accordance with NSW EPA (2014) Waste Classification Guidelines.
- Machinery used within asbestos removal area to be appropriately cleaned of all asbestos within a decontamination zone prior to removal from site or commencing 'clean work' on site.
- Validation and asbestos clearance certificates to be issued by a qualified environmental consultant or occupational hygienist.

6.2.5 Air Monitoring and Exposure Standards

Air monitoring involves sampling airborne asbestos fibres to assist in assessing exposure to asbestos and the effectiveness of the implemented control measures. In accordance with WorkSafe NSW 2016 *How To Safely Remove Asbestos, Code of Practice*, it must be conducted in accordance with the *Guidance Note on the membrane Filter Method for Estimating Airborne Asbestos Dust, 2nd Edition [NOHSC: 3003 (2005)]*. The air-monitoring analysis must be undertaken by a laboratory with NATA accreditation for airborne fibre analysis.

WorkSafe NSW *How To Safely Remove Asbestos, Code of Practice* (2016) indicates that air monitoring requirements will vary depending on the type of asbestos being removed, the location and position of asbestos, if an enclosure is used and whether the asbestos removal work is inside or outside a building.

- **Friable asbestos removal:** air monitoring is mandatory for all friable asbestos removal.
- **More than 10 m^2 of non-friable asbestos removal:** air monitoring is not required but may be considered to be carried out by an independent licenced asbestos assessor or competent person to ensure compliance with the duty to eliminate or minimise exposure to airborne asbestos and to ensure the exposure standard is not exceeded.
- **Public Location:** air monitoring should be considered where the asbestos removal work is being undertaken in or next to a public location.
- **Exposure Air Monitoring:** should be carried out at other times to establish a worker's exposure to airborne asbestos if, based on reasonable grounds, there is uncertainty as to whether the exposure standard may be exceeded and a risk assessment by a competent person indicates it is necessary.

Air monitoring may be required when:

- It is not clear if the existing control measures are effective.
- There is evidence the control measures have deteriorated as a result of poor maintenance.
- Modifications or changes in safe work methods have occurred that may adversely affect worker exposure.
- There has been an uncontrolled disturbance of asbestos at the workplace.

In accordance with SafeWork NSW 2016 required actions for air monitoring are summarised on the following table:

Action Level (airborne asbestos fibres/mL)	Control	Action
Less than 0.01	No new control measures necessary.	Continue with control measures.
≥ 0.01 and ≤ 0.02	Review.	Review control measures.
	Investigate.	Investigate the cause.
	Implement.	Implement controls to eliminate or minimise exposure and prevent further release.
> 0.02	Stop Work.	Stop removal work.
	Notify the Regulator.	Complete the SafeWork *Notifications of Respirable Asbestos Fibre Levels at more than 0.02 fibres/ml*. (https://www.safework.nsw.gov.au/__data/assets/pdf_file/0009/477495/Notification-of-respirable-asbestos-fibre-levels-at-more-than-0.02-fibres-ml.pdf). Send completed notification form to SafeWork NSW by email or post detailing that work has ceased and the results of the air monitoring.
	Investigate the cause.	Conduct thorough inspection of the works area and associated equipment in consultation with all workers involved with the removal work.
	Implement controls to eliminate or minimise potential exposure and prevent further release.	Extend the isolated/barricaded area around the removal area as far as reasonably practicable (until fibre levels are < 0.01 fibres/mL).
	Do not recommence removal work until further air monitoring is conducted.	Do not recommence until fibre levels are at or below 0.01 fibres/mL.

7.0 Storage and Handling of Hazardous Chemicals

Based on proposed construction activities it is considered that the following hazardous substances will likely be used on site:

- Fuel.
- Hydraulic oil.
- Grease.

These materials are to be stored in secure, dry and bunded containers. Storage of hazardous materials is to consider:

- Relevant Australian Standards.
- Bunding of storage areas are to be 110% the size of the largest single stored volume.
- NSW EPA (1997) Bunding and Spill Management, technical bulletin.
- Follow all safety data sheet (SDS) storage and handling requirements.
- Incompatible hazardous materials are not to be stored with each other.
- Hazardous materials are to be stored in a secure, limited access area.
- Appropriate first aid equipment to be available, should it be required.
- Audits of hazardous material storage and physical arrangement to be conducted by the Multiplex Safety and Environment Officer.

7.1 Spills

In the case that a spill occurs the following procedure should be conducted:

- Where there is threat to safety or human health (such as fire), site emergency procedure to be followed.
- Where chemical spills occur, procedures outlined in the SDS are to be followed.
- Following checking/removing risk of danger an effort should be made to prevent spill from increasing, i.e., confining/dam and/or turning off source.
- Once contained, use absorbent spill kits to clean spill and dispose of waste appropriately.
- If soil is impacted by a spill, the soil should be assessed, removed if required, classified and disposed to a licenced waste facility. Validation sampling to confirm removal of contaminated soil will be required.
- Any spill equipment that is used must be replenished.
- Report incident in accordance with Multiplex emergency reporting requirements outlined within the CEMP.

8.0 Environmental Control Measures and Compliance

8.1 Roles and Responsibilities

In addition to those detailed in the CEMP, the roles and responsibilities presented in **Table 8.1** are relevant to the HMMP.

Table 8.1: Roles and responsibilities

Role	Responsibility
Contaminated Land Consultant	Assess requirements to mitigate impacts of unexpected find and follow procedures outlined in the RAP and this HMMP.
Foreman and Environmental Officer	Communicate discovery and nature of unexpected finds to contamination consultant and NSW EPA accredited site auditor.
NSW EPA Accredited Site Auditor	Review investigation, remediation, and validation work done by contaminated land consultants.

An appropriately qualified environmental consultant and/or hygienist is to be engaged to identify and monitor the removal of known HBM (asbestos and lead within soil) and to assess any additional material (unexpected finds) should they be encountered. Throughout works the consultant should:

- Conduct asbestos air monitoring during movement of potentially contaminated fill on site.
- Conduct dust/particulate monitoring during site establishment works to assess effectiveness to monitor dust generation.
- Provide on-site advice on management of suspected hazardous materials should they be encountered.
- Provide regular inspection and validate the site in accordance with the RAP to confirm that HBM has been removed and no residual contamination remains on-site that may cause ongoing harm to human health or the environment.
- Provide clearance certificates and sufficient documentation to support that HBM was investigated and removed to licensed waste facilities.

If additional asbestos is observed within remaining buildings or within soil, SafeWork NSW will need to be notified and a licenced asbestos removal contractor will need to be engaged for the removal works.

8.2 Human Health

Chemicals can be absorbed through inhalation, skin absorption and ingestion. To eliminate the risk of absorption it is recommended (where possible) to follow the hierarchy of control to:

- Eliminate the need to use chemicals.
- Substitute with less toxic substance.
- Engineer controls to prevent exposure.
- PPE (e.g., respirators, tyvex and nitrile gloves)

To minimise the potential for incidental ingestion of contaminants, workers are to practice good hygiene. Workers should wash their hands prior to eating and taking rest breaks. Designated areas should be utilised for rest and eating.

8.3 Training

Personnel involved in construction works in the project area will be made aware of and trained in the recognition of HBM. Training will be undertaken as a part of general site induction and refreshed periodically at toolbox meetings.

Training will provide general awareness for recognition of potential contamination and hazardous materials, so that works can be suspended temporarily to allow evaluation by an appropriately qualified person. Project workers will be trained in identifying and reporting the following:

- Asbestos (i.e., either bonded or friable).
- Leaks/spills.
- Fill containing waste (e.g., ash, slag, refuse, demolition materials).

Where HBM is known to be present, the Multiplex Project Manager and/or Environmental and Sustainability Manager will be responsible for making the Site Manager aware of the nature of these prior to construction activities commencing in those areas.

8.4 Site Access Controls

If any HBM are identified, the area is to be:

- Delineated with temporary fencing or barricades.
- Appropriately signed, detailing PPE and access requirements.
- Adequate PPE to be supplied.
- Installation of decontamination areas and PPE waste storage.
- Access restricted to only allow for qualified trained personnel to handle and remove material.
- All hazmat contractor licences, permits and SWMS are to be acquired and requirements followed.
- An occupational hygienist/licenced asbestos assessor is to be engaged to implement and monitor control measures.

8.5 Monitoring and Inspection

Monitoring and inspection will be conducted in accordance with section 9 of the CEMP. Results and actions of monitoring and inspection are to be recorded as specified within the CEMP.

8.6 Auditing

Internal and external audit requirements will be conducted as outlined within section 10.1 of the CEMP.

8.7 Reporting

Reporting will be conducted as outlined within section 12 of the CEMP.

8.8 Non-conformance

Non-conformances will be managed as outlined in section 10.2 of the CEMP.

9.0 Review and Improvement

This plan may be updated or revised if required. The procedure for review and approval of any updates or revisions will be in accordance with the procedure described in the CEMP.

10.0 Principles and Limitations of Investigation

The following principles are an integral part of site contamination assessment practices and are intended to be referred to when resolving any ambiguity or exercising such discretion as is accorded the user or site assessor.

Area	Principle and Limitation
Elimination of Uncertainty	Some uncertainty is inherent in all site investigations. Furthermore, any sample, either surface or subsurface, taken for chemical testing may or may not be representative of a larger population or area. Professional judgment and interpretation are inherent in the process, and even when exercised in accordance with objective scientific principles, uncertainty is inevitable. Additional assessment beyond that which was reasonably undertaken may reduce the uncertainty.
Failure to Detect	Even when site investigation work is executed competently and in accordance with the appropriate Australian guidance, such as the National Environment Protection (Assessment of Site Contamination) Amendment Measure ('the NEPM'), it must be recognised that certain conditions present especially difficult target analyte detection problems. Such conditions may include, but are not limited to, complex geological settings, unusual or generally poorly understood behaviour and fate characteristics of certain substances, complex, discontinuous, random, or heterogeneous distributions of existing target analytes, physical impediments to investigation imposed by the location of services, structures and other man-made objects, and the inherent limitations of assessment technologies.
Limitations of Information	The effectiveness of any site investigation may be compromised by limitations or defects in the information used to define the objectives and scope of the investigation, including inability to obtain information concerning historic site uses or prior site assessment activities despite the efforts of the user and assessor to obtain such information.
Chemical Analysis Error	Chemical testing methods have inherent uncertainties and limitations. Senversa routinely seeks to require the laboratory to report any potential or actual problems experienced, or non-routine events which may have occurred during the testing, so that such problems can be considered in evaluating the data.
Level of Assessment	The investigation herein should not be an exhaustive assessment of environmental conditions on a property. There is a point at which the effort required to obtain information is outweighed by the time required to obtain that information, and, in the context of private transactions and contractual responsibilities, may become a material detriment to the orderly conduct of business. If the presence of target analytes is confirmed on a property, the extent of further assessment is a function of the degree of confidence required and the degree of uncertainty acceptable in relation to the objectives of the assessment.
Comparison with Subsequent Inquiry	The justification and adequacy of the findings of this investigation in light of the findings of a subsequent inquiry should be evaluated based on the reasonableness of judgments made at the time and under the circumstances in which they were made.
Data Useability	Investigation data generally only represent the site conditions at the time the data were generated. Therefore, the usability of data collected as part of this investigation may have a finite lifetime depending on the application and use being made of the data. In all respects, a future reader of this report should evaluate whether previously generated data are appropriate for any subsequent use beyond the original purpose for which they were collected, or are otherwise subject to lifetime limits imposed by other laws, regulations or regulatory policies.
Nature of Advice	The investigation works herein are intended to develop and present sound, scientifically valid data concerning actual site conditions. Senversa does not seek or purport to provide legal or business advice.

Figures

Figure 1: Site Location Plan



Path: S:\01_Jobs\1.NSW_Jobs\S18417_MULTIPLEX_FISH MARKETS_REDEVELOPMENT\S18417_003.aprx

This Drawing is Subject to COPYRIGHT. No portion of this drawing may be removed, extracted, copied, electronically stored or disseminated in any form without the prior written permission of Senversa

senversa
Address: Level 5, 201 Kent Street, Sydney NSW 2000
Phone: (02) 9994 8016
Website: www.senversa.com.au

Legend

- Approximate Seawall Extent
- Stormwater Discharge
- Heritage Stormwater Channel
- Site Boundary
- Property Cadastre

Notes:
Cadastre and road data sourced from land.vic.gov.au (DELWP)
Aerial imagery sourced from Nearmap Pty Ltd

Designed:	Z. Smith	Date:	9/03/2021
Drawn:	C. Smith	Revision:	0
Checked:	.	Scale:	1:1,750 (A3)
File:	S18417_003_F001		

0 40 80 120 Metres

Datum GDA 1994, Projection MGA Zone 55

Figure No: 1

Title: Site Location Plan

Project: New Sydney Fish Market (Stage 2)

Location: 1A-1C Bridge Road, Glebe and Part of 56-60 Pyrmont Bridge Road, Pyrmont NSW

Client: Multiplex

Appendix A: JBS&G (2020) Hazardous Materials Survey and Photos of Southern Land Portion of the Site

Hazardous Materials Register (Rev 0)
New Sydney Fish Markets Development
1A to 1C Bridge Road, Glebe, NSW
Lot 3
Date of Production – 18 May 2020

JBS&G SAMPLE NO.	LOCATION	MATERIAL DESCRIPTION	PHOTO NUMBER	ACCESSIBLE AREA?	FRIABILITY	ANALYTICAL RESULT	MATERIAL CONDITION	APPROX. QUANTITY	ACTION REQUIRED	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)	DATE OF CONTROL ACTION &/OR REMOVAL
Asbestos Containing Materials (ACM)											
A-01	Top of brick wall adjacent shower room	Bituminous membrane	2	Yes	Non-Friable	**Chrysotile Asbestos**	Poor	< 1 m^2	Remove prior to demolition. Works to be completed under controlled conditions by Class A or B licensed removal contractor in accordance with SWNSW 2019a	30/4/2020 JBS&G SL	
A-02	Store Room, floor	Fibre cement conduit	3	Yes	Non-Friable	**Chrysotile and Amosite Asbestos**	Fair	< 1 m^2	Remove prior to demolition. Works to be completed under controlled conditions by Class A or B licensed removal contractor in accordance with SWNSW 2019a	30/4/2020 JBS&G SL	
~~58788-001-006 (Prensa 2018)~~	~~North, on ground, dumped electrical equipment~~	~~Bituminous backing board~~	~~-~~	~~Yes~~	~~Non-Friable~~	~~**Asbestos Detected**~~	~~Fair~~	~~1 m^2~~	~~Remove prior to demolition. Works to be completed under controlled conditions by Class A or B licensed removal contractor in accordance with SWNSW 2019a~~	~~Prensa 2018~~	Material unable to be located during JBS&G inspection and is assumed to have been removed. No documentation was made available to JBS&G.
No Asbestos Detected (NAD)											
AD-01	Shower Room, floor	Settled dust	-	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
~~58788-001-005 (Prensa 2018)~~	~~North, on ground, dumped electrical equipment~~	~~Cable wrap~~	~~-~~	~~Yes~~	~~-~~	~~No Asbestos Detected~~	~~-~~	~~-~~	~~No further action required~~	~~Prensa 2018~~	Material unable to be located during JBS&G inspection. Assumed to have been removed
~~58788-001-007 (Prensa 2018)~~	~~North, on ground, dumped material, door~~	~~Caulking~~	~~-~~	~~Yes~~	~~-~~	~~No Asbestos Detected~~	~~-~~	~~-~~	~~No further action required~~	~~Prensa 2018~~	Material unable to be located during JBS&G inspection. Assumed to have been removed
Lead Containing Dust											
LD-01	Shower Room, floor	Settled dust	4	Yes	-	**2,000 mg/kg**	Poor	10 m^2	Remove prior to demolition by an experience hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	

JBS&G SAMPLE NO.	LOCATION	MATERIAL DESCRIPTION	PHOTO NUMBER	ACCESSIBLE AREA?	FRIABILITY	ANALYTICAL RESULT	MATERIAL CONDITION	APPROX. QUANTITY	ACTION REQUIRED	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)	DATE OF CONTROL ACTION &/OR REMOVAL
Lead Based Paints											
LP-01	Store Room, door, internal surface	Green paint	5	Yes	-	**28% w/w**	Poor	3 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be disposed as general solid waste if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
58788-001-LP06 (Prensa 2018)	Store Room, door, external surface	Cream paint	-	Yes	-	**0.46% w/w**	Poor	2 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be disposed as general solid waste if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
LP-02	Timber structure, columns and beams	Black paint	6	Yes	-	**26% w/w**	Poor	40 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be disposed as general solid waste if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	

JBS&G SAMPLE NO.	LOCATION	MATERIAL DESCRIPTION	PHOTO NUMBER	ACCESSIBLE AREA?	FRIABILITY	ANALYTICAL RESULT	MATERIAL CONDITION	APPROX. QUANTITY	ACTION REQUIRED	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)	DATE OF CONTROL ACTION &/OR REMOVAL
LP-03	Timber structure, external timber doors and metal vents	Yellow paint	7	Yes	-	**2.3% w/w**	Poor	8 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be disposed as general solid waste if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
-	Shower Room, walls	Blue/green paint	8	Yes	-	**Assumed Lead Paint (XRF > 1.00 mg/cm^2)**	Poor	20 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be disposed as general solid waste if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
~~58788-001-LP07 (Prensa 2018)~~	~~North, on ground, dumped materials, door~~	~~White paint~~	~~-~~	~~Yes~~	~~-~~	~~**0.19% w/w**~~	~~Fair~~	~~Unknown~~	~~Remove under controlled conditions in accordance with AS/NZS 4361.2:2017 Guide to hazardous paint management prior to renovation or demolition works~~	~~Prensa 2018~~	Material unable to be located during JBS&G inspection and is assumed to have been removed. No documentation was made available to JBS&G.
Non-Lead Based Paints											
58788-001-LP03 (Prensa 2018)	Shower Room, ceiling	White paint	-	Yes	-	0.062% w/w	-	-	No further action required	30/4/2020 JBS&G SL	

JBS&G SAMPLE NO.	LOCATION	MATERIAL DESCRIPTION	PHOTO NUMBER	ACCESSIBLE AREA?	FRIABILITY	ANALYTICAL RESULT	MATERIAL CONDITION	APPROX. QUANTITY	ACTION REQUIRED	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)	DATE OF CONTROL ACTION &/OR REMOVAL
Polychlorinated Biphenyls (PCBs)											
No Polychlorinated Biphenyl materials were identified at the time of inspection									-	30/4/2020 JBS&G SL	
Synthetic Mineral Fibres (SMF)											
No Synthetic Mineral Fibre materials were identified at the time of inspection									-	30/4/2020 JBS&G SL	
Ozone Depleting Substances (ODS)											
No Ozone Depleting Substances were identified at the time of inspection									-	30/4/2020 JBS&G SL	
Inaccessible Areas											
Substation S405 was locked and there was no access at the time of inspection											

Hazardous Materials Register (Rev 0)
New Sydney Fish Markets Development
1A to 1C Bridge Road, Glebe, NSW
Lot 4
Date of Production – 18 May 2020

JBS&G SAMPLE NO.	LOCATION	MATERIAL DESCRIPTION	PHOTO NUMBER	ACCESSIBLE AREA?	FRIABILITY	ANALYTICAL RESULT	MATERIAL CONDITION	APPROX. QUANTITY	ACTION REQUIRED	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)	DATE OF CONTROL ACTION &/OR REMOVAL
General Site											
Asbestos Containing Materials (ACM)											
No Asbestos Containing Materials were identified within the general site area at the time of inspection									-	30/4/2020 JBS&G SL	
No Asbestos Detected (NAD)											
A-05	General site, southwest end, expansion joint - mastic	Mastic	-	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
A-06	General site, length of lot, expansion joint	Mastic	10	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
Lead Based Paints											
LP-06	General site, southwest end, timber and metal barrier	White paint	11	Yes	-	**Lead Based Paint (0.26% w/w)**	Poor	5 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be demolished if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	

JBS&G SAMPLE NO.	LOCATION	MATERIAL DESCRIPTION	PHOTO NUMBER	ACCESSIBLE AREA?	FRIABILITY	ANALYTICAL RESULT	MATERIAL CONDITION	APPROX. QUANTITY	ACTION REQUIRED	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)	DATE OF CONTROL ACTION &/OR REMOVAL
General Site											
As per LP-06	Pier, timber beams	White paint	12	Yes	-	**Lead Based Paint (0.26% w/w)**	Poor	500 lin. m.	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be demolished if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
Non-Lead Based Paints											
58788-001-LP02 (Prensa 2018)	Wharf, timber piles, top section	White paint	-	Yes	-	Non-Lead Based Paint (< 0.005% w/w)	-	-	No further action required	30/4/2020 JBS&G SL	
Polychlorinated Biphenyls (PCBs)											
No Polychlorinated Biphenyl materials were identified within the general site area at the time of inspection									-	30/4/2020 JBS&G SL	
Synthetic Mineral Fibres (SMF)											
No Synthetic Mineral Fibre materials were identified within the general site area at the time of inspection									-	30/4/2020 JBS&G SL	
Ozone Depleting Substances (ODS)											
No Ozone Depleting Substances were identified within the general site area at the time of inspection									-	30/4/2020 JBS&G SL	

JBS&G SAMPLE NO.	LOCATION	MATERIAL DESCRIPTION	PHOTO NUMBER	ACCESSIBLE AREA?	FRIABILITY	ANALYTICAL RESULT	MATERIAL CONDITION	APPROX. QUANTITY	ACTION REQUIRED	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)	DATE OF CONTROL ACTION &/OR REMOVAL
Old Office Building											
Asbestos Containing Materials (ACM)											
A-07	Old Office Building, roof	Corrugated fibre cement sheeting	14	Yes	Non-Friable	**Chrysotile and Amosite Asbestos**	Poor	100 m^2	Remove prior to demolition. Works to be completed under controlled conditions by Class A or B licensed removal contractor in accordance with SWNSW 2019a	30/4/2020 JBS&G SL	
A-08	Old Office Building, roof, barge capping	Fibre cement sheeting	15	Yes	Non-Friable	**Chrysotile and Amosite Asbestos**	Fair	5 lin. m.	Remove prior to demolition. Works to be completed under controlled conditions by Class A or B licensed removal contractor in accordance with SWNSW 2019a	30/4/2020 JBS&G SL	
-	Old Office Building, roof, gutters	Moulded fibre cement	16	No	Non-Friable	**Assumed Asbestos**	Poor	25 lin. m.	Remove prior to demolition. Works to be completed under controlled conditions by Class A or B licensed removal contractor in accordance with SWNSW 2019a	30/4/2020 JBS&G SL	
-	Old Office Building, roof, SW downpipe	Fibre cement pipe	17	No	Non-Friable	**Assumed Asbestos**	Poor	2 lin. m.	Remove prior to demolition. Works to be completed under controlled conditions by Class A or B licensed removal contractor in accordance with SWNSW 2019a	30/4/2020 JBS&G SL	
-	Old Office Building, gutters and downpipes	Accumulated soil and debris	-	No	Friable	**Assumed Asbestos**	Poor	Unknown	Material assumed to be present due to degradation of the roof sheeting. Remove prior to demolition. Works to be completed under controlled conditions by Class A or B licensed removal contractor in accordance with SWNSW 2019a	30/4/2020 JBS&G SL	
As per A-07 & A-08	Old Office Building, on top of concrete roof of north store room	Mixed fibre cement fragments	18	Yes	Non-Friable	**Chrysotile and Amosite Asbestos**	Poor	1 m^2	Remove prior to demolition. Works to be completed under controlled conditions by Class A or B licensed removal contractor in accordance with SWNSW 2019a	30/4/2020 JBS&G SL	
A-10	Old Office Building, ground floor, main room, south wall	Fibre cement fragments on timber studs and behind nails	19	Yes	Non-Friable	**Chrysotile and Amosite Asbestos**	Poor	< 1 m^2	Remove prior to demolition. Works to be completed under controlled conditions by Class A or B licensed removal contractor in accordance with SWNSW 2019a	30/4/2020 JBS&G SL	

JBS&G SAMPLE NO.	LOCATION	MATERIAL DESCRIPTION	PHOTO NUMBER	ACCESSIBLE AREA?	FRIABILITY	ANALYTICAL RESULT	MATERIAL CONDITION	APPROX. QUANTITY	ACTION REQUIRED	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)	DATE OF CONTROL ACTION &/OR REMOVAL
Old Office Building											
AD-05	Old Office Building, ground floor toilets, floor	Settled dust	20	Yes	Friable	**Chrysotile Asbestos detected in loose fibre bundles**	Poor	12 m^2	Remove prior to demolition. Works to be completed under controlled conditions by Class A licensed removal contractor in accordance with SWNSW 2019a	30/4/2020 JBS&G SL	
~~58788-001-009 (Prensa 2018)~~	~~Old Office Building, adjacent rear entrance, on ground~~	~~Corrugated fibre cement debris~~	~~-~~	~~Yes~~	~~Non-Friable~~	~~**Asbestos Detected**~~	~~Poor~~	~~< 1 m^2~~	~~Remove prior to demolition. Works to be completed under controlled conditions by Class A or B licensed removal contractor in accordance with SWNSW 2019a~~	~~Prensa 2018~~	Item removed as a sample during Prensa 2018.
No Asbestos Detected (NAD)											
58788-001-008 (Prensa 2018)	Old Office Building, external, electrical cabinet	Electrical backing board	-	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
A-09	Old Office Building, roof void	Insulation	-	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
AD-02	Old Office Building, roof void	Settled dust	-	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
A-11	Old Office Building, redundant electrical wiring	Red cable sheath	21	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
A-12	Old Office Building, redundant electrical wiring	Black cable sheath	21	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
AD-04	Old Office Building, ground floor, floor	Settled dust	-	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
Same as 58788-001-016 (Prensa 2018)	Old Office Building, ground floor, timber windows	Caulking	-	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
58788-001-010A (Prensa 2018)	Old Office Building, ground floor, west end. floor	Black vinyl tiles	-	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
58788-001-010B (Prensa 2018)	Old Office Building, ground floor, west end, floor	Woven backing to vinyl tiles	-	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
58788-001-011 (Prensa 2018)	Old Office Building, ground floor, west end, floor	Paper backing to vinyl tiles	-	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	

JBS&G SAMPLE NO.	LOCATION	MATERIAL DESCRIPTION	PHOTO NUMBER	ACCESSIBLE AREA?	FRIABILITY	ANALYTICAL RESULT	MATERIAL CONDITION	APPROX. QUANTITY	ACTION REQUIRED	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)	DATE OF CONTROL ACTION &/OR REMOVAL
Old Office Building											
58788-001-012 (Prensa 2018)	Old Office Building, stairwell, walls	Bituminous backing to cement render	22	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
58788-001-013 (Prensa 2018)	Old Office Building, stairwell, floor	Black vinyl tiles	-	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
AD-03	Old Office Building, first floor, floor	Settled dust	-	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
58788-001-014 (Prensa 2018)	Old Office Building, first floor, floor	Black vinyl tiles	23	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
58788-001-015 (Prensa 2018)	Old Office Building, first floor, floor	Paper backing to vinyl tiles	23	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
58788-001-016 (Prensa 2018)	Old Office Building, first floor, timber windows	Caulking	-	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
Lead Containing Dust											
LD-02	Old Office Building, roof void	Settled dust	24	Yes	-	**1,500 mg/kg**	Poor	100 m^2	Remove prior to demolition by an experience hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
LD-04	Old Office Building, ground floor, floor	Settled dust	-	Yes	-	200 mg/kg	Poor	100 m^2	Remove prior to demolition by an experience hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
58788-001-LD02 (Prensa 2018)	Old Office Building, ground floor, floor	Settled dust	-	Yes	-	**320 mg/kg**					
LD-05	Old Office Building, ground floor toilets, floor	Settled dust	20	Yes	-	**1,800 mg/kg**	Poor	10 m^2	Remove prior to demolition by an experience hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
58788-001-LD01 (Prensa 2018)	Old Office Building, ground floor, window sills	Settled dust	25	Yes	-	**3,600 mg/kg**	Poor	20 m^2	Remove prior to demolition by an experience hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
58788-001-LD03 (Prensa 2018)	Old Office Building, ground floor, stairwell, floor	Settled dust	-	Yes	-	**2,100 mg/kg**	Poor	20 m^2	Remove prior to demolition by an experience hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	

JBS&G SAMPLE NO.	LOCATION	MATERIAL DESCRIPTION	PHOTO NUMBER	ACCESSIBLE AREA?	FRIABILITY	ANALYTICAL RESULT	MATERIAL CONDITION	APPROX. QUANTITY	ACTION REQUIRED	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)	DATE OF CONTROL ACTION &/OR REMOVAL
Old Office Building											
LD-03	Old Office Building, first floor, floor	Settled dust	26	Yes	-	**4,800 mg/kg**	Poor	100 m^2	Remove prior to demolition by an experience hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
58788-001-LD04 (Prensa 2018)	Old Office Building, first floor, floor	Settled dust	-	Yes		**1,000 mg/kg**					
58788-001-LD05 (Prensa 2018)	Old Office Building, cavity between first floor and ground floor	Settled dust	-	Yes	-	**3,900 mg/kg**	Poor	100 m^2	Remove prior to demolition by an experience hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
Lead Based Paints											
58788-001-LP09 (Prensa 2018)	Old Office Building, external, north, timber windows	Cream paint	-	Yes	-	**Lead Based Paint (0.46% w/w)**	Poor	5 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be demolished if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
58788-001-LP10 (Prensa 2018)	Old Office Building, external, north, walls	Cream paint	27	Yes	-	**Lead Based Paint (0.54% w/w)**	Poor	40 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be demolished if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	

JBS&G SAMPLE NO.	LOCATION	MATERIAL DESCRIPTION	PHOTO NUMBER	ACCESSIBLE AREA?	FRIABILITY	ANALYTICAL RESULT	MATERIAL CONDITION	APPROX. QUANTITY	ACTION REQUIRED	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)	DATE OF CONTROL ACTION &/OR REMOVAL
Old Office Building											
58788-001-LP11 (Prensa 2018)	Old Office Building, external, east, door and frame	Cream paint	-	Yes	-	**Lead Based Paint (8.8% w/w)**	Poor	4 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be demolished if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
LP-07	Old Office Building, ground floor ceiling	White paint	28	Yes	-	**Lead Based Paint (0.12% w/w)**	Poor	100 m^2	Previously identified as non-lead based paint in Prensa 2018. Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be demolished if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
LP-08	Old Office Building, ground floor toilets, walls	Blue paint	29	Yes	-	**Lead Based Paint (0.72% w/w)**	Poor	30 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be demolished if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	

JBS&G SAMPLE NO.	LOCATION	MATERIAL DESCRIPTION	PHOTO NUMBER	ACCESSIBLE AREA?	FRIABILITY	ANALYTICAL RESULT	MATERIAL CONDITION	APPROX. QUANTITY	ACTION REQUIRED	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)	DATE OF CONTROL ACTION &/OR REMOVAL
Old Office Building											
LP-09	Old Office Building, ground floor toilets, timber doors and frames	Yellow/orange paint	30	Yes	-	**Lead Based Paint (14% w/w)**	Poor	10 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be demolished if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
58788-001-LP12 (Prensa 2018)	Old Office Building, ground floor, throughout, brick walls	White paint	31	Yes	-	**Lead Based Paint (0.21% w/w)**	Poor	200 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be demolished if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
58788-001-LP13 (Prensa 2018)	Old Office Building, ground floor, timber windows	Cream paint	-	Yes	-	**Lead Based Paint (4.2% w/w)**	Poor	20 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be demolished if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	

JBS&G SAMPLE NO.	LOCATION	MATERIAL DESCRIPTION	PHOTO NUMBER	ACCESSIBLE AREA?	FRIABILITY	ANALYTICAL RESULT	MATERIAL CONDITION	APPROX. QUANTITY	ACTION REQUIRED	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)	DATE OF CONTROL ACTION &/OR REMOVAL
Old Office Building											
Same as 58788-001-LP13 (Prensa 2018)	Old Office Building, ground floor, east end, timber work	Cream paint	-	Yes	-	**Lead Based Paint (4.2% w/w)**	Poor	5 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be demolished if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
Same as 58788-001-LP12 (Prensa 2018)	Old Office Building, ground floor, throughout, paint debris on floor	White paint	-	Yes	-	**Lead Based Paint (0.21% w/w)**	Poor	10 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be demolished if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
58788-001-LP15 (Prensa 2018)	Old Office Building, ground floor, stairwell, roller door and frame	Brown paint	-	Yes	-	**Lead Based Paint (0.52% w/w)**	Poor	6 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be demolished if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	

JBS&G SAMPLE NO.	LOCATION	MATERIAL DESCRIPTION	PHOTO NUMBER	ACCESSIBLE AREA?	FRIABILITY	ANALYTICAL RESULT	MATERIAL CONDITION	APPROX. QUANTITY	ACTION REQUIRED	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)	DATE OF CONTROL ACTION &/OR REMOVAL
Old Office Building											
58788-001-LP16 (Prensa 2018)	Old Office Building, ground floor, stairwell, door frame	White paint	-	Yes	-	**Lead Based Paint (2.8% w/w)**	Poor	2 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be demolished if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
58788-001-LP22 (Prensa 2018)	Old Office Building, ground floor, door to north store room	Brown paint	32	Yes	-	**Lead Based Paint (12% w/w)**	Poor	4 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be demolished if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
58788-001-LP17 (Prensa 2018)	Old Office Building, first floor, east room, timber windows	Green paint	33	Yes	-	**Lead Based Paint (0.42% w/w)**	Poor	2 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be demolished if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	

JBS&G SAMPLE NO.	LOCATION	MATERIAL DESCRIPTION	PHOTO NUMBER	ACCESSIBLE AREA?	FRIABILITY	ANALYTICAL RESULT	MATERIAL CONDITION	APPROX. QUANTITY	ACTION REQUIRED	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)	DATE OF CONTROL ACTION &/OR REMOVAL
Old Office Building											
58788-001-LP18 (Prensa 2018)	Old Office Building, first floor, main room, timber windows	White paint	34	Yes	-	**Lead Based Paint (0.70% w/w)**	Poor	5 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be demolished if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
58788-001-LP19 (Prensa 2018)	Old Office Building, first floor, main room, walls	Blue paint	35	Yes	-	**Lead Based Paint (0.57% w/w)**	Poor	60 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be demolished if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
58788-001-LP20 (Prensa 2018)	Old Office Building, first floor, toilets, timber windows	Green paint	-	Yes	-	**Lead Based Paint (0.52% w/w)**	Poor	30 m^2	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be demolished if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	

JBS&G SAMPLE NO.	LOCATION	MATERIAL DESCRIPTION	PHOTO NUMBER	ACCESSIBLE AREA?	FRIABILITY	ANALYTICAL RESULT	MATERIAL CONDITION	APPROX. QUANTITY	ACTION REQUIRED	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)	DATE OF CONTROL ACTION &/OR REMOVAL
Old Office Building											
58788-001-LP21 (Prensa 2018)	Old Office Building, first floor, east room, walls	Cream paint	-	Yes	-	**Lead Based Paint (0.62% w/w)**	Poor	20 m²	Remove loose and flaking paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017. Remaining paint well adhered to the building materials may be demolished if care is taken not to spread paint flakes to surrounding areas. Alternatively, remove all paint prior to demolition by an experienced hazardous materials removal contractor in accordance with AS4361.2-2017.	30/4/2020 JBS&G SL	
Polychlorinated Biphenyls (PCBs)											
Detailed inspection of light fittings could not be undertaken due to access restrictions. All light fittings should be assumed to contain PCBs.									Undertake detailed inspection once safe access provided, OR Handle in accordance with ANZECC 1997	30/4/2020 JBS&G SL	
Synthetic Mineral Fibres (SMF)											
A-09	Old Office Building, roof void	Insulation	24	Yes	-	**SMF Detected**	Good	100 m²	Remove in accordance with NOHSC:2006 (1990)	30/4/2020 JBS&G SL	
Ozone Depleting Substances (ODS)											
No Ozone Depleting Substances were identified at the time of inspection									-	30/4/2020 JBS&G SL	

JBS&G SAMPLE NO.	LOCATION	MATERIAL DESCRIPTION	PHOTO NUMBER	ACCESSIBLE AREA?	FRIABILITY	ANALYTICAL RESULT	MATERIAL CONDITION	APPROX. QUANTITY	ACTION REQUIRED	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)	DATE OF CONTROL ACTION &/OR REMOVAL
Site Office											
Asbestos Containing Materials (ACM)											
No Asbestos Containing Materials were identified at the time of inspection									-	30/4/2020 JBS&G SL	
No Asbestos Detected (NAD)											
58788-001-001 (Prensa 2018)	Site Office, external, walls	Fibre cement sheeting	37	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
58788-001-003 (Prensa 2018)	Site Office, south and east, external metal walls	Mastic	38	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
58788-001-004 (Prensa 2018)	Site Office, external, electrical cabinet	Electrical backing board	-	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
58788-001-002 (Prensa 2018)	Site Office, old kitchenette, wall	Fibre cement sheeting	39	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
Same as 58788-001-002 (Prensa 2018)	Site Office, toilets, walls	Fibre cement sheeting	-	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
Lead Based Paints											
No Lead Based Paints were identified at the time of inspection									-	30/4/2020 JBS&G SL	
Non-Lead Based Paints											
58788-001-LP01 (Prensa 2018)	Site Office, external walls	Grey paint	-	Yes	-	Non-Lead Based Paint (< 0.005% w/w)	-	-	No further action required	30/4/2020 JBS&G SL	
Polychlorinated Biphenyls (PCBs)											
No Polychlorinated Biphenyl materials were identified at the time of inspection									-	30/4/2020 JBS&G SL	

JBS&G SAMPLE NO.	LOCATION	MATERIAL DESCRIPTION	PHOTO NUMBER	ACCESSIBLE AREA?	FRIABILITY	ANALYTICAL RESULT	MATERIAL CONDITION	APPROX. QUANTITY	ACTION REQUIRED	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)	DATE OF CONTROL ACTION &/OR REMOVAL
Site Office											
Synthetic Mineral Fibres (SMF)											
-	Site Office, external south aspect, hot water system	Internal insulation	40	Yes	Bonded	**Assumed SMF**	Good	2 m^2	Remove in accordance with NOHSC:2006 (1990)	30/4/2020 JBS&G SL	
-	Site Office, roof void	Insulation batts	41	Yes	Bonded	**Assumed SMF**	Good	85 m^2	Remove in accordance with NOHSC:2006 (1990)	30/4/2020 JBS&G SL	
-	Site Office, internal and external wall cavities	Insulation batts	-	Yes	Bonded	**Assumed SMF**	Good	150 m^2	Remove in accordance with NOHSC:2006 (1990)	30/4/2020 JBS&G SL	
Ozone Depleting Substances (ODS)											
No Ozone Depleting Substances were identified at the time of inspection									-	30/4/2020 JBS&G SL	

Hazardous Materials Register (Rev 0)
New Sydney Fish Markets Development
1A to 1C Bridge Road, Glebe, NSW
Lot 5
Date of Production – 18 May 2020

JBS&G SAMPLE NO.	LOCATION	MATERIAL DESCRIPTION	PHOTO NUMBER	ACCESSIBLE AREA?	FRIABILITY	ANALYTICAL RESULT	MATERIAL CONDITION	APPROX. QUANTITY	ACTION REQUIRED	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)	DATE OF CONTROL ACTION &/OR REMOVAL
Asbestos Containing Materials (ACM)											
No Asbestos Containing Materials were identified at the time of inspection									-	30/4/2020 JBS&G SL	
No Asbestos Detected (NAD)											
A-03	Northern portion, expansion joint	Mastic	43	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
A-04	Central portion, expansion joint	Mastic	44	Yes	-	No Asbestos Detected	-	-	No further action required	30/4/2020 JBS&G SL	
Lead Based Paints											
No Lead Based Paints were identified at the time of inspection									-	30/4/2020 JBS&G SL	
Non-Lead Based Paints											
LP-04	Pier extending from northern portion of lot, steel framework	White paint	45	Yes	-	Non-Lead Based Paint (0.02% w/w)	-	-	No further action required	30/4/2020 JBS&G SL	
LP-05	Southern portion, bollards	Yellow paint	46	Yes	-	Non-Lead Based Paint (0.06% w/w)	-	-	No further action required	30/4/2020 JBS&G SL	
-	Throughout	Various coloured paints	-	Yes	-	Assumed Non-Lead Paint (XRF < 0.1 mg/cm^2)	-	-	No further action required	30/4/2020 JBS&G SL	
Polychlorinated Biphenyls (PCBs)											
Detailed inspection of light fittings could not be undertaken due to access restriction at the time of inspection. All light fittings should be assumed to contain PCBs.									Undertake detailed inspection once safe access is provided, OR Handle in accordance with ANZECC 1997	30/4/2020 JBS&G SL	

JBS&G SAMPLE NO.	LOCATION	MATERIAL DESCRIPTION	PHOTO NUMBER	ACCESSIBLE AREA?	FRIABILITY	ANALYTICAL RESULT	MATERIAL CONDITION	APPROX. QUANTITY	ACTION REQUIRED	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)	DATE OF CONTROL ACTION &/OR REMOVAL
Synthetic Mineral Fibres (SMF)											
No Synthetic Mineral Fibre materials were identified at the time of inspection									-	30/4/2020 JBS&G SL	
Ozone Depleting Substances (ODS)											
No Ozone Depleting Substances were identified at the time of inspection									-	30/4/2020 JBS&G SL	
Inaccessible Areas											
Substation S1608 was locked and there was no access at the time of inspection											

Timber Treatment Materials Register (Rev 0)
New Sydney Fish Markets Development
1A to 1C Bridge Road, Glebe, NSW
Lot 4 & Lot 5 – Wharf and Piers
Date of Production – 18 May 2020

JBS&G SAMPLE NO.	LOCATION & MATERIAL	PHOTO NUMBER	ORGANOTINS TIMBER TREATMENT RESULTS			CREOSOTE TIMBER TREATMENT RESULTS						COPPER CHROME ARSENATE TREATMENT RESULTS		CLASSIFICATION	DATE OF LAST INSPECTION (INCL. COMPANY NAME AND INITIALS)
			MONOBUTYLTIN	DIBUTYLTIN	TRIBUTYLTIN	BENZO(A)PYRENE	TOTAL PAH	HALOGENATED PHENOLS	O-CRESOL	M&P-CRESOL	NON-HALOGENATED PHENOLS	CHROMIUM VI	ARSENIC		
T-01	Lot 5, northern portion of pier – timber pile	47/48	< 0.5 ng/g (Below LOR)	< 0.5 ng/g (Below LOR)	< 0.5 ng/g (Below LOR)	< 2.5 mg/kg (Below LOR)	< 2.5 mg/kg (Below LOR)	< 5 mg/kg (Below LOR)	< 2.5 mg/kg (Below LOR)	< 5 mg/kg (Below LOR)	< 75 mg/kg (Below LOR)	< 1 mg/kg (Below LOR)	< 2 mg/kg (Below LOR)	No timber treatments were identified and the timber is deemed suitable to be disposed of as general solid waste in accordance with NSW EPA 2014	1/5/2020 JBS&G SL
T-02	Lot 4, northern portion of pier – timber pile	49/50	< 0.5 ng/g (Below LOR)	< 0.5 ng/g (Below LOR)	< 0.5 ng/g (Below LOR)	< 2.5 mg/kg (Below LOR)	< 2.5 mg/kg (Below LOR)	< 5 mg/kg (Below LOR)	< 2.5 mg/kg (Below LOR)	< 5 mg/kg (Below LOR)	< 75 mg/kg (Below LOR)	< 1 mg/kg (Below LOR)	< 2 mg/kg (Below LOR)	No timber treatments were identified and the timber is deemed suitable to be disposed of as general solid waste in accordance with NSW EPA 2014	1/5/2020 JBS&G SL
T-03	Lot 4, eastern portion of wharf – timber pile	51/52	< 0.5 ng/g (Below LOR)	< 0.5 ng/g (Below LOR)	< 0.5 ng/g (Below LOR)	< 2.5 mg/kg (Below LOR)	< 2.5 mg/kg (Below LOR)	< 5 mg/kg (Below LOR)	< 2.5 mg/kg (Below LOR)	< 5 mg/kg (Below LOR)	< 75 mg/kg (Below LOR)	< 1 mg/kg (Below LOR)	< 2 mg/kg (Below LOR)	No timber treatments were identified and the timber is deemed suitable to be disposed of as general solid waste in accordance with NSW EPA 2014	1/5/2020 JBS&G SL



Photo 1: Overview of Lot 3



Photo 2: Lot 3, asbestos containing bituminous membrane on top of the brick wall adjacent the shower room



Photo 3: Lot 3, asbestos containing fibre cement conduit penetrating the floor of the store room



Photo 4: Lot 3, lead containing dust to the floor of the shower room



Photo 5: Lot 3, lead based green paint to the store room door



Photo 6: Lot 3, lead based black paint to the columns and beams of the timber structure

© JBS&G

Source:			
0	Original Issue -	SL	18/05/2020
Rev	Description	Drn.	Date

JBS&G

Appendix B: Photographs

Client: Infrastructure NSW

Project: New Sydney Fish Markets Redevelopment HBMS

Job No: 58317 File Name: R01 App B - Photo Log



Photo 7: Lot 3, lead based yellow paint to the substation timber doors



Photo 8: Lot 3, lead based blue paint to the shower room walls



Photo 9: Overview of Lot 4



Photo 10: Lot 4, non-asbestos containing mastic to the concrete expansion joint



Photo 11: Lot 4, lead based white paint to the metal and timber barrier at the SW end of the lot



Photo 12: Lot 4, lead based white paint to the timber beams of the pier

© JBS&G

Source:

Rev	Description	Drn.	Date
0	Original Issue -	SL	18/05/2020

JBS&G

Appendix B: Photographs

Client: Infrastructure NSW

Project: New Sydney Fish Markets Redevelopment HBMS

Job No: 58317 File Name: R01 App B - Photo Log



Photo 13: Lot 4, Overview of the Old Office Building



Photo 14: Lot 4, Old Office Building, asbestos containing corrugated fibre cement roof (internal surface)



Photo 15: Lot 4, Old Office Building, asbestos containing fibre cement roof barge capping



Photo 16: Lot 4, Old Office Building, assumed asbestos containing fibre cement gutters



Photo 17: Lot 4, Old Office Building, assumed asbestos containing fibre cement downpipe



Photo 18: Lot 4, Old Office Building, asbestos containing mixed fibre cement debris on top of the concrete roof to the north store room

© JBS&G

Source:

Rev	Description	Drn.	Date
0	Original Issue -	SL	18/05/2020

JBS&G

Appendix B: Photographs

Client: Infrastructure NSW

Project: New Sydney Fish Markets Redevelopment HBMS

Job No: 58317 File Name: R01 App B - Photo Log



Photo 19: Lot 4, Old Office Building, asbestos containing fibre cement fragments to the timber studs and behind nails on the south wall of the main room (ground floor)



Photo 20: Lot 4, Old Office Building, asbestos containing and lead containing settled dust to the floor of the ground floor toilets



Photo 21: Lot 4, Old Office Building, non-asbestos containing red and black cable sheath to redundant electrical wiring



Photo 22: Lot 4, Old Office Building, non-asbestos containing bituminous backing to the cement rendered walls of the stairwell



Photo 23: Lot 4, Old Office Building, non-asbestos containing black vinyl tiles and paper backing to the floor covering on the first floor



Photo 24: Lot 4, Old Office Building, lead containing dust and SMF insulation throughout the roof void

© JBS&G

Source:

Rev	Description	Drn.	Date
0	Original Issue -	SL	18/05/2020

Appendix B: Photographs

Client: Infrastructure NSW

Project: New Sydney Fish Markets Redevelopment HBMS

Job No: 58317 File Name: R01 App B - Photo Log



Photo 25: Lot 4, Old Office Building, lead containing dust to the ground floor window sills



Photo 26: Lot 4, Old Office Building, lead containing dust throughout the first floor



Photo 27: Lot 4, Old Office Building, lead based cream paint to the external north wall



Photo 28: Lot 4, Old Office Building, lead based white paint to the ground floor ceiling



Photo 29: Lot 4, Old Office Building, lead based blue paint to the ground floor toilet walls



Photo 30: Lot 4, Old Office Building, lead based yellow/orange paint to the ground floor toilet timber doors and frames

© JBS&G

Source:

Rev	Description	Drn.	Date
0	Original Issue -	SL	18/05/2020

JBS&G

Appendix B: Photographs

Client: Infrastructure NSW

Project: New Sydney Fish Markets Redevelopment HBMS

Job No: 58317 File Name: R01 App B - Photo Log



Photo 31: Lot 4, Old Office Building, lead based white paint to the ground floor internal brick walls



Photo 32: Lot 4, Old Office Building, lead based brown paint to the north store room door



Photo 33: Lot 4, Old Office Building, lead based green paint for the first floor east room windows



Photo 34: Lot 4, Old Office Building, lead based white paint to the first floor main room windows



Photo 35: Lot 4, Old Office Building, lead based blue paint to the first floor main room walls



Photo 36: Lot 4, Overview of Site Office

© JBS&G

Source:			
0	Original Issue -	SL	18/05/2020
Rev	Description	Drn.	Date

JBS&G

Appendix B: Photographs

Client: Infrastructure NSW

Project: New Sydney Fish Markets Redevelopment HBMS

Job No: 58317 File Name: R01 App B - Photo Log



Photo 37: Lot 4, Site Office, non-asbestos containing fibre cement sheeting to the external walls



Photo 38: Lot 4, Site Office, non-asbestos containing mastic to the external metal walls



Photo 39: Lot 4, Site Office, non-asbestos containing fibre cement sheeting to the former kitchenette



Photo 40: Lot 4, Site Office, assumed SMF insulation to the hot water system



Photo 41: Lot 4, Site Office, assumed SMF insulation throughout the roof void



Photo 42: Overview of Lot 5

© JBS&G

Source:			
0	Original Issue -	SL	18/05/2020
Rev	Description	Drn.	Date

JBS&G

Appendix B: Photographs

Client: Infrastructure NSW

Project: New Sydney Fish Markets Redevelopment HBMS

Job No: 58317 File Name: R01 App B - Photo Log



Photo 43: Lot 5, non-asbestos containing mastic to the expansion joint in the northern portion



Photo 44: Lot 5, non-asbestos containing mastic to the expansion joint in the central portion



Photo 45: Lot 5, non-lead based white paint to the pier extending from the northern portion of the lot



Photo 46: Lot 5, non-lead based yellow paint to the bollards in the southern portion



Photo 47: Lot 5, Overview of the pier



Photo 48: Lot 5 pier, no timber treatments were identified to the timber piles

© JBS&G

Source:			
0	Original Issue -	SL	18/05/2020
Rev	Description	Drn.	Date

JBS&G

Appendix B: Photographs

Client: Infrastructure NSW

Project: New Sydney Fish Markets Redevelopment HBMS

Job No: 58317 File Name: R01 App B - Photo Log



Photo 49: Lot 4, Overview of the pier



Photo 50: Lot 4 pier, no timber treatments were identified to the timber piles



Photo 51: Lot 4, Overview of the wharf



Photo 52: Lot 4 wharf, no timber treatments were identified to the timber piles

© JBS&G

Source:

Rev	Description	Drn.	Date
0	Original Issue -	SL	18/05/2020

JBS&G

Appendix B: Photographs

Client: Infrastructure NSW

Project: New Sydney Fish Markets Redevelopment HBMS

Job No: 58317 File Name: R01 App B - Photo Log

senversa

tel: + 61 2 8252 0000
fax: + 61 3 9606 0074
enquiries@senversa.com.au
www.senversa.com.au
Level 5, The Grafton Bond Building, 201 Kent St, Sydney NSW 2000
Senversa Pty Ltd ABN 89 132 231 380



Appendix 11: Acid Sulphate Soils Management Plan

Infrastructure NSW

Acid Sulfate Soil Management Plan

The new Sydney Fish Market
1A to 1C Bridge Rd, Glebe NSW

26 April 2021

60081/136,951 (Rev 6)

JBS&G Australia Pty Ltd

www.jbsg.com.au

Infrastructure NSW

Acid Sulfate Soil Management Plan

The new Sydney Fish Markets
1A to 1C Bridge Rd, Glebe NSW

26 April 2021

60081/136,951 (Rev 6)
JBS&G Australia Pty Ltd

Table of Contents

1. Introduction 1
   - 1.1 Introduction and Development Details 1
   - 1.2 Aims and Objectives 1
   - 1.3 Proposed Development 2
   - 1.4 Previous Assessments 4
2. Acid Sulfate Soil General Information 6
   - 2.1 Acid Sulfate Soils Background 6
   - 2.2 Laboratory Assessment Criteria 6
   - 2.3 Other Regulatory Guidance 7
3. Site Condition 9
   - 3.1 Site Identification 9
   - 3.2 Site Condition 9
   - 3.3 Geology and Soils 9
   - 3.4 Acid Sulfate Soils 10
   - 3.5 Topography and Hydrology 10
   - 3.6 Hydrogeology 11
4. Extent of Acid Sulfate Soils 12
5. Management Procedures 13
   - 5.1 Scope of Soil /Sediment Disturbance Activities 13
   - 5.2 Investigation of Occurrence of ASS and/or PASS Material 13
   - 5.3 Evaluation of Potential Management Strategies 14
     - 5.3.1 Avoidance Strategies 15
     - 5.3.2 Management by Neutralisation 15
     - 5.3.3 Full Oxidation and Leachate Collection 16
     - 5.3.4 Reburial of ASS Material 17
     - 5.3.5 Separation Techniques 17
     - 5.3.6 Selection of Preferred Management Strategies 18
   - 5.4 Sediment Adjustment Management Strategy 18
   - 5.5 General Site Management Strategy 20
     - 5.5.1 Pre-disturbance Works 20
     - 5.5.2 Neutralisation Chemicals 20
     - 5.5.3 Treatment Area Design 21
     - 5.5.4 General Site Management 23
     - 5.5.5 Excavation Works 23
     - 5.5.6 Treatment of Excavated PASS Material 24
     - 5.5.7 Water Management During Treatment 24

5.5.8 Validation of Treated PASS Material 25
5.5.9 Site Condition Monitoring 26
5.5.10 Removal of Neutralised ASS Material from the Site 27
6. Responsibilities 28
7. Contingencies 29
7.1 General Site Management Activities 29
7.1.1 Failure of Initial Acid Neutralisation Treatment 29
7.1.2 Significant Acidification of Surface Water 29
7.2 Sediment Adjustment Works 29
7.2.1 Oxidation/Acidification of Sediments within Split Hopper Barge 29
7.2.2 Suspension of Sediments in Water Column 30
8. Conclusions 31
9. Limitations 32

List of Tables

Table 2.1: ASSMAC Site Action Criteria based on General Soil Texture Categories 7
Table 3.1 Summary Site Details 9
Table 5.1: Treatment of Acidic Dewater 25

List of Figures

Figure 1 Site Location
Figure 2 Site Layout
Figure 3 Extent of Acid Sulfate Soil at Site
Figure 4 Proposed Construction Work Areas

1. Introduction

1.1 Introduction and Development Details

JBS&G Australia Pty Ltd (JBS&G) was engaged by Infrastructure NSW (iNSW, the client) to prepare an Acid Sulfate Soil Management Plan (ASSMP) for the proposed new Sydney Fish Market site located at the head of Blackwattle Bay between the Pyrmont Peninsula and the foreshore of Glebe (the site). The site is legally identified as Lots 3-5 in DP 1064339, part Lot 107 in DP 1076596 and part Lot 1 in DP835794 as shown on **Figures 1** and **2**. The individual lots fall within City of Sydney (CoS) local government area. The site area is approximately 3.7 Ha, of which 0.7 Ha consists of soil based materials present behind an existing sea wall above the high water mark.

The proposed new Sydney Fish Market site is situated at the southern portion of Blackwattle Bay, which is one portion of the Bays Precinct Urban Transformation Area (BPUT) that comprises approximately 80 Ha of land, in addition to 94 Ha of water that is the subject of a NSW Government urban transformation project that will have the potential to deliver additional residential, commercial, recreational and community developments over a 20-30 year timeframe.

Review of the *Acid Sulfate Soil Risk Map for Prospect/Parramatta*[1] indicates that the site is located within an area of '*high probability of occurrence of Acid Sulfate Soils*'. In such areas there is a severe environmental risk if bottom sediments are disturbed by activities such as dredging. Previous investigations have identified potential indicators of ASS comprising odorous marine sediments with sea shells observed in boreholes located in the southern portion of the site (overlying the land portion of the site) and within marine sediments in Blackwattle Bay. Moreover, additional sediment materials recently identified beneath the former Hanson Wharf were reported to comprise of Potential ASS (PASS (JBS&G 2021)[2].

With due consideration to the geological and soil characteristics of the site (i.e. fine-grained sediments), in addition to historical information, management of development activities is required to consider the potential for disturbance of acid sulfate soil (ASS) including PASS if development activities involve excavation or otherwise oxidation of soils beneath the water table.

Site development activities within the land portion of the site are largely at grade, however, it is anticipated that works associated with construction of the new development will require disturbance of sediments within the bay as a result of piling installation activities and adjustment of sediment bed levels for stormwater culvert maintenance and construction of the future basement.

As such an ASSMP is required to document procedures to be implemented to manage the potential environmental risk associated with disturbance of these materials. This ASSMP has been prepared in accordance with the general requirements of the Acid Sulfate Soil Manual (ASSMAC 1998[3]) and with consideration to the National Acid Sulfate Soils Guidance (DAWR 2018[4]).

1.2 Aims and Objectives

The aim of this ASSMP is to outline management techniques that may be employed to mitigate the potential environmental impacts associated with the risk of disturbance of ASS/PASS during the proposed site construction works. Specifically, the objectives of this ASSMP are to document:

---

1 *Acid Sulfate Soil Risk Map – Prospect/Parramatta,* Edition 2, 1997 1:25 000 Ref: 91 30N2. NSW DLWC (1997)

2 *Sediment Characterisation Assessment, t*he new Sydney Fish Market, 1A to 1C Bridge Rd, Glebe NSW, JBS&G Australia Pty Ltd, 12 January 2021 (JBS&G 2021).

3 *Acid Sulfate Soil Manual*, NSW Acid Sulfate Soil Management Advisory Committee, August 1998 (ASSMAC 1998)

4 *National Acid Sulfate Soil Guidance*. Australian Government Department of Agriculture and Water Resources (DAWR), June 2018 (AGDAW, 2018)

- The known and anticipated site sub-surface characteristics expected to be encountered during future excavation works for consideration in development of future investigative and management activities;
- A monitoring and sampling strategy to be implemented prior to and during the proposed ground disturbance activities such that ASS/PASS may be appropriately identified and managed during the excavation works;
- Evaluation of potential ASS/PASS management opportunities and constraints resulting in the identification of a preferred management strategy(ies); and
- Procedures for the management and validation of ASS during the future site excavation works so as to minimise the potential for adverse environmental impacts as a result of the ASS/PASS disturbance activities.

1.3 Proposed Development

It is understood that statutory approval for the proposed development scheme was obtained in two stages, comprising the initial concept development approval (SSD-8924), being for the demolition of existing structures and approval for the proposed development envelope for use of the site as a fish market. The second development approval (Main Works, SSD-8925) for the construction of the new fish market and associated works.

Specifically, the Concept development application gained approval for:

- the use of the site for the fish market including waterfront commercial and tourist facilities and ancillary uses and the distribution of uses;
- a gross floor area of 26,953 m^2 contained within a defined building envelope;
- waterfront structures such as wharves;
- concepts for improvements to the public domain including promenades, access to Blackwattle Bay and landscaping;
- pedestrian cycle and road access and circulation principles; and
- principles for infrastructure provision and waste management.

The development application 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.

The Main Works development application gained approval for:

- the construction of a new fish market including land and water-based structures.
- the use of the site for the fish market including waterfront commercial and tourist facilities and ancillary uses and the distribution of uses;
- a gross floor area of approximately 26,000m^2 as calculated according to the definition of GFA under SREP 26 (approximately 25,600m^2 as calculated according to the definition of GFA under the Standard Instrument).
- public domain works including promenades access to Blackwattle Bay and landscaping;
- pedestrian, cycle and road access and circulation;
- infrastructure provision and waste management; and
- 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;
- 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; and
- 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.

Specifically, the proposed development works to occur within the works area as shown in **Figure 4** will include:

- Retention, rehabilitation/repair of the existing sea wall structures.
- Removal/decommissioning of all existing industrial and wharf infrastructure.
- Construction of a new basement level carpark in front of the existing sea wall with appropriate measures to allow the continued discharge of stormwater through existing culverts.

- Foundations for the new structures will be completed as driven steel piles with the basement constructed as a precast stainless steel structure within which a membrane will be fitted and in-situ basement pavements poured resulting in a water tight structure.
- The proposed basement finished floor level (FFL) has been designed at -0.3 m AHD. Allowing for a hydrostatic slab and steel structure, JBS&G has conservatively assumed a base of structure of approximately -1.3 m AHD.
- To facilitate continued use of the existing stormwater culverts and allow for the construction of the basement, the proposed works will include some reprofiling of sediments across the extent of the site. It is anticipated that a volume of approximately 12,500 m^3 of sediment materials will require reprofiling.

  Where possible, all sediment/silt movement will relocate excess material within the basement footprint so as to minimise the level of disturbance of both the material and ecological receptors. However, it is noted that some sediments may require reprofiling up to the extent of the site boundary.

  Given the inherent uncertainties associated with the survey methodology and the potential for movement of sediment/silt within the building footprint between the survey period and commencement of works, the reported volumes requiring removal should be preliminary estimates and contingency allowed should additional material required removal to achieve the drainage/construction objectives.
- Following the installation of the driven steel piles, a coffer dam will be installed around the construction footprint to enclose the site and enable temporary partial dewatering to facilitate construction requirements whilst ensuring that sediments remaining beneath the building footprint will remain saturated during the construction period until such time as the coffer dam is disassembled.

1.4 Previous Assessments

Review of the following site investigation (environmental and geotechnical) reports has been undertaken in forming the basis for the requirements of the ASSMP. The available reports included:

- *Environmental Site Investigation Blackwattle Bay Maritime Precinct Blackwattle Bay Maritime Precinct, NSW*, March 2009, Parsons Brinkerhoff (PB 2009)
- *Sydney Bays Precinct Urban Growth NSW Geotechnical Desktop Review*, 6 August 2014, Jacobs Group (Australia) Pty Limited (Jacobs 2014);
- *UrbanGrowth NSW Environmental Site Assessment The Bays Precinct Urban Transformation Area.* Rev 1, 18 November 2015, JBS&G Australia Pty Ltd (JBS&G 2015a);
- *Contamination Investigation The Bays Precinct – Separable Portion 1 Blackwattle Bay, Pyrmont, NSW*, 12 July 2017, Environmental Investigation Services (EIS 2017);
- *Revised Geotechnical Report to Urbangrowth NSW on Geotechnical Investigation for Proposed Bays Market District at Blackwattle Bay & Wentworth Park, Pyrmont, NSW rev 2*, 14 September 2017, JK Geotechnics (JK 2017);
- *Environmental Site Assessment, the new Sydney Fish Market, 1A to 1C Bridge Road, Glebe, NSW*, 4 April 2019, Rev 3, JBS&G Australia Pty Ltd (JBS&G 2019a);
- *Data gap Assessment, the new Sydney Fish Market, 1A to 1C Bridge Road, Glebe, NSW*, 12 March 2019, Rev A, JBS&G Australia Pty Ltd (JBS&G 2019b);
- *Remedial Action Plan, the new Sydney Fish Market, 1A to 1C Bridge Road, Glebe, NSW*, 8 July 2020, Rev 4, JBS&G Australia Pty Ltd (JBS&G 2020); and

- *Sediment Characterisation Assessment*, the new Sydney Fish Market, 1A to 1C Bridge Rd, Glebe NSW, JBS&G Australia Pty Ltd, 12 January 2021 (JBS&G 2021).

2. Acid Sulfate Soil General Information

2.1 Acid Sulfate Soils Background

ASS is a common name given to naturally occurring sediments and soils containing iron sulfides (generally as iron sulfide or iron disulfide). These soil profiles are typically located in coastal, low-lying alluvial or estuarine areas such as mangroves, salt marshes, coastal rivers and creeks, estuaries, tidal lakes and coastal floodplains where historical iron rich sediment deposition in the presence of a sulfate source (commonly salt water), organic matter and microbial action over time has resulted in the formation of particular environmental conditions. ASSs are predominantly encountered in areas where the soil profile has an elevation of less than 5 m Australian Height Datum (AHD), and may be found close to the ground level or at depth in the soil profile where continued deposition actions have resulted in raising of the ground levels.

Changes in environmental conditions which result in the exposure of these materials to air, via excavation or drainage of subsurface soils, can lead to the reaction of the iron sulfides with oxygen, causing the generation of sulfuric acid. This may result in significant environmental and infrastructure damage if the produced acid is spread by groundwater or surface water.

ASS consist of two major categories:

- Acid Sulfate Soils (ASS) are soils that have been exposed to air which has caused the oxidation of iron sulfides to form sulfuric acid. Some of this acid is commonly neutralised by other soil particles in a process known as buffering, however the excess acid is spread by water movement through the soil; and
- Potential Acid Sulfate Soils (PASS) are soils which contain iron sulfides, but which have not been exposed to air and oxidised. These soils are generally kept from contact with air by permanent waterlogging or the density of the soil profile and so are relatively stable, or in equilibrium. In this state the soils are generally non-acidic and are considered harmless to the environment. However, oxidation of such soils through disturbance has the potential to generate acidic conditions.

Commonly, an ASS profile will consist of a combination of both ASS and PASS material as a result of ongoing chemical reactions in response to environmental changes including groundwater fluctuations and seasonal soil moisture changes.

The following types of site activities are likely to result in disturbance of ASS (both ASS and PASS) during urban development activities:

- Bulk excavation works which encounter subsurface soil which may be completed to achieve basement levels, installation of drainage infrastructure, alteration of existing site levels to achieve modified ground levels, dredging or otherwise mobilisation such that the sediment may become oxidised, etc.;
- Dewatering activities associated with construction works proposed at elevations below the standing water table, for example installation of drainage infrastructure, etc. which may result in ASS beyond the excavation extent becoming exposed to oxygen due to a lowering of groundwater levels, thereby generating acidic conditions; and
- Generation of spoil which may return ASS to the ground surface associated with foundation construction works, including piling spoil during CFA or bored pile installation activities, directional drilling works for infrastructure services installation, etc.

2.2 Laboratory Assessment Criteria

The assessment of site soil conditions with respect to ASS occurrence is completed in accordance with the guidance provided in ASSMAC (1998). The requirement to manage soils for ASS is evaluated

by comparison of laboratory analysis results with Site Action Criteria (SAC) developed based on three broad soil texture categories. The SAC are based on the percentage of oxidisable sulfur or equivalent acid trail (i.e. titratable actual acidity-TAA or titratable potential acidity-TPA) results. There are two categories based on the scale of the proposed disturbance, with the SAC for small scale (i.e. less than 1000 tonnes) works based upon the texture of the soil material and the SAC for large scale works adopting the most sensitive SAC being the SAC for coarse textured soils in small scale works.

Table 2.1: ASSMAC Site Action Criteria based on General Soil Texture Categories

Type of material		Action Criteria 1-1000 tonnes disturbed		Action Criteria if more than 1000 tonnes disturbed	
Texture Range. McDonald at al. (1990)	Approx. clay content (%<0.002 mm)	Sulfur trail % S oxidisable (oven-dry basis) e.g. S_{Cr} or S_{pos}	Acid trail Mol H^+/tonne (oven-dry basis) e.g., TPA or TSA	Sulfur Trail % S oxidisable (oven-dry basis) e.g. S_{Cr} or S_{pos}	Acid trail Mol H^+/tonne (oven-dry basis) e.g., TPA or TSA
Coarse Texture Sands to loamy sands	≤5	0.03	18	0.03	18
Medium texture Sandy loams to light clay	5-40	0.06	36	0.03	18
Fine texture Medium to Heavy clays and silty clays	≥40	0.1	62	0.03	18

Exceedance of the SAC attributable to ASS material generally triggers the need to prepare a management plan and is based on the percentage of oxidisable sulfur (or equivalent TPA, TAA) for broad categories of soil. However, it is noted that other soil properties and constituents may cause acidic conditions in soils that are not related to acid sulfate soil conditions. This may include sources of organic acidity where the soils have a pH of less than 5 and positive titratable actual acidity (TAA) or titratable potential acidity (TPA) but have no detectable sulfur source (i.e. no S%). In this case, exceedance of the Acid Trail SAC does not trigger treatment of these soils (DWAR 2018e[5]).

Given the nature of the works to be undertaken at the site (expected to result in >1000 tonnes of materials disturbed) and with consideration to the variability of the soils types noted in previous investigations, the SAC adopted for assessment and management of ASS at this site are:

- Sulfur Trail Criteria (S_{pos} or S_{Cr} %) > 0.03 %;
- Acid Trail Criteria (TSA, TPA) > 18 mol H^+ / tonne soil.

2.3 Other Regulatory Guidance

Section 105 of the *Contaminated Land Management Act 1997* (CLM Act) allows the Environment Protection Authority (EPA) to "make or approve" guidelines for any purpose related to the objects of the Act. In addition to ASSMAC (1998), this management plan has been prepared with reference to the following:

- *Waste Classification Guidelines Part 1: Classifying Waste* (EPA 2014a);
- *Waste Classification Guidelines Part 4: Acid Sulfate Soils* (EPA 2014b);
- *Contaminated Sites: Guidelines for NSW Site Auditor Scheme*, 3rd Edition, EPA (2017); and
- *Protection of the Environment Operations Act* 1997 (POEO Act) and associated regulations.

Note is also made of the National Acid Sulfate Soil Guidance issued in June 2018 by the Australian Government Department of Agriculture and Water Resources (DAWR), including:

[5] *Guideline for the Dredging of Acid Sulfate Soil Sediments and Associated Dredge Spoil Management, Australian Government Department of Agriculture and Water Resources, June 2018 (DAWR 2018e)*

- *National Acid Sulfate Soil Guidance: A Synthesis* (DAWR 2018a);
- *National Strategy for the Management of Coastal Acid Sulfate Soils* (DAWR 2018b);
- *National Acid Sulfate Soils Sampling and Identification Methods Manual (DAWR 2018c);*
- *National Acid Sulfate Soils Sampling and Laboratory Methods Manual (DAWR 2018c);*
- *Guidance for the Dewatering of Acid Sulfate Soils in Shallow Groundwater Environments* (DAWR 2018d); and
- *Guideline for the Dredging of Acid Sulfate Soil Sediments and Associated Dredge Spoil Management (DAWR 2018e).*

3. Site Condition

3.1 Site Identification

The site location is shown in **Figure 1**, and current site layout is shown in **Figure 2**. The site details are summarised in **Table 3.1** and described in the following sections.

Table 3.1 Summary Site Details

Site Lot / DP	Lots 3-5 in DP 1064339 Part Lot 107 in DP1076596 Part Lot 1 in DP835794
Site Address	1A to 1C Bridge Road, Glebe NSW and part 56-60 Pyrmont Bridge Road, Pyrmont NSW
Investigation Area Lot / DP	Part Lot 5 in DP1064339
Investigation Area Address	1A Bridge Road, Glebe NSW
Local Government Authority	City of Sydney Council
Approximate MGA Coordinates (MGA 56)	Easting: 332669.678 Northing: 6250259.919
Previous Use	Various industrial and commercial uses (concrete batching plant)
Proposed Use	Commercial use (fish market)
Site Area	Approximately 3.7 Ha (approximately 0.76 Ha land based)

3.2 Site Condition

A detailed site description and environmental setting is provided in JBS&G (2019a). At the time of preparing this ASSMP, the site was in the process of been demolished as consistent with the Stage 1 consent (SSD-8924).

As discussed in JBS&G (2021) the key site observations noted during the additional assessment activities in the western portion of the site included:

- The former wharf structure was in the process of been demolished at the time of sampling activities including removal of the former deck structures leaving wooden piles within the water (in November 2020);
- At high tide, all areas within the investigation footprint (comprising the former Hanson Wharf footprint at western portion of the site) were inundated with surface water of Blackwattle Bay;
- At low tide, there were exposed sediments within the central-southern portion of the Hanson wharf footprint. The sediments were observed to comprise of dark-grey to black gravelly silt with several larger pieces of concrete present on the seedbed.

3.3 Geology and Soils

Jacobs (2014) reported that review of existing geotechnical maps indicate that the area of the site is underlain by a significant depth (>3 m) of fill material, as consistent with historical reclamation of the area from Blackwattle Bay. This is consistent with Wentworth Park as located further south of the site. Hawkesbury Sandstone was anticipated under site filling.

JK (2017a) reported that the 1:100,000 Geological Map of Sydney indicated the site to be underlain by man-made fill and estuarine soils overlying Hawkesbury Sandstone of the Wianamatta Group. The Hawkesbury Sandstone comprises medium to coarse grained quartz sandstone with very minor shale and laminite lenses. It was further noted that at least two dykes were believed to extend through the site in a rough north-west to south-east alignment.

Boreholes in Blackwattle Bay undertaken for JK (2017a) disclosed a subsurface profile generally comprising natural clay and sandy clay sediment/soils of medium to high plasticity and clayey sand sediment/soil overlying sandstone bedrock. In the bay, the boreholes typically encountered no fill from the seabed level, except the boreholes close to the existing shoreline where fill extending up to 4.7m depth was encountered. There generally appeared to be a fill layer close to the southern

shoreline. The fill sediments were reported to comprise a clayey sand and silty clay with trace amounts of fine to medium grained sand and coal and plastic fragments. Boreholes in the adjoining Wentworth Park identified fill comprising silty sand or sandy clay containing varying amounts of inclusions such as sandstone and igneous gravel, also timber, tile, ceramic, glass, shell, concrete and brick fragments, slag and ash.

Natural soils/sediments were reported by JK (2017a) to have been encountered either from seabed level or about 0.5m depth in the Bay and comprised interbedded layers of silty clay, sandy clay and clayey sand soils. The predominantly clay samples were assessed as having moisture content greater than their plastic limits and based upon hand penetrometer tests completed on the samples, ranged in strength from very soft to very stiff. The clays were assessed as generally being of medium to high plasticity, although more sandy clays were generally of low to medium plasticity. The predominantly sandy samples were assessed as wet and ranged from very loose to dense relative density. The natural soils contained varying amounts of fine to coarse grained gravel, shell fragments and other organic materials.

Sandstone bedrock was encountered underlying natural soils at depths ranging from approximately 5.5 - 13.4 m below ground surface (bgs) being -9.1 to -18.5 m AHD.

The additional JBS&G (2021) investigation works encountered sediments comprising of gravelly, clayey silt (mud), with varying levels of inclusions that included coal, ash, organic material, sea shells and metal fragments. The materials were observed to be largely consistent (visually) across each sampling location to the maximum depth of the investigation (2.2 m) to an average depth of 0.9 m.

3.4 Acid Sulfate Soils

Review of the Acid Sulfate Soil (ASS) Risk Map for Prospect/Parramatta (DLWC 1997) indicates that the subject site is located within an area of 'high probability' of acid sulfate soils within bottom sediments. In such areas, there is the potential for severe environmental risk if bottom sediments are disturbed by activities such as dredging. The high probability classification covers the whole site footprint as shown in **Figure 3**.

PB (2009) noted potential indicators of ASS comprising odorous marine sediments with sea shells in boreholes located in the southern portion of the site (overlying the land portion of the site) and within marine sediments in Blackwattle Bay. Similar observations were reported in JBS&G (2015) and EIS (2017), however no samples were analysed at a laboratory to confirm the nature of acid generation potential. As documented in JBS&G (2015), marine sediments underlying the bay and underlying fill material behind sea walls bordering Blackwattle Bay have previously been identified via laboratory characterisation as PASS.

A data gap assessment (JBS&G 2019b) within the land based site portion reported shallow gravelly-sandy (coarse materials) fill materials in the unsaturated zone to comprise non-PASS, while saturated sediments (sandy clay/silty sand) at depths from 2.2 m bgs within the land-based site portion comprised of PASS. In addition, the additional sediments underlying the former Hanson Wharf as recently assessed (JBS&G 2021), were all confirmed to comprise PASS.

3.5 Topography and Hydrology

The site is situated on predominantly flat terrain associated with reclamation of the former extent of Blackwattle Bay underlying Bridge Road and Wentworth Park further to the south-east of the site. These areas were reclaimed during the period between 1836 and 1891. Review of topographic information obtained from regional topographic maps available on NearMap spatial information database indicated that southern portion of the site that has been subject to land reclamation and has an elevation of approximately 2 m Australian Height Datum (AHD), retained by a sandstone block and in parts concrete block retaining wall.

Site surface water is anticipated to drain directly into Blackwattle Bay.

3.6 Hydrogeology

A review of the registered bore information (NSW DPI 2017[6]) indicated that there are 14 registered bores within a 500 m radius of the site. The closest wells (approximately 250 m south-west of site) were constructed for monitoring purposes and were reported to contain a standing water level of approximately 0.6 m within shallow fill materials.

Groundwater monitoring as undertaken within the extent of the site as part of previous investigation and has identified:

- Site groundwater to have reported total dissolved solids (TDS) concentrations consistent with saline waters; and
- Standing water levels correspond with tidal surface water levels of Blackwattle Bay in which site groundwater is anticipated to discharge.

[6] NSW Department of Primary Industries, 2015. Groundwater Monitoring Overview Map. Http://allwaterdata.water.nsw.gov.au/water.stm. Accessed 13 February 2018

4. Extent of Acid Sulfate Soils

Previous investigations noted potential indicators of ASS comprising odorous marine sediments with sea shells in boreholes located in the southern portion of the site (overlying the land portion of the site) and within marine sediments in Blackwattle Bay. In addition, all sediments assessed within the former Hanson Wharf footprint as documented in JBS&G (2021), were confirmed to comprise PASS. Therefore, based on the physical observations of sediment characteristics and previous broader information on PASS conditions around the Bay, for the purposes of this ASSMP, all marine sediments have been characterised as PASS material. Such conditions extend beyond the site boundaries in all directions.

During previous site investigation activities, no obvious visual/olfactory potential indicators of ASS were noted on the borehole logs within fill material in the land based portion of the site. In addition, JBS&G (2019b) reported that the shallow unsaturated gravelly-sandy (coarse materials) fill materials encountered during the investigation comprised of non-PASS. As such, these materials likely do not require management with regard to ASS during future construction activities.

The underlying saturated soils/sediments within the land based site portion were reported to comprise PASS and therefore require appropriate management and treatment during future works that result in their disturbance. Based on the current extent of sediment investigations within the Bay site portion, the sediments are expected to also comprise PASS and will require management/treatment during all works that may result in disturbance of these materials.

As such, for the purposes of this ASSMP, it is considered that all ground disturbance activities within saturated soils/sediments, both behind the sea wall and within the Bay will require consideration of ASS management requirements. Further site assessment (field and/or laboratory based testing) is also required to be undertaken prior to, and also potentially during development activities, as outlined in this ASSMP to confirm specific requirements for management of material types during the works such that the risk of acid generation is appropriately managed. As discussed within the RAP (JBS&G 2020), it is anticipated that additional characterisation of soil and sediment will be undertaken prior to commencement of works at the site for both contamination and acid sulfate soil management objectives.

In addition, given that the marine sediments within the bay portion of the site are expected to also be representative of ASS, any works that result in their significant disturbance, including excavation, dewatering and/or mobilisation (sediment resuspension) into the overlying water column, will require specific consideration of ASS management requirements.

5. Management Procedures

The aim of the following management procedures is to identify ASS/PASS material and implement appropriate mitigation measures such that the potential environmental impacts associated with disturbance of ASS/PASS during the proposed site remediation and construction works may be appropriately managed. Specifically, the objectives are to provide:

- A methodology for the identification of materials requiring management;
- Protocols for the on-site treatment and management of ASS/PASS materials and associated leachate water (as required) during the proposed works;
- Excavation inspection and validation assessment protocols to be implemented during the proposed works such that the extent of ASS/PASS material may be delineated from non-ASS material (overlying non-ASS material, residual soils, etc) to provide for off-site disposal of the balance of excavated material without the need for lime stabilisation);
- Water and soil quality targets for the excavation, treatment and removal of material encountered during the proposed works; and
- A contingency framework in the event that additional ASS conditions are encountered during the site works; monitoring indicates disturbance of off-site ASS materials; or the proposed treatment strategy fails.

5.1 Scope of Soil /Sediment Disturbance Activities

The proposed development works will include removal of the existing site infrastructure, installation of new piled footings for the above water site portion, excavation/installation of footings, fixtures, foundations and retaining walls on the land portion, all of which may require the excavation of fill material, natural soils and sediments from below the water table. Sediment relocation activities will be required to provide for the construction of the new structure which will include reprofiling of approximately 12,500 m^3 of materials across the proposed basement footprint. The relocation works will include movement of material in the vicinity of existing stormwater culverts to ensure maintenance of water flows and removal of a portion of the existing rock revetment along the sea wall. On this basis, PASS material will be disturbed within the Bay portion of the site and there is also the potential for the disturbance of ASS material within the land based site portion during development works.

The final scope of ASS/PASS disturbance activities will be evaluated following detailed further characterisation of site conditions and also upon finalisation of the construction requirements/methodologies to be implemented during the works.

5.2 Investigation of Occurrence of ASS and/or PASS Material

Historically, field and laboratory assessment of PASS conditions has been limited spatially within soils/sediment at or in the vicinity of the site as discussed in previous sections. Further characterisation of the location and extent of ASS/PASS material within the site should therefore be undertaken either prior to the commencement of ground disturbance activities and/or sequentially as areas of disturbance extend across the site such that material requiring management may be identified and treatment requirements established as separate to non-ASS material.

To evaluate the potential presence and extent of ASS/PASS material, the following assessment activities should be undertaken by an appropriately qualified environmental consultant in accordance with the general philosophies outlined in ASSMP (1998)/ DAWR (2018) with regard to the identification of ASS/PASS materials within the remaining areas of the site prior to commencement of any disturbance activities:

- Sampling locations should be completed at an even grid spacing of no greater than 20 m in areas of anticipated ground/sediment disturbance to provide for assessment of the variability of ASS/PASS conditions. In transitional zones between areas of likely disturbance and those of no disturbance, sufficient sampling should be completed to ensure management requirements may be suitably understood prior to commencement of works. Each sampling location should be extended to confirm the presence of bedrock, or to a maximum of 1 m below the proposed level of disturbance (whichever is less);
- Visual inspection and sampling of representative soil profiles of damp to saturated soil/sediment at a frequency of no less than one sample per 1 m per metre depth interval, or discrete strata, at each sampling location. Each sample should be the subject of field pH_f and pH_{fox} tests;
- Based on the inspection and field testing results, no less than one sample per 1 metre per material type per area/material type should subsequently be selected for sPOCAS or chromium reducible sulfur (S_{Cr}) laboratory analysis to confirm the presence/absence of ASS/PASS material requiring management;
- Based upon the results of the field and laboratory analysis program, an updated inferred plan of the lateral and vertical extent of ASS/PASS requiring management will be provided to the Principal Contractor. In addition, the laboratory data will be used to identify anticipated liming requirements for ASS/PASS material types at the site (where appropriate); and
- The results of the assessment will provide a line of evidence for the validation of material beyond the ASS/PASS zone (if identified) for characterisation of the balance of surrounding/overlying soils as non-ASS material.

5.3 Evaluation of Potential Management Strategies

Where the presence of ASS/PASS has been identified, evaluation of options to minimise the level of disturbance and to mitigate the potential impact of disturbance (if necessary) of the materials is required. As per ASSMP (1998)/DAWR (2018), potential mitigation approaches have been identified:

- Avoid ASS materials being encountered during works by not undertaking the proposed development works or by altering the proposed development plans, i.e. removing excavation and/or dewatering requirements, use of non-intrusive/less intrusive trenching, pile installation, etc methods;
- Where encountering ASS/PASS during works cannot be avoided, manage the potential for acid generation by neutralising disturbed materials, preventing movement of acid impacted water, and the use of suitable construction materials;
- If ASS/PASS materials have previously been disturbed, undertake works to mitigate the existing conditions, minimise the production of further acid during the proposed works and rehabilitate impacted areas;
- Treat soil by allowing full oxidation of the sulfide component under controlled conditions followed by flushing the acid from the soil with water and neutralisation of the subsequent leachate;
- Avoid using untreated ASS/PASS materials as fill material in non-ASS areas by either leaving material on-site, or managing the potential for acid generation prior to material being transported from the site of origin; and/or
- Reburial of ASS/PASS materials beneath the permanent water table or beneath a dense soil profile which excludes oxygen exposure such as an engineered clay cap. This may be undertaken on-site if there are low lying areas where reburial and consequential flooding

of the soil profile or construction of a suitable capping layer can be undertaken as part of development works, or at an alternative off-site location provided that sufficient stabilisation of material is undertaken to minimise acid generation during transportation and handling.

The potential suitability of the various options is further discussed in the following sections.

5.3.1 Avoidance Strategies

Avoidance of ASS/PASS disturbance is generally considered to be the preferred means of ASS/PASS risk management where such actions can be achieved. However, given the extent of the development footprint associated with foundations, fixtures, footings and requirements to maintain operation of the existing culvert infrastructure that will require the reprofiling of sediments to facilitate the construction of the basemnt, the use of avoidance as a large scale risk management strategy is not a suitable option within the Bay portion of the site.

With regard to disturbance of sediment within the Bay portion of the site, wherever possible, measures will be undertaken to minimise the risk of oxidation of the sediments underlying the water column. Where construction works are required that may result in disturbance of bay sediment surface or near-surface sediments, management procedures will be implemented to minimise the lateral scale and depth of sediment mobilisation/disturbance.

5.3.2 Management by Neutralisation

Neutralisation techniques can be used to treat ASS by the addition of chemicals that react with the produced acid to ensure that acid is not released from the treated material. The neutralisation activities should result in the pH of the disturbed materials (water, sediment and/or soil) being between 5.5 to 7.5 and requires that ASS material disturbed during site activities be treated with the preferred neutralising agent.

Laboratory analysis is used to assess the levels of existing and/or actual acidity and indicates the level of neutralising capacity required to react with all potential acidity that may be generated during/following disturbance of the ASS material.

The potential uncertainty associated with the quantity of neutralising capacity to be added is commonly managed by the use of a factor of safety of 1.2 or 2 depending upon the level of uncertainty.

Sufficient capacity in terms of a suitable treatment area, machinery, budget to purchase the neutralising agent and time is necessary to successfully implement ASS neutralisation. Implementation of environmental controls is also necessary to ensure that all potentially acidic leachate produced during the treatment process is captured and adequately treated and that heavy metals which may be released during oxidation of ASS material are also appropriately managed.

An evaluation of potential neutralisation chemicals should be undertaken during the planning process and appropriate quantities of the preferred chemicals sourced for the duration of the site activities.

For the purposes of this plan, the neutralising chemical is assumed to be high quality agricultural lime (aglime). The aglime should be fine ground (<1mm) calcium carbonate ($CaCO_3$) or calcite (limestone or marble powder). In the event that neutralising products other than high quality aglime are selected for use in this project, there are several issues that should be considered:

- Is there any potential environmental risk associated with use of the compounds (i.e. other components that may contaminate water, result in a much higher pH value (i.e. hydrated lime), stain treatment areas, etc.);
- Will the neutralising agent be of comparable effectiveness or will properties including: neutralising value, effective neutralising capacity, solubility, pH, chemical components,

moisture content, impurities and particle size; require the quantity of agent addition to be varied by a consistent factor.

It is recommended that small scale treatment trials be implemented prior to broad scale implementation of alternative neutralising compounds. The small scale trials should document the effectiveness of the revised approach in terms of the time, cost, availability, suitability, etc. Consideration will also be required as to the feasibility of dewatering material and associated management of separated water and solids. Alternatively, consideration may be given to disposal of all material as liquid waste (as per EPA 2014 requirements).

During works, a sufficient supply of agricultural lime (aglime) will be required to be kept on site at all times. The quantity is based on requirements for the treatment of ASS to be neutralised within the treatment area; for application on exposed excavation faces where ASS is expected or suspected; and for wet weather events where existing applications will require replacement and/or treatment of acidic water is necessary. Receipts, dockets and other field records showing the storage locations of all chemicals and location of all applications of neutralising agents must be kept.

ASS management by neutralisation is considered to be a suitable option for the proposed works associated with the land based portion of the site and where sediments are generated at the ground/water surface (rather than at the bay sediment bed level) as:

- Material disturbed to achieve installation of services trenches, foundations or similar within the land based portion of the site will subsequently be surplus to development requirements, and as such neutralisation of the material following excavation will not affect the installation program (material may be set aside for treatment by others, whilst installation works continue, following which the material will be disposed of off-site);
- The majority of the piling works (and therefore the majority of potential spoil requiring treatment) is to be undertaken within the waterborne portion of the site and so this will provide an opportunity to treat the materials on the land portion of the site;
- Via staging of the excavation works, a contractor will be able to ensure sufficient space can be made available within the site to set aside a treatment area(s) close to the identified ASS disturbance which can be hydraulically isolated from the remainder of the site;
- The proposed works are able to be staged in a manner which will allow treatment of ASS material in a timely manner;
- Appropriate machinery to mix the soil and neutralisation chemicals can be supplied by the civil works/earthworks contractors completing works on site; and
- Following successful completion of the neutralisation process, the treated soils/sediments are no longer considered to be ASS materials and so may be removed off-site as waste.

5.3.3 Full Oxidation and Leachate Collection

In the event that the acid production potential is relatively low, or there is a relatively low quantity of material to be treated, consideration may be given to the excavation and exposure of the soils to promote full oxidation. This option requires the implementation of environmental controls to ensure that all acid produced is flushed from the soil as leachate. Similar to management by neutralisation, a suitable treatment area is necessary where material can be spread and reworked to allow oxygen to react with the sulfides in the soil and where all leachate produced can be captured and treated by neutralisation.

This method is considered not to be a viable option for the proposed works as the process of soil oxidation may take extended periods (weeks to months) to reach completion. There is also a significant level of uncertainty in the volumes of leachate that would require neutralisation and

disposal due to climatic variation, including rainfall events. Given the anticipated volume of material requiring treatment, the requirement to maintain environmental controls for this period and the potential for such works to extend the civil works program, this option is considered undesirable when compared to the relatively low cost of neutralisation chemicals as discussed in **Section 5.3.2** above.

5.3.4 Reburial of ASS Material

Strategic reburial or interment techniques can be used to manage PASS material by prevention of oxidation through permanent storage in an anoxic environment. These techniques are often adopted where areas are available for reburial and cost savings can be achieved by avoiding soil handling labour and neutralisation chemical costs. An alternative method of achieving reburial is over excavation of non-acid sulfate soil materials followed by reinstatement of the excavation with potential ASS material. Potential reburial sites must have a permanent groundwater table level above the proposed top of the reburial cell or alternatively measures to minimise oxygen exposure to ensure that the material is returned to an anoxic environment.

Reburial may occur within the site or alternatively, where appropriate licences are obtained, at a site lawfully able to accept this material in accordance with the requirements of EPA (2014).

Excavation of ASS and creation of re-interment voids must be staged to ensure that adequate space is available for all ASS materials to be adequately reburied below a permanent water table and that the ASS will not be buried in conditions that may cause the formation of acidic conditions. A maximum period of time between the commencement of disturbance and completion of interment works of approximately 48 hours should be adopted in all instances. If the material is to remain exposed for longer the 24 hours the pH levels should be monitored every 12 hours to ensure acid conditions are not developing.

On this site, given the number of excavations to accommodate foundations, footings and fixtures including significant piling works, strategic reburial of PASS material sourced from within the land portion of the site, or alternatively from piling spoil, without neutralisation is not considered a viable/recommended option.

However, adoption of these techniques is considered to potentially be appropriate in addressing the requirement to adjust sediment levels via reprofiling of the Bay sediment bed to achieve required construction levels for the basement structure and facilitate the continued operation of an existing stormwater culverts to the rear of the basement as shown in **Figure 4**.

The works will be conducted within controlled areas of identified need using methods that will minimise the mobilisation of sediment into the water column. It is anticipated that this will comprise use of an excavator mounted on a barge, to carefully excavate and then place saturated material within a separate split hopper barge, where the sediments will remain saturated so as to minimise oxygen exposure to the sediments and avoid the generation of acidic soil/water conditions, prior to final placement on the sediment bed within the site. The materials will be released from the split hopper barge at a depth close to the seabed so as to minimise the resuspension of sediment particles within the water column to the extent practicable.

Subsequent to further characterisation of sediment conditions (where required), consideration will be given as to whether the placed sediments should also be capped in-situ as part of the relocation works.

5.3.5 Separation Techniques

Separation techniques are increasingly being implemented to reduce the quantity of PASS material requiring treatment in areas where works include the disturbance of large quantities of PASS. These activities include the removal of fine ASS particles including pyrite and monosulfides from coarser grained soil particles. This results in two material streams, concentrated ‘ASS fines’ and non-ASS

material which can be removed from the management process. Management of ASS fines would then involve implementation of other ASS management techniques such as reburial, neutralisation, etc.

Separation is typically implemented by creating a soil slurry where fine particles can be suspended in solution away from heavier soil particles using methods such as sluicing or cycloning. Typically, such methods require suitably grained soils such as sand or non-consolidated sediments and a significant water source to implement the separation.

Environmental controls are required during the separation processes to ensure that the PASS fines do not undergo oxidation prior to the implementation of other management measures and validation of the non-ASS stream would then be necessary to confirm that the ASS fines have been adequately removed.

On this site, separation techniques are considered not to be a viable management option as it is anticipated that the majority of the material requiring management is fine-grained sediments, thereby limiting the efficacy of the technique.

5.3.6 Selection of Preferred Management Strategies

Evaluation of potential management strategies has identified the use of neutralisation techniques, where disturbance cannot be avoided (as discussed in **Section 5.4** following) as the most appropriate technique for management of disturbed soil and sediment across the majority of this site. Where adjustment of the sediment bed level will be required, management will be via implementation of measures as discussed in **Section 5.5** that avoid the oxidation of the saturated sediment in addition to the potential for re-burial of disturbed material such that there is no risk of occurrence of acid generation.

Management measures for excavated ASS/PASS material will include the application of neutralisation chemicals, neutralisation of exposed excavation faces during staged treatment works and neutralisation of groundwater seepage and drainage leachate produced during the excavation and treatment works. Following validation to confirm the acid generation potential of the material has been appropriately neutralised, the material will either be set aside for use as engineered fill material within the site, or alternatively, will require off-site disposal in accordance with the requirements of EPA (2014).

5.4 Sediment Adjustment Management Strategy

As noted above, disturbance of sediment within the Bay portion of the site will, where possible, be minimised via implementation of design solutions prior to commencement of works on site. However, based on current sediment bed survey information, it is anticipated that approximately 12,500 m^3 materials in the basement footprint may require movement as reprofiling to facilitate construction of the basement and ensure maintenance of culvert infrastructure performance and removal of existing rock revetment sections.

In this instance, disturbance of the ASS material is unavoidable. As such, implementation of management measures required to address the acid generation potential of the material during the movement and placement. Given the sediments are currently permanently water logged as a result of their location, exposure of underlying sediments at depth during these works is not expected to result in significant oxidation of the underlying material that becomes the exposed face. As such, beyond minimising any mobilisation of newly exposed sediment into the water column, no specific actions are required in relation to the material that will remain in-situ. However, should further assessment of site conditions prior to, or during disturbance identify geochemical changes in the in-situ sediments upon this disturbance works, consideration will be given to capping the newly exposed material so as to preserve the anoxic balance of material within this portion of the site.

For the material that is required to be moved to achieve construction objectives, the primary management techniques proposed will comprise the minimisation of disturbance to the extent practicable. Application of industry best practice measures that includes adoption of measured excavation procedures, management of overlying water level depths and use of dedicated silt curtains in the immediate vicinity of the work zone, etc as required to contain any disturbance activities that may cause acid generation as well as preclude any opportunity for mixing of on-site and off-site soil/sediment/water. For areas where piling activities may result in localised re-suspension of sediments, dedicated silt curtains surrounding individual works areas will also be adopted to minimise the spread of any suspended sediment and ensure its minimisation.

The methodology and associated management techniques will be refined with the appointed Principal Contractor (and where appropriate a specialist sub-contractor), however the following points will generally be employed:

- The sediments will be gently excavated using an excavator mounted on a barge and then placed within a separate split hopper barge. The materials will be required to always remain saturated, such that they are not drained and/or exposed to the air. This will be completed by loading the materials systematically along the length of the split hopper barge and maintaining a volume of bay surface water above the loaded sediments within the vessel at all times, thereby minimising the oxidation of exposed sediment during the movement activities;
- The split hopper barge will transport the sediments to the final placement location and release the materials within 12 hours of being loaded into the barge (and always released prior to end of work day) in order to minimise the potential for oxidation of the materials. The saturated material and associated water will be released via the base of the hopper barge, with the draft of the loaded barge being approximately 2 – 4 m above the sediment bed and commencement of unloading, thereby minimising the duration of the 'drop' and thereby potential for sedimentation suspension within the water column;
- All sediment adjustment works will be conducted within the confines of closely held sediment curtains (that comprise local silt curtains around the work zone and at the site boundary) to minimise the potential mobilisation of sediment into the water column within the broader site areas (and beyond the site); and
- The final methodology to be implemented will require optimisation / adaptive management based on the results of environmental monitoring to demonstrate the works are not causing or have the potential to cause environmental impact. A small scale site trial of the proposed methodology should be completed prior to the commencement of the general reprofiling sediment adjustment activities such that it can be demonstrated that the proposal is practical and meets the objectives of this ASSMP, or alternatively management measures will require adjustment until such can be demonstrated at which point the reprofiling works may commencement.

Given the high buffering capacity of salt water within the Bay, such measures are considered sufficient to minimise the risk of acid generation, heavy metals release and sedimentation during the adjustment works.

Continuous monitoring of water column turbidity (via visual inspection and monitoring buoys) and water pH will be undertaken during all adjustment activities to ensure measures are appropriate to achieve the required minimal generation of acidity. Monitoring buoys will be implemented immediately outside the silt curtains at locations relevant to the works being undertaken. Results will be continuously monitored against baseline water quality data established prior to the commencement of works so as to demonstrate the appropriate implementation of management measures during all activities.

5.5 General Site Management Strategy

In addition to the above management measures required for the sediment reprofiling works package, the site management strategy to be implemented during works which may disturb ASS/PASS materials as identified via works described in **Section 5.2** (other than the sediment bed disturbance/adjustment activities) will ensure the following:

- Adequate treatment of ASS/PASS material such that there is sufficient acid neutralizing capacity and no net acidity following stabilization (as measured through appropriate field testing and laboratory validation);
- Water discharged from the excavation and treatment areas (including run-off, water from dewatering and leachate) is neutral and discharged to stormwater once it has been shown to meet with the criteria specified in this plan, shall be reused on site, or alternatively reused on site for dust suppression;
- Surface/groundwater quality indicators and levels are not significantly changed beyond the construction footprint from the existing levels/quality during excavation activities and are re-established after the completion of construction works; and
- Implementation of additional assessment procedures during earthworks operations for the effective treatment and management of any drained, disturbed or excavated acid sulfate soils.

5.5.1 Pre-disturbance Works

Subsequent to the additional investigation activities as identified in **Section 5.2**, and prior to the commencement of any ground disturbance works which may disturb ASS/PASS materials at the site, including demolition and piling activities with the potential to disturb sediments and/or generate spoil, the following preparations should be implemented:

- The sequencing of proposed demolition, sediment bed disturbance activities, piling, excavation, services installation and other activities should be planned in detail taking into account the time and space necessary to complete the ASS/PASS management activities outlined in this document. The planning should provide a contingency for treatment of additional quantities of materials in the event that requirements for the disturbance of additional ASS/PASS material is identified following the commencement of site works, or heavy rainfall/storm/tide events result in significant additional quantities of collected impacted water; and
- The actual areas of ASS/PASS occurrence where disturbance/excavation will occur during each stage of works (piling, excavation, services installation, etc.) as part of the site activities should be identified and suitable location(s) for treatment areas close to the areas of disturbance identified. Based on the proposed works, the available space for treatment and the approximate volume anticipated to be disturbed, staging of the disturbance activities should then be planned such that sufficient drying and mixing time can be achieved for all materials needing treatment. The staging should also allow for adequate time to obtain the results of verification testing before the material is placed at the final location or removed from the site.

5.5.2 Neutralisation Chemicals

An evaluation of potential neutralisation chemicals should be undertaken during the planning process and appropriate quantities of the preferred chemicals sourced for the duration of the site activities. For the purposes of this plan, the neutralising chemical is assumed to be high quality agricultural lime (aglime). The aglime should be fine ground (<1 mm) calcium carbonate ($CaCO_3$) or

calcite (limestone or marble powder). In the event that neutralising products other than high quality aglime are selected for use in this project, there are several issues that should be considered:

- Is there any potential environmental risk associated with use of the compounds (i.e. other components that may contaminate water, result in a much higher pH value (i.e. hydrated lime), stain treatment areas, etc); and
- Will the neutralising agent be of comparable effectiveness or will properties including: neutralising value, effective neutralising capacity, solubility, pH, chemical components, moisture content, impurities and particle size; require the quantity of agent addition to be varied by a consistent factor.

It is recommended that a small scale treatment trial be implemented at the commencement of site works prior to broad scale implementation of alternative neutralising compounds. The small scale trials should document the effectiveness of the revised approach in terms of the time, cost, availability, suitability, etc.

5.5.3 Treatment Area Design

As noted above, the treatment area should be situated in an appropriate location(s) with respect to site disturbance activities. In addition, consideration should also be given to the ease with which environmental controls can be implemented and potential requirement for off-site disposal of the material once stabilised and validated.

Small Quantities

For small scale disturbance activities, it is anticipated that a large lined skip bin or suitable structure could be used as a 'treatment cell' to minimise the potential for release of acidic leachate or partially treated soil. This may be appropriate for the treatment of piling spoil or minor trenching activities.

Significant Excavation Quantities

Should quantities of material disturbed in a staged manner exceed that able to be managed in a large skip bin, a treatment area should be established with consideration of the following:

- The treatment area should be established separate to the area of disturbance but able to be accessed from the area of disturbance by plant/vehicles transporting the material to be treated and material to be removed from the treatment area at the completion of stabilisation activities;
- The treatment areas should be sufficiently large to facilitate a pre-treatment stockpile area, a treatment pad, water/sediment collection and treatment measures, post treatment stockpile storage area and lime storage area.
- The treatment area should be isolated from major external surface water catchments, including overland surface water flow and potential flood water, excavation flooding by rainfall events, by ground surface contouring, installation of perimeter drains or bunds covered with an impervious layer (concrete, geomembrane, compacted non-ASS clay, etc.).
- Infiltration of surface water (rain or drainage) through the ASS to groundwater or Blackwattle Bay surface waters within the treatment area should also be prevented to the extent possible. A layer of lime stabilised soil should be prepared on the ground surface within the treatment area that will act to neutralise any acidic water that my infiltrate the ground surface during treatment activities. The minimum application should be no less than 5 kg lime/m^2 of treatment area. This application should not be taken into account when material to be treated is placed within the treatment area as the neutralisation capacity of these added chemicals will decrease with time as a result of insoluble iron

coating generation and it is difficult to ensure that there has been adequate mixing of the neutralising agent within the soil added to the site.

- Pre-treatment and post-treatment stockpile areas should be separately bunded or drained to minimise the potential for re-acidification of treated material.
- The treatment pad should be of a size that would allow treatment of material by a single machine over a reasonable timeframe to minimise the oxidation of material during spreading and treatment. Assuming the material the subject of treatment is spread to a depth of approximately 0.3 m, a single treatment area 10 m by 20 m could treat 60 m^3 of material per treatment cycle. Should capacity to treat more material be required, two or three treatment pads could be established, separated by a suitable width to allow for excavator movement between the bunds of each pad.
- The bund surrounding each treatment pad may be constructed of concrete, compacted non-ASS clay, sand and lime filled sandbags or other suitable materials that are relatively impervious and can be coated with a guard layer of lime to neutralise acidic leachate that may contact the bund.
- The base of the treatment pad should be surfaced with concrete, asphaltic concrete, or soil mixed with lime as discussed above. This base should be graded where possible at a minimum fall of 1° to facilitate drainage of leachate such that it can be collected and/or pumped to a treatment/holding tank.
- Once well mixed with a suitable quantity of neutralisation agent, the material should be transferred to the post treatment stockpile area. Here the validation testing will be completed and the material will remain until receipt of the validation results. The material will then be cleared for beneficial reuse within the site, or alternatively for off-site disposal to landfill.
- Surface water flows will be diverted around the treatment area where possible. Water falling within the various portions of the treatment area will be collected at appropriate locations and transferred either to a holding tank or artificial detention basin. The water quality will be monitored to ensure only water of suitable quality is discharged from the treatment area of the site. Dilution of water collected within the treatment area is not an acceptable method of treatment at this site. Contaminants resulting from oxidation of ASS should be collected, treated and/or managed on-site. Water discharges from the site must not have a significant impact on pH, buffering capacity, turbidity, colour or ionic composition of the receiving water body (stormwater, groundwater, sewer, etc) as per the requirements of the POEO Act (1997).
- A sufficient supply of aglime should be kept on site at all times for the treatment of ASS to be neutralised within the treatment area, for application on exposed excavation faces where ASS is expected or suspected; and for wet weather events where existing applications will require replacement and/or treatment of acidic water is necessary. Receipts, dockets and other field records showing the storage locations of all chemicals and location of all applications of neutralising agents must be kept.
- The supply shall be stored in a covered and bunded area to prevent accidental exposure to water and deterioration of the inherent neutralizing capacity. ASS treatment materials should be stored in a manner that minimise the exposure of the materials to wet or humid conditions. Such conditions may result in the clumping or surface crusting of particulate lime which can reduce the level of effectiveness in neutralising water or soil.

5.5.4 General Site Management

All natural soils/sediments within areas of ASS must be treated as ASS material until such a time as the material is demonstrated to be non-ASS material or treatment effectively reduces the risk associated with the material and validation results meet the relevant specifications.

ASS/PASS materials that have been excavated (or otherwise brought to the ground/water surface) should be immediately transferred to the treatment area or treated in-situ as soon as practicable to minimise the quantity of soil, sediment and/or water requiring treatment and the risk of environmental harm to the site and/or down-gradient receptors.

Bunding, diversion drains, contaminated water treatment/containment etc. may be used to contain surface water run-off from ASS storage and treatment areas. However, ASS materials must not be used in the construction of bunds and other diversion devices.

Equipment used in the treatment of ASS shall be washed with an alkaline solution at the completion of each work period to minimize corrosion of equipment.

5.5.5 Excavation Works

Excavation works (other than the re-profiling activities) should be undertaken in the following manner:

- Any material identified as non-ASS (as determined through additional investigations as detailed in **Section 5.2**) is to be removed from within the ASS zone footprint and treatment area as per the requirements of the site RAP;
- Natural sediments or materials identified as ASS, or suspected to comprise physical properties indicative of ASS should be assumed to be ASS unless demonstrated otherwise. All excavated natural sediment material brought to the ground/water surface should be transferred immediately to the treatment area;
- Works including disturbance of natural soils/sediments will be subject to field testing upon initial exposure of each natural soil horizon. Field testing will include pH_f and post peroxide pH_{fox}, with both required to meet the validation criteria of pH 6 to be considered non-ASS soil. Alternatively, dependent upon the scheduling of the excavation works, laboratory pre-testing of soils from this zone may be undertaken using sPOCAS or S_{Cr} methods. If either the field criteria or laboratory analysis results indicate the material is considered to be ASS, then the material will require treatment as discussed in the following section;
- At the completion of the day's activities, where excavation works result in the exposure of known or suspected ASS, a guard layer of fine aglime will be applied to the base of the excavation at a rate of 5 kg lime/m^2 of exposed soil. If the base of the excavation is to remain exposed for an extended period (i.e. more than three days) the lime coating should be checked and re-limed as necessary. Alternatively, the lime may be covered with a layer of compacted non-ASS material at least 0.3 m in thickness. It is noted that this will not be required during piling works in the waterborne area of the site;
- All cut batters/exposed faces potentially including ASS, (i.e. faces at the edge of excavation faces, etc), shall be coated with fine aglime at a rate of 5 kg/m^2 and the lime coating should be checked and re-limed as necessary on a daily basis during periods of dewatering, whilst the faces are temporarily exposed and/or following wet weather events.

5.5.6 Treatment of Excavated PASS Material

Treatment of ASS soils will comprise the addition of sufficient quantities of finely ground neutralising agent to treat all oxidisable S% and actual acidity and provide a factor of safety to compensate for potential impurities in the neutralising agent, non-homogenous mixing and limitations to the solubility of the neutralising agent. This will need to be determined on the basis of analysis data collected as per **Section 5.2**.

The excavated ASS material will be immediately transferred to the treatment area and placed either in a stockpile within the pre-treatment stockpile area or immediately on the treatment pad. Treatment of excavated material should occur within one day of excavation of the material.

If stockpiled, the material should be formed into a conical stockpile to minimise the exposure of the material to air. In the event of significant wet weather periods, the stockpiles should be covered with builder's plastic or similar to limit the infiltration of rainfall into the stockpiles.

If site conditions require the stockpiling of material for longer than 24 hours, the stockpiles should be treated with a guard layer of aglime of 5 kg lime/ m^2 per vertical metre of soil in the stockpile. This would result in a two metre high stockpile requiring an application of 10 kg lime/m^2 surface area. The stockpile should then be covered with an impervious surface (i.e. builder's plastic) that covers the top and sides of the stockpile to minimise drying by wind and sun and to prevent rainfall entering the stockpile.

Following placement within the treatment pad the material should be spread to a depth that will allow the material to be properly treated by thoroughly mixing neutralising agent through the soil. The actual depth of spreading will be somewhat dependent upon the soil type, the machinery used to mix the material and the form of the neutralising agent. However, the nominal spread depth should initially be no more than 0.3 m. Mixing of the lime and soil mixture may be undertaken by harrowing, rotary hoeing, using an excavator shaker bucket to blend the material, the use of a pug mill or similar equipment.

Care shall be taken to ensure that mixing occurs throughout the depth of the layer. The soil must be managed to achieve a consistency that will allow for thorough mixing of the soil and neutralising agent to ensure that the effective neutralisation occurs. This may require drying of the disturbed material (with associated management of any acidic leachate and other resulting contaminants), mechanical turning and breaking up of soil. Drying should not be undertaken during foreseeable wet weather events due to the increased risk of runoff flushing acid from the material and into uncontrolled areas.

Following mixing, aglime shall be spread at a rate of approximately 5 kg lime/m^2 around the toe of the treated soil, around a 1 m perimeter between the toe of the material and across the exposed face of the bund to neutralise any leachate released from the soil. Once the soil has sufficiently dried that no more leachate is being released, the material should be turned to ensure that all leachate is released from the treatment area.

If there is a likelihood that neutralisation treatment of particular soils encountered during works (i.e. heavy clays) will not be effective for the soil type/s, a small scale trial to demonstrate that the proposal is practical should be performed before larger scale disturbance of this soil type.

5.5.7 Water Management During Treatment

Surface drainage, marine water within the coffer dam and groundwater that comes into contact with ASS materials has the potential to become acidic and contaminated with heavy metals leached from the acidified soil. Sources of water may include ground surface drainage associated with rainfall, dewatering product produced during the excavation works, leachate produced during treatment of excavated soils, and groundwater inflow into open excavations.

In general, soil and water at the site is required to be managed under an earthworks Soil and Water Management Plan to be for the site prior to the commencement of site works. However, in addition to these requirements, water from within the treatment area will be required to be collected, assessed and if necessary treated prior to discharge from the site. Once pH, suspended sediment and contaminant concentrations are considered suitable for discharge from the site, the water may be used for dust suppression at the site and/or released to the site stormwater system.

Additional water holding tanks may be necessary in the vicinity of the treatment works zones to store collected water prior to treatment. The water holding capacity directly related to the acid sulfate soil excavation and treatment areas should be maintained at a minimum quantity associated with a 1 in 10 year rainfall event to ensure that sufficient capacity is available to store all potentially acidic water that may be generated during site works.

Water will be neutralised, where required by the addition of lime (or equivalent alkaline product) within a dedicated treatment tank or lined detention basin. Lime shall be added incrementally and thoroughly mixed within the treatment vessel. Approximate lime application rates based on initial pH are provided in **Table 5.1** below.

Table 5.1: Treatment of Acidic Dewater

Water pH	Agricultural Lime / 1000L Water
0.5	11.7kg
1.0	3.7kg
1.5	1.2kg
2.0	0.37kg
2.5	0.12kg
3.0	37g
3.5	12g
4.0	4g
4.5	1.2g
5.0	0.37g
5.5	0.12g

Lime addition and mixing shall continue until the pH of the water is within the range of 6.5 – 8.5.

In the event water volumes greater than the capacity of the water treatment holding capacity are produced during the acid sulfate soil management activities, consideration should be given to off-site disposal of water via a licensed contractor or treatment of water using neutralisation chemical dosing within holding tanks prior to re-irrigation of open excavations once the pH of the water has been demonstrated to be suitable.

5.5.8 Validation of Treated PASS Material

Following the application and mixing of lime to the ASS at the treatment pad the material should be allowed to stand for a minimum of 48 hours prior to validation assessment. The spread soil should then be assessed to establish whether the following performance criteria have been achieved:

- The neutralising capacity of the treated soil must exceed the sum of the TAA and TPA of the soil, i.e. there is no net acidity in the soil as measured by sPOCAS / SCr < 0.03%S;
- Post neutralisation, the soil pH is greater than pH 5.5 (and preferably less than 9); and
- Excess neutralising potential should remain in the soil as all acid generation reactions may not be complete and so the soil may still have further capacity to generate acidity.

Validation testing using field tests to measure the soil/water pH shall be undertaken at a rate of ten samples per treatment batch (to a maximum quantity of 100 m^3, or a rate of 1 sample per 20 m^3). Field testing will include pH_f and post treatment peroxide pH_{fox}, with both required to meet the post neutralisation criteria noted above for all samples per treatment batch.

Confirmatory laboratory analysis (pH and sPOCAS / SCr) will be undertaken at a rate of one sample per treatment batch (to a maximum quantity of 100 m^3, or a rate of 1 sample per 100 m^3 for larger quantities). The samples obtained for laboratory analysis may be obtained by compositing three subsamples obtained from the treatment material to provide a broader indication of net acidity levels. All samples will be obtained from no less than 0.1 m below the stockpile surface at the time of sampling to ensure representative samples are obtained for field testing/laboratory analysis.

Samples should be obtained immediately following movement of the material from the treatment pad area to the post-treatment stockpile area of the treatment zone. Each stockpile should be identified with a unique identifier and its location logged with the laboratory validation sample identification so that laboratory results can then be matched to each stockpile within the post-treatment area. Following additional applications of neutralisation chemicals, a greater density of validation sampling is necessary to confirm the successful neutralisation.

In the presence of positive field validation tests, laboratory analysis of validation samples may be employed to determine the level of net acidity and confirm that the treatment has been successful, or provide an indication of the quantity of further aglime application necessary to neutralise the soil.

If negative field tests occur but the confirmatory laboratory analysis results indicate that there is still net acidity, a further application of aglime will be mixed with material to ensure additional neutralisation capacity, prior to further confirmatory analysis.

Following receipt and logging of the successful laboratory validation results, the stockpile may then be released for beneficial reuse of material at the site, or alternatively, for off-site disposal. In the event that the laboratory results indicate that the stockpile requires further treatment, the material should be returned to the treatment pad as a unique treatment batch and treated as required prior to re-sampling.

5.5.9 Site Condition Monitoring

It is anticipated that monitoring of conditions will be undertaken by both the site contractors and an independent appropriately qualified consultant to ensure that the appropriate environmental controls are in place and the treatment strategy is minimising the environmental risk associated with the ASS materials.

The following inspection/monitoring regime will be implemented during the site works period and documented as appropriate to demonstrate compliance with this ASSMP:

- Stockpiles of material within the treatment area and of treated material will be inspected daily by the site contractors with pH measurements of any retained leachate taken and recorded. In the event that leachate is significantly acidic (pH < 5.0), the stockpiled material will be returned to the pre-treatment area until the laboratory results are available and the quantity of required additional lime application is known;
- In the event that an on-site sump/detention basin is used to manage water ingress, surface water monitoring points will be sampled and field tested and the pH recorded every day by site contractors during active site activities and weekly during periods where no active ground works are being undertaken within the ASS area;
- All treated excavation faces to be retained for more than three days will be inspected on the third morning and lime reapplied as necessary each following morning;
- As part of broader environmental monitoring during construction works, surface waters within the construction works zone and within Blackwattle Bay beyond the works zone will be monitored on a daily basis for pH and turbidity with results compared to established site baseline conditions. These requirements will be defined within the contractor level CEMP prior to the commencement of works.

Regular inspection of all excavation and treatment areas will be undertaken to identify potential indications of PASS oxidation. These inspections should note:

- Unexplained scalding, corrosion or degradation of onsite steel equipment and concrete paved surfaces;
- Formation of the mineral jarosite or other acidic salts in exposed or excavated soils;
- Areas of surface water blue-green, blue-white in colour or extremely clarified indicating high concentrations of aluminium; and
- Rust coloured deposits on excavation faces, in drainage paths, on bunds, channels, etc indicating iron precipitates.
- Such inspections should also identify the presence of unusual odours, including strong organic or sulfurous smells (i.e. rotten egg gas).

5.5.10 Removal of Neutralised ASS Material from the Site

Only material confirmed to be below the criteria listed in **Section 5.4.8** will be considered as stabilised ASS material for potential reuse within or removal from the site. Once stabilised, the material will be provided a final waste classification as per the requirements of EPA (2014) for off-site disposal to a lawful facility. A final round of field pH testing should be undertaken prior to loading of the trucks to ensure that pH levels remain above 6. Should material continue to have a high moisture content, consideration may be given to off-site removal as liquid waste as per EPA (2014).

6. Responsibilities

The selection of samples for environmental analysis as per **Section 5.2** shall be undertaken by a suitably qualified and experienced environmental consultant. Results of analysis shall be assessed and evaluated by a suitably qualified and experienced consultant.

Implementation of the physical treatment, material management and environmental controls portions of this ASSMP will be the responsibility of the site contractor engaged to complete remediation and/or construction earthworks within the site. The monitoring of conditions, unless otherwise specified in the monitoring sections will be the responsibility of a suitable qualified environmental consultant who will regularly inspect the site, the treatment area and treatment activities and implement the validation assessments to document compliance with this ASSMP.

The contractor should appoint a foreman or other responsible employee to undertake the appropriate monitoring activities as designated in this ASSMP. This person should be appropriately trained by the environmental consultant in all actions to be completed by the contractor. Where doubt arises concerning the results of the inspections or of field test validity, the environmental consultant should be contacted for verification of appropriate actions.

The contractor is not authorised to make any changes to this ASSMP or implement unapproved variations to the treatment and/or monitoring protocols outlined in this document unless explicit written approval is obtained from the environmental consultant prior to implementation of the changes.

Where ambiguity or conflicts in procedures arise, it is the contractor's responsibility to seek clarification on appropriate actions from the environmental consultant.

ASS mitigation measures should be documented as they apply to all individual works activities to be undertaken at the site. All persons responsible for the works activities should be made aware of their responsibilities in writing and suitable ASS management training should be provided to those persons to ensure that the responsibilities can be achieved.

Where contingency actions are necessary, or in the event that non-compliance with the ASSMP is identified by the contractor, the environmental consultant should be immediately informed in writing. The environmental consultant will then be obliged to provide a timely response documenting the necessary corrective actions.

7. Contingencies

In the event of unexpected events, including the failure of management measures as described in this ASSMP, the associated environmental risk will be managed by the evaluation and implementation of the contingency procedures and mitigation strategies.

7.1 General Site Management Activities

7.1.1 Failure of Initial Acid Neutralisation Treatment

As described in **Section 5.4.8** following the treatment of materials within the treatment pad area, validation sampling will be completed to assess the success of the neutralisation process prior to removal of the material from the holding area. In the event that the validation testing indicates that neutralisation of the material is incomplete (i.e. pH<6 or S>0.03 %), a further application of lime and repeat of the treatment procedure will be undertaken prior to further validation assessment. If the proposed techniques fail, further consideration may be given to alternative management strategies as outlined in **Section 5.3**.

7.1.2 Significant Acidification of Surface Water

Monitoring of contained water conditions within the site will be undertaken prior to the commencement of site disturbance activities and during the period of disturbance as ASS conditions are identified as outlined in **Section 5.4.9**. Should the works identify the acidification of contained water not directly related to the treatment area, all works associated with the potential disturbance of ASS at the site shall cease.

Active exposure areas will require to be limed with a guard layer of at least 5 kg lime/m^2 exposed soil and all treatment areas will be checked to ensure that leachate and water migration is not occurring onto exposed soils or into surface water drainage channels at the site. If these activities identify a source of the increased acidity, remedial actions will be implemented to prevent the further occurrence of acidification at the site.

If these activities do not identify the source of the added acidity, or alternatively, if conditions are not corrected by the addition of lime, consideration may be required to the construction of a subsurface limestone treatment trench along the site boundary to neutralise groundwater prior to movement off-site. The design of such a barrier will be highly dependent upon the stage of the disturbance works at the site and extent of the acidic plume identified in this section of the site. Disturbance works within the ASS area should not recommence until the barrier has been installed to limit the generation of additional acidic groundwater.

7.2 Sediment Adjustment Works

As noted in **Section 5.5**, the final methodology to be implemented for the sediment adjustment works will require optimisation / adaptive management based on the results of environmental monitoring to demonstrate the works are not causing or have the potential to cause environmental impact. As further noted, a small-scale trial of the proposed methodology will be required at the commencement of works to demonstrate that the methodology is practical and meets the objectives of this ASSMP, prior to any larger scale disturbance / sediment adjustment activities.

7.2.1 Oxidation/Acidification of Sediments within Split Hopper Barge

The following contingencies are required, in instances where the results of environmental monitoring identify oxidation/acidification of sediments when stored in the split hopper barge:

- In instances of mechanical failure of the barge, a manual release will be fitted to the split vessel such that the sediments can be placed below surface water at any time;

- In instances that the manual release fails, seawater will be pumped into the barge via a sprinkler system to temporarily mitigate the risks until repairs are made;
- During works, a sufficient supply of aglime (equivalent to the volume required to treat an entire load of sediment within the split hopper barge) will be stored at a location where it can be readily applied to the sediments within the barge; and
- Appropriate modifications of construction methodologies as based on a review of the small-scall trial and results of environmental monitoring during the works.

7.2.2 Suspension of Sediments in Water Column

The sediment adjustment works are required to cease immediately, in instances where the results of environmental monitoring identify that sediments are remaining suspended in the water column for a period that could result in oxidation/acidification of the particles as well as affect surface water quality around the work zone and beyond the site boundary. Under these circumstances, a thorough review of the construction methodology will be required in order to apply adaptive management to the methods employed and ensure that the environmental risks associated with the works are appropriately managed. At a minimum, consideration should be given to the following:

- The impacts of environmental factors such as tide levels, wind, chop, water turbulence, stormwater runoff etc on the suspension/settling of sediments within the works area and planning of the works to be completed under favourable conditions;
- Review and modification of containment measures (such as silt curtains etc) as required, around the work zone and boundary of the site to ensure that any change in water quality resulting from the works is confined to within the work zone; and
- Review and optimisation of methodologies implemented during excavation, relocation and final placement of sediments.

8. Conclusions

Site characterisation assessment data available for subsurface conditions across the site has identified the occurrence of PASS material, primarily consisting of marine sediments within Blackwattle Bay and saturated soils/sediments overlying the land portion of the site.

Where existing and future assessment data identifies the presence of ASS/PASS materials that may be disturbed during construction activities, the measures identified in this acid sulfate soil management plan (ASSMP) provide appropriate procedures to manage the risks associated with the proposed activities. If successfully implemented, these measures will minimise the environmental risks associated with disturbance of the PASS materials.

9. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own enquires.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Figures



Legend

Approximate New Sydney Fish Market Development Boundary

JBS&G

Job No: 60081

Client: Infrastructure NSW

Version: R03 Rev A	Date: 13-Apr-2021
Drawn By: RF/RH	Checked By: CB

Scale 1:8,000

0 100 200
metres

Coor. Sys. GDA 1994 MGA Zone 56

1A-1C Bridge Road
Glebe, NSW

SITE LOCATION

FIGURE 1

File Name: 60081_01
Service Layer Credits: © OpenStreetMap (and) contributors, CC-BY-SA



Legend:

- Approximate New Sydney Fish Market Development Boundary
- Approximate Seawall Extent
- Cadastral Boundary
- Approximate Fish Market Basement Footprint

Proposed Landuse

- Fish Market Building Envelope
- Public Domain
- Approximate Land Area

JBS&G

Job No: 60081

Client: Infrastructure NSW

Version: R03 Rev A	Date: 13-Apr-2021
Drawn By: RF/RH	Checked By: JR/CB

Scale 1:2,000

0 25 50

metres

Coor. Sys. GDA 1994 MGA Zone 56

1A-1C Bridge Road
Glebe, NSW

SITE LAYOUT

FIGURE 2

File Name: 60081_02
Reference: Near Map - http://www.nearmap.com.au/. Imagery - 24-01-2021.



Legend:

- Approximate New Sydney Fish Market Development Boundary
- Approximate Land Area
- Extent of PASS/ASS

JBS&G

Job No: 60081

Client: Infrastructure NSW

Version: R03 Rev A	Date: 13-Apr-2021
Drawn By: RF/RH	Checked By: JR/CB

Scale 1:2,000

0 25 50

metres

Coor. Sys. GDA 1994 MGA Zone 56

1A-1C Bridge Road
Glebe, NSW

EXTENT OF PASS/ASS

FIGURE 3

File Name: 60081_03
Reference: Near Map - http://www.nearmap.com.au/. Imagery - 24-01-2021.



Legend:

- Approximate New Sydney Fish Market Development Boundary
- Approximate Seawall Extent
- Approximate Fish Market Basement Footprint
- Approximate Extent of Sediment Requiring Reprofiling

Extent of Revetment Removal

- Extent of Reverment Removal to RL 3.01m
- Extent of Reverment Removal to Underside of Basement Structure

Proposed Landuse

- Fish Market Building Envelope

JBS&G

Job No: 60081

Client: Infrastructure NSW

Version: R03 Rev A	Date: 13-Apr-2021
Drawn By: RF/RH	Checked By: JR/CB

Scale 1:2,000

0 25 50

metres

Coor. Sys. GDA 1994 MGA Zone 56

1A-1C Bridge Road
Glebe, NSW

PROPOSED CONSTRUCTION WORK AREAS

FIGURE 4

File Name: 60081_04
Reference: Near Map - http://www.nearmap.com.au/. Imagery - 24-01-2021.

© JBS&G

This document is and shall remain the property of JBS&G. The document may only be used for the purposes for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited

Document Distribution

Rev No.	Copies	Recipient	Date
A	1 x electronic	Nick Bouziotis – UrbanGrowth NSW	01/03/2018
0	1 x electronic	Nick Bouziotis – UrbanGrowth NSW	03/09/2018
1	1 x electronic	Nick Bouziotis – UrbanGrowth NSW	01/11/2018
2	1 x electronic	Jennifer Chang – UrbanGrowth NSW Tom Onus - Ramboll	4/04/2019
3	1 x electronic	Jennifer Chang – Infrastructure NSW	14/04/2021
4	1 x electronic	Jennifer Chang – Infrastructure NSW	20/04/2021
5	1 x electronic	Jennifer Chang – Infrastructure NSW	21/04/2021
6	1 x electronic	Jennifer Chang – Infrastructure NSW	26/04/2021

Document Status

Rev No.	Author	Reviewer	Approved for Issue		
		Name	Name	Signature	Date
A	Chris Bielby	Joanne Rosner	Draft for UrbanGrowth NSW review		01/03/2018
0	Chris Bielby	Joanne Rosner	Joanne Rosner		03/09/2018
1	Chris Bielby	Joanne Rosner	Joanne Rosner		01/11/2018
2	Chris Bielby	Joanne Rosner	Joanne Rosner		04/04/2019
3	Chris Bielby	Joanne Rosner	Joanne Rosner		14/04/2021
4	Chris Bielby	Joanne Rosner	Joanne Rosner		20/04/2021
5	Chris Bielby	Joanne Rosner	Joanne Rosner		21/04/2021
6	Chris Bielby	Joanne Rosner	Joanne Rosner		26/04/2021



Appendix 12: Remedial Action Plan

Infrastructure NSW

Remedial Action Plan

The new Sydney Fish Market
1A to 1C Bridge Rd, Glebe and
part 56-60 Pyrmont Bridge Road, Pyrmont, NSW

8 July 2020

54162/113808 (Rev 4)

JBS&G Australia Pty Ltd

www.jbsg.com.au

Infrastructure NSW

Remedial Action Plan

The new Sydney Fish Market
1A to 1C Bridge Rd, Glebe and
Part 56-60 Pyrmont Bridge Road, Pyrmont, NSW

8 July 2020

54162/113808 (Rev 4)

JBS&G Australia Pty Ltd

Table of Contents

Executive Summary vi

Abbreviations viii

1. Introduction & Objectives 1
   - 1.1 Introduction 1
   - 1.2 Objective 2
   - 1.3 Proposed Development 2
   - 1.4 Previous Assessments 4

2. Site Condition & Surrounding Land Uses 6
   - 2.1 Site Identification 6
   - 2.2 Site Condition 6
   - 2.3 Site History 6
   - 2.4 Geology and Soils 7
   - 2.5 Topography and Hydrology 7
   - 2.6 Hydrogeology 8
   - 2.7 Acid Sulfate Soils 8
   - 2.8 Meteorology 8

3. Summary of Previous Assessments 9
   - 3.1 Environmental Site Assessment (JBS&G 2019) 9
   - 3.2 Data Gap Assessment 11

4. Contamination Status / Conceptual Site Model 14

5. Remediation Options 17
   - 5.1 Remedial Goals 17
   - 5.2 Guidance Framework 17
   - 5.3 Regulatory and Planning Requirements 18
     - 5.3.1 Requirements in Relation to Planning Approvals 18
     - 5.3.2 Other Requirements 18
   - 5.4 Extent of Remediation and/or Management Required 20
     - 5.4.1 Soil 20
     - 5.4.2 Sediment 20
   - 5.5 Consideration of Possible Remedial Options 21

6. Remediation Plan 24
   - 6.1 Data Gap Assessment 24
   - 6.2 Site Establishment 24
   - 6.3 Buildings and Structure Demolition 24

6.4 Disturbed/Excavated Material Management Principles 24
6.5 Excavation of Impacted Materials / Generation of Material Excess to Site Requirements 25
6.6 Off-site Disposal 25
6.7 Material Importation 26
6.8 Validation 26
6.9 Site Dis-establishment 26
7. Validation Plan 27
7.1 Data Quality Objectives 27
7.1.1 State the Problem 27
7.1.2 Identify the Decision 27
7.1.3 Identify Inputs to the Decision 28
7.1.4 Define the Study Boundaries 28
7.1.5 Develop a Decision Rule 28
7.1.6 Specify Limits of Decision Error 30
7.1.7 Optimise the Design for Obtaining Data 32
7.2 Validation Inspections and Sampling 33
7.2.1 Impacted Material Removal 33
7.2.2 Sampling Methodology 34
7.2.3 Laboratory Analyses 36
7.3 Validation Criteria 37
7.4 Validation Reporting 38
7.5 Contingency Plan 39
7.5.1 Identification of an Underground Storage Tank 39
7.5.2 Identification of Oily Materials 40
7.5.3 Material Storage Breach 40
7.5.4 Emissions Complaints 41
7.5.5 Groundwater Dewatering 41
7.5.6 Excavation Validation Failure 41
7.6 Unexpected Finds Protocol (UFP) 42
8. Site Management Plan 44
8.1 Hours of Operation 44
8.2 Preparation of a Remediation Environmental Management Plan 44
8.2.1 Required Elements 44
8.3 Health and Safety 46
8.3.1 Work Health and Safety Management Plan 46
8.3.2 Additional Site-Specific Elements/Procedures 46
8.4 Air Quality 46

8.4.1 Air Monitoring 46
8.4.2 Additional Consideration of Chemical Contaminants 48
8.5 Materials Tracking 48
8.6 Disposal of Waste Material 49
9. Environmental and Health and Safety Management 50
9.1 Environmental Management 50
9.1.1 Environmental Management Plan 50
9.1.2 Required Elements/Procedures 50
9.2 Health and Safety Management 51
10. Conclusions 53
11. Limitations 54

List of Tables

Table 2.1: Summary Site Details 6
Table 4.1: Refined Conceptual Site Model 14
Table 5.1: Remedial Options Screening Matrix 22
Table 7.1: Summary of Decision Rules 29
Table 7.2: Summary of Data Quality Indicators 32
Table 7.3: Validation Sampling Plan 33
Table 7.4: Soil Laboratory Analysis Methods (all units in mg/kg unless stated) 37
Flowchart 7.1 – Unexpected Finds Protocol 43
Table 8.1: Required Elements of the REMP 44
Table 9.1: Required Elements of the EMP 50

List of Figures

Figure 1 Site Location
Figure 2 Site Layout
Figure 3 Historical Sample Locations and Remediation Areas

Appendices

Appendix A Proposed Development Plans

Executive Summary

JBS&G Australia Pty Ltd (JBS&G) was engaged by Infrastructure NSW (INSW, the client) to prepare a Remedial Action Plan (RAP) for the proposed new Sydney Fish Market located at the head of Blackwattle Bay between the Pyrmont Peninsula and the foreshore of Glebe (the site). The site is legally identified as Lots 3-5 in DP 1064339, part Lot 107 in DP 1076596 and part Lot 1 in DP835794 as shown on **Figures 1** and **2**. The individual lots fall within City of Sydney (CoS) local government area. The site area is approximately 3.7 Ha, of which 0.7 Ha consists of soil based materials present above the high water mark.

The site has historically been used for a range of commercial/industrial uses. The proposed fish market development will include retail and food and beverage premises, wholesale facilities, auction rooms, offices and commercial space, the Sydney Seafood School, back of house facilities, and car, truck and coach parking facilities.

An Environmental Site Assessment (JBS&G 2019[1]) was previously completed for the site, which comprised review and assessment of site condition data from a range of previous investigations. JBS&G (2019) identified no unacceptable health risks with respect to the proposed development, however there were a number of identified data gaps that required further assessment, such that the final remedial requirements could be defined. Subsequent assessment of the data gaps as documented in JBS&G (2019c[2]), confirmed that there were no unacceptable health or ecological risks (as relevant to the development proposal) within soils, groundwater and soil gas at the site. Notwithstanding, the presence of trace asbestos identified at SB06 0.2-1.0 and potential acid sulfate soils (PASS) within saturated silty clay and sandy clay materials (sediments) were identified as impacts that will require appropriate management during future construction activities. The acid sulfate soil management plan has been issued as a standalone document to complement this RAP (JBS&G 2019b[3]).

Based on the results and findings of the data gaps assessment, it was considered that the remedial principles outlined in the presented Development Application stage RAP (JBS&G 2019d[4]) (were valid, and when implemented will ensure the site is suitable for the proposed development. Notwithstanding, it was recommended that the RAP be revised to include the additional results and findings of the assessment such that the final remedial scope/management requirements can be defined. It is noted a Section B Site Audit Report (Ramboll 2019[5]) was previously prepared on the basis of JBS&G (2019d) by the appointed Site Auditor (Tom Onus).

This RAP, prepared following issue of the project Development Consents presents a summary of known and suspected site conditions, a conceptual site model (CSM) of contamination conditions and identification of existing data gaps in relation to the proposed development scheme, an evaluation of potential remedial strategies, identification of preferred strategies and details of site management and associated validation requirements to be implemented during the proposed works.

[1] *Environmental Site Assessment*, The new Sydney Fish Market, 1A to 1C Bridge Road, Glebe, NSW. 4 April 2019, Rev 3, JBS&G Australia Pty Ltd (JBS&G 2019)

[2] *Data Gap Assessment*, The new Sydney Fish Market, 1A to 1C Bridge Road, Glebe, NSW. 12 March 2019, Rev A, JBS&G Australia Pty Ltd (JBS&G 2019c).

[3] *Acid Sulfate Soil Management Plan, The new Sydney Fish Market, 1A to 1C Bridge Road, Glebe, NSW*. 4 April 2019, Rev 2 (JBS&G Australia Pty Ltd (JBS&G 2019b)

[4] *Remedial Action Plan*, The new Sydney Fish Market, 1A to 1C Bridge Road, Glebe, NSW. 4 April 2019, Rev 3, JBS&G Australia Pty Ltd (JBS&G 2019d).

[5] *Site Audit Report*, The new Sydney Fish Market, 1A to 1C Bridge Road, Pyrmont, NSW. 25 September 2019, Ramboll Australia Pty Ltd (Ramboll 2019).

Overall, it is considered that the proposed actions outlined in this RAP conform to the requirements of the *Contaminated Sites Guidelines for the NSW Site Auditor Scheme (3rd Edition)* (EPA 2017) because they are: technically feasible; environmentally justifiable; and consistent with relevant laws policies and guidelines endorsed by NSW EPA.

Subject to the successful implementation of the measures described in this RAP and with consideration to the Limitations presented in **Section 11**, it is considered that the Site can be made suitable for the intended uses and that the risks posed by contamination can be managed in such a way as to be adequately protective of human health and the environment.

Abbreviations

Term	Definition
ACM	Asbestos Containing Materials
AEC	Areas of Environmental Concern
AHD	Australian Height Datum
ASRIS	Australian Soil Resource Information System
ASS	Acid Sulfate Soils
BTEXN	Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene
CLM Act	Contaminated Land Management Act
COC	Chain of Custody
COPC	Contaminants of Potential Concern
CSM	Conceptual Site Model
DBYD	Dial Before You Dig
DO	Dissolved Oxygen
DP	Development Plan
DQI	Data Quality Indicators
DQO	Data Quality Objectives
DSI	Detailed Site Investigation
EC	Electrical Conductivity
Eh	Redox Potential
EIL	Ecological Investigation Levels
EPA	NSW Environmental Protection Authority
ESA	Environmental Site Assessment
ESLs	Ecological Screening Levels
GSV	Gas Screening Value
Ha	Hectare
HAR	Heritage Assessment Report
HILs	Health Investigation Levels
HSLs	Health Screening Levels
JBS&G	JBS&G Australia Pty Ltd
JRA	Job Risk Assessment
LEP	Local Environmental Plan
LOR	Limit of Reporting
NATA	National Accreditation Testing Authority
OCP	Organochlorine Pesticides
OPP	Organophosphate Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PID	Photoionisation Detector
POEO Act	Protection of Environment Operations Act
PSI	Preliminary Site Investigation
QA/QC	Quality Assurance/Quality Control
RFQ	Request for Quote
RPD	Relative Percentage Difference
SAQP	Sampling Analytical and Quality Plan
SCID	Stored Chemical Information Database
SWMS	Safe Work Method Statement
TRH	Total Recoverable Hydrocarbons
UCL	Upper Confidence Limit
UST	Underground storage tank
VOC	Volatile Organic Compounds

1. Introduction & Objectives

1.1 Introduction

JBS&G Australia Pty Ltd (JBS&G) was engaged by Infrastructure NSW (INSW, the client) to prepare a Remedial Action Plan (RAP) for the proposed new Sydney Fish Market located at the head of Blackwattle Bay between the Pyrmont Peninsula and the foreshore of Glebe (the site). The site is legally identified as Lots 3-5 in DP 1064339, part Lot 107 in DP 1076596 and part Lot 1 in DP835794 as shown on **Figures 1** and **2**. The individual lots fall within City of Sydney (CoS) local government area. The site area is approximately 3.7 Ha, of which 0.7 Ha consists of soil based materials present above the high water mark.

The site was recently used for a variety of commercial and industrial uses, primarily comprising a concrete batching plant and commercial boat hire operation. The site is currently zoned as Ports and Employment under State Environmental Planning Policy (SEPP) No. 26 – City West.

An Environmental Site Assessment (JBS&G 2019[6]) was previously completed for the site, which comprised review and assessment of site condition data from a range of previous investigations. JBS&G (2019) identified no unacceptable health risks with respect to the proposed development, however there were a number of identified data gaps that required further assessment, such that the final remedial requirements could be defined. Subsequent assessment of the data gaps as documented in JBS&G (2019c[7]), confirmed that there were no unacceptable health or ecological risks (as relevant to the development proposal) within soils, groundwater and soil gas at the site. Notwithstanding, the presence of trace asbestos identified at SB06 0.2-1.0 and potential acid sulfate soils (PASS) within saturated silty clay and sandy clay materials (sediments) were identified as impacts that will require appropriate management during future construction activities. The acid sulfate soil management plan has been issued as a standalone document to complement this RAP (JBS&G 2019b[8]).

Based on the results and findings of the data gaps assessment, it was considered that the remedial framework outlined in the Development Application stage RAP (JBS&G 2019d[9]) were valid, and when implemented will ensure the site is suitable for the proposed development. Notwithstanding, it was recommended that the RAP be revised to include the additional results and findings of the assessment such that the final remedial scope/management requirements can be defined. It is noted a Section B Site Audit Report (Ramboll 2019[10]) was previously prepared on the basis of JBS&G (2019d) by the appointed Site Auditor (Tom Onus).

This report has been prepared in accordance with the requirements of the NSW Environment Protection Authority (EPA) published, and endorsed guidelines and the Conditions of Consent for Stage 1[11] and Stage 2[12] of the new Fish Market development.

[6] *Environmental Site Assessment*, The New Sydney Fish Market, 1A to 1C Bridge Road, Glebe, NSW. 4 April 2019, Rev 3, JBS&G Australia Pty Ltd (JBS&G 2019

[7] *Data Gap Assessment*, The New Sydney Fish Market, 1A to 1C Bridge Road, Glebe, NSW. 12 March 2019, Rev A, JBS&G Australia Pty Ltd (JBS&G 2019c).

[8] *Acid Sulfate Soil Management Plan, The new Sydney Fish Market, 1A to 1C Bridge Road, Glebe, NSW*. 4 April 2019, Rev 2 (JBS&G Australia Pty Ltd (JBS&G 2019b)

[9] *Remedial Action Plan*, The New Sydney Fish Market, 1A to 1C Bridge Road, Glebe, NSW. 4 April 2019, Rev 3, JBS&G Australia Pty Ltd (JBS&G 2019d).

[10] *Site Audit Report*, The New Sydney Fish Market, 1A to 1C Bridge Road, Pyrmont, NSW. 25 September 2019, Ramboll Australia Pty Ltd (Ramboll 2019).

[11] Development Consent SSDA 8924 dated 12 June 2020 1A, 1B and 1C Bridge Road, Glebe. Concept Development Application for the new Sydney Fish Market including Stage 1 works.

[12] Development Consent SSDA 8925 dated 12 June 2020 1A, 1B and 1C Bridge Road, Glebe. Stage 2 Development application for the construction, use and operation of a new Sydney Fish Market.

1.2 Objective

The objectives of this RAP are to establish a suitable framework for management of potentially contaminated media such that upon completion of works, the site will be considered suitable for the proposed use. As such, the objectives are to: identify the known and/or anticipated extent of environmental impact via presentation of a conceptual site model, identification and evaluation of remedial/management options in relation to regulatory requirements, the development details and overall objectives; and to document the procedures and standards to be followed such that (potentially) contaminated media are appropriately managed whilst ensuring the protection of human health and the surrounding environment.

1.3 Proposed Development

The most recent concept plans for the proposed new Sydney Fish Market are provided as **Appendix A**. It is understood that statutory approval for the proposed development scheme will be sought in two stages, comprising the initial concept development application, being for the demolition of existing structures and approval for the proposed development envelope for use of the site as a fish market. The second development application (Main Works) will seek approval for the construction of the new fish market and associated works.

Specifically, the Concept development application seeks approval for:

- the use of the site for the fish market including waterfront commercial and tourist facilities and ancillary uses and the distribution of uses;
- a gross floor area of up to 30,000m^2 contained within a defined building envelope;
- waterfront structures such as wharves;
- concepts for improvements to the public domain including promenades, access to Blackwattle Bay and landscaping;
- pedestrian cycle and road access and circulation principles; and
- principles for infrastructure provision and waste management.

The 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.

The Main Works development application seeks approval for:

- the construction of a new fish market including land and water-based structures.
- the use of the site for the fish market including waterfront commercial and tourist facilities and ancillary uses and the distribution of uses;
- a gross floor area of approximately 26,000m^2 as calculated according to the definition of GFA under SREP 26 (approximately 25,600m^2 as calculated according to the definition of GFA under the Standard Instrument).
- public domain works including promenades access to Blackwattle Bay and landscaping;
- pedestrian, cycle and road access and circulation;
- infrastructure provision and waste management; and
- 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;
- 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; and
- 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.

Specifically, the proposed development works as outlined in plans included in **Appendix A** will include:

- Retention, rehabilitation/repair of the existing sea wall structures;
- Removal/decommissioning of all existing industrial and wharf infrastructure;
- Construction of a new basement level carpark in front of the existing sea wall with appropriate measures to allow the continued discharge of stormwater through existing culverts.
- Foundations for the new structures will be completed as driven steel piles with the basement constructed as a precast stainless steel structure within which a membrane will be fitted and in-situ basement pavements poured resulting in a water tight structure.

- The proposed basement finished floor level (FFL) has been designed at -0.3 m AHD. Allowing for a hydrostatic slab and steel structure, JBS&G has conservatively assumed a base of structure of approximately -1.3 m AHD.
- A coffer dam will be installed around the construction footprint to enclose the site and enable temporary partial dewatering to facilitate construction requirements whilst ensuring that sediments remain saturated.
- To facilitate continued use of the existing stormwater culverts, etc the proposed works will include some dredging of sediment in the vicinity of an existing culvert within the new building footprint. These works will be completed to provide a gap of at least 1 m between the culvert mouth and the new basement structure. It is anticipated that approximately 55 m^3 of sediment/silt will require movement to an elevation of -3.01 m RL. The sediment/silt movement will relocate excess material within the basement footprint so as to minimise the level of disturbance of both the material and ecological receptors. In addition, it is anticipated that approximately 470 m^3 of existing rock revetment will also require removal within the zone along the base of the sea wall. Given the inherent uncertainties associated with the survey methodology and the potential for movement of sediment/silt within the building footprint between the survey period and commencement of works, the reported volumes requiring removal should be preliminary estimates and contingency allowed should additional material required removal to achieve the drainage/construction objectives.

1.4 Previous Assessments

The RAP has been substantially prepared on the basis of a range of previous assessments. This has included:

- *Environmental Site Investigation Blackwattle Bay Maritime Precinct Blackwattle Bay Maritime Precinct, NSW*, March 2009, Parsons Brinkerhoff (PB 2009);
- *Report to Land and Property Management Authority C/- Government Architects Office on Preliminary Environmental Site Assessment for Proposed Redevelopment – Waterfront at Markets, 56-60 Pyrmont Bridge Road, Pyrmont, NSW.* Ref: E24125Krpt, EIS, August 2010 (EIS 2010b);
- *Sydney Bays Precinct Urban Growth NSW Geotechnical Desktop Review*, 6 August 2014, Jacobs Group (Australia) Pty Limited (Jacobs 2014);
- *UrbanGrowth NSW Environmental Site Assessment The Bays Precinct Urban Transformation Area rev 1*, 18 November 2015, JBS&G Australia Pty Ltd (JBS&G 2015a);
- *UrbanGrowth NSW Site Wide Remedial Concept Plan The Bays Precinct Urban Transformation Area rev 0*, 4 December 2015, JBS&G Australia Pty Ltd (JBS&G 2015b);
- *Bays Market Precinct: Blackwattle Bay & Wentworth Park History, Built Heritage, Archaeology & Landscape Study*, July 2017, City Plan Heritage (CPH 2017);
- *Contamination Investigation The Bays Precinct – Separable Portion 1 Blackwattle Bay, Pyrmont, NSW*, 12 July 2017, Environmental Investigation Services (EIS 2017);
- *Revised Geotechnical Report to Urbangrowth NSW on Geotechnical Investigation for Proposed Bays Market District at Blackwattle Bay & Wentworth Park, Pyrmont, NSW rev 2*, 14 September 2017, JK Geotechnics (JK 2017);
- *Environmental Site Assessment, The new Sydney Fish Market, 1A to 1C Bridge Road, Glebe, NSW*. 4 April 2019, Rev 3, JBS&G Australia Pty Ltd (JBS&G 2019);

- *Acid Sulfate Soil Management Plan, The new Sydney Fish Market, 1A to 1C Bridge Rd, Glebe NSW*. 4 April 2019, Rev 2, JBS&G Australia Pty Ltd (JBS&G 2019b);
- *Data Gap Assessment*, *The new Sydney Fish Market, 1A to 1C Bridge Road, Glebe, NSW*. 12 March 2019, Rev A, JBS&G Australia Pty Ltd (JBS&G 2019c);
- *Remedial Action Plan*, The new Sydney Fish Market, 1A to 1C Bridge Road, Glebe, NSW. 4 April 2019, Rev 3, JBS&G Australia Pty Ltd (JBS&G 2019d); and
- *Site Audit Report*, The New Sydney Fish Market, 1A to 1C Bridge Road, Pyrmont, NSW. 25 September 2019, Ramboll Australia Pty Ltd (Ramboll 2019).
-

2. Site Condition & Surrounding Land Uses

2.1 Site Identification

The site location is shown in **Figure 1**, and current site layout is shown in **Figure 2**. The site details are summarised in **Table 2.1** and described in the following sections. It is understood that the land site is currently zoned as Ports and Employment under State Environmental Planning Policy (SEPP) No. 26 – City West and Maritime Waters under Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005.

Table 2.1: Summary Site Details

Lot / DP	Lots 3-5 in DP 1064339 Part Lot 107 in DP1076596 Part Lot 1 in DP835794
Address	1A to 1C Bridge Road, Glebe NSW and part 56-60 Pyrmont Bridge Road, Pyrmont NSW
Local Government Authority	City of Sydney Council
Approximate MGA Coordinates (MGA 56)	Easting: 332669.678 Northing: 6250259.919
Current Use	Vacant but was recently various industrial and commercial uses (concrete batching plant and commercial boat hire operations).
Proposed Use	Commercial use (fish market)
Site Area	Approximately 3.7 Ha

2.2 Site Condition

A detailed site description and environmental setting is provided in JBS&G (2019 and 2019c). At the time of preparing this RAP, all above ground structures as previously associated with the concrete batching plant were in the process of been demolished. The eastern portion of the site (comprising properties 1B and 1C Bridge Road) formerly used as a commercial boat hire business was also vacant.

JBS&G (2019c) further reported that the ground surface in the eastern portion of the site comprised a mixture of hardstand and exposed surface soils in which there was various areas of municipal and building and demolition waste scattered on the ground surface. Asbestos containing materials (ACM) in the form of fragments of fibre cement sheeting were observed to be present (refer to **Figure 2**) within the waste materials.

2.3 Site History

From a review of the previous investigations, the following summarises the key aspects of the site history with respect to potential contaminating activities:

- The site and Blackwattle Bay were originally reclaimed between 1836 and 1891;
- The site was used for commercial purposes from 1900 that included timber merchants, abattoirs and garbage collectors;
- Lot 3 in DP1064339 located in the eastern portion of the site was used for unloading coal since before 1951. Coal fragments have been reported on the seafloor and within boreholes previously completed at the site;
- The site formerly had five underground storage tanks (USTs) which were removed from the site in 1995. The USTs contained gasoline, distillate, racing fuel, mineral spirit and mineral oil.
- During the UST removal, impacted soils were reportedly excavated and removed from the site. The resulting excavations were reportedly validated for TPH, however it was further reported that heavy metal impacts remained in-situ. At the time of this current assessment, no direct records were available as to the former location of these facilities or the

remediation works completed for their removal, as such there remains uncertainty as to the potential for residual infrastructure and/or impacts within the site;

- Demolition of former site structures reportedly resulted in the removal of 700 m^2 of asbestos from the site; and
- The site is currently vacant but was recently used as a concrete batching plant and for commercial boat hire operations.

2.4 Geology and Soils

Jacobs (2014) has reported that review of existing geotechnical maps indicate that the area of the site is underlain by a significant depth (>3 m) of fill material, as consistent with historical reclamation of the area from Blackwattle Bay. This is consistent with Wentworth Park as located further south of the site. Hawkesbury Sandstone was anticipated under site filling.

JK (2017a) reported that the 1:100,000 Geological Map of Sydney indicated the site to be underlain by man-made fill and estuarine soils overlying Hawkesbury Sandstone of the Wianamatta Group. The Hawkesbury Sandstone comprises medium to coarse grained quartz sandstone with very minor shale and laminite lenses. It was further noted that at least two dykes were believed to extend through the site in a rough north-west to south-east alignment.

Boreholes in Blackwattle Bay undertaken in JK (2017a) disclosed a subsurface profile generally comprising natural clays and sandy clays of medium to high plasticity and clayey sands overlying sandstone bedrock. In the bay, the boreholes typically encountered no fill from the seabed level, except the boreholes close to the existing shoreline where fill extending up to 4.7m depth was encountered. There generally appears to be a fill layer close to the southern shoreline. The fill was reported to comprise a clayey sand and silty clay with trace amounts of fine to medium grained sand and coal and plastic fragments. Boreholes in the adjoining Wentworth Park identified fill comprising silty sand or sandy clay containing varying amounts of inclusions such as sandstone and igneous gravel, also timber, tile, ceramic, glass, shell, concrete and brick fragments, slag and ash.

Natural soils were encountered either from seabed level or about 0.5m depth in the Bay comprised interbedded layers of silty clay, sandy clay and clayey sand soils. The predominantly clay samples were assessed as having moisture content greater than their plastic limits and based upon hand penetrometer tests completed on the samples, ranged in strength from very soft to very stiff. The clays were assessed as generally being of medium to high plasticity, although more sandy clays were generally of low to medium plasticity. The predominantly sandy samples were assessed as wet and ranged from very loose to dense relative density. The natural soils contained varying amounts of fine to coarse grained gravel, shell fragments and other organic materials.

Sandstone bedrock was encountered underlying natural soils at depths ranging from approximately 5.5-13.4 m bgs (-9.1 to -18.5 m AHD).

2.5 Topography and Hydrology

The site is situated on predominantly flat terrain. Review of topographic information obtained from regional topographic maps available on NearMap spatial information database indicated that southern portion of the site that has been subject to land reclamation and has an elevation of approximately 2 m Australian Height Datum (AHD). The ground surface of the northern portion of the site is situated on piers overlying the surface waters of Blackwattle Bay. Site surface water is anticipated to drain directly into Blackwattle Bay.

2.6 Hydrogeology

A review of the registered bore information (NSW DPI 2017[13]) indicated that there are 14 registered bores within a 500 m radius of the site. The closest wells (approximately 250 m south-west of site) were constructed for monitoring purposes and were reported to contain a standing water level of approximately 0.6 m within shallow fill materials. Groundwater monitoring as undertaken within the extent of the site as part of previous investigations has identified:

- Site groundwater to have reported total dissolved solids (TDS) concentrations consistent with saline waters; and
- Standing water levels correspond with tidal surface water levels of Blackwattle Bay in which site groundwater is anticipated to discharge.

2.7 Acid Sulfate Soils

Review of the Acid Sulfate Soil (ASS) Risk Map for Prospect/Parramatta indicates[14] that the subject site is located within an area of 'high probability' of acid sulfate soils within bottom sediments. In such areas, there is a severe environmental risk if bottom sediments are disturbed by activities such as dredging.

PB (2009) noted potential indicators of ASS comprising odorous marine sediments with seashell inclsuions in boreholes located in the southern portion of the site (overlying the land portion of the site) and within marine sediments in Blackwattle Bay. Similar observations were reported in JBS&G (2015) and EIS (2017).

Based on the results from JBS&G (2019c), shallow gravelly-sandy (coarse materials) fill materials in the unsaturated zone (within the land based portion) are considered to be non-PASS and thus do not require specific management with regard to ASS during future construction activities.

Saturated natural sediments comprising sandy clay/silty sand present at depths from 2.2 m bgs within the land based site portion are classified as PASS and require appropriate management and treatment during future works that result in their disturbance. As previously identified, sediments within the balance of the site are also considered PASS.

2.8 Meteorology

A review of average climatic data for the nearest Bureau of Meteorology monitoring location (Observatory Hill[15]) indicates the Site is located within the following meteorological setting:

- Average minimum temperatures vary from 8.1 ^{o}C in July to 18.8 ^{o}C in February;
- Average maximum temperatures vary from 16.4 ^{o}C in July to 26.0 ^{o}C in January;
- The average annual rainfall is approximately 1215.7 mm with rainfall greater than 1 mm occurring on an average of 99.9 days per year; and
- Monthly rainfall varies from 68.4 mm in September to 133.2 mm in June with the wettest periods occurring on average from January to June.

[13] NSW Department of Primary Industries, 2015. Groundwater Monitoring Overview Map. Http://allwaterdata.water.nsw.gov.au/water.stm. Accessed 13 February 2018

[14] *'Acid Sulfate Soil Risk Map – Prospect/Parramatta, Edition 2',* 1997 1:25 000, NSW Department of Land and Water Conservation (DLWC), Ref 9130N3 (NSW DLWC)

[15] http://www.bom.gov.au/climate/averages/tables/cw_066062.shtml, Commonwealth of Australia, 2013 Bureau of Meteorology, Product IDCJCM0028 prepared on 29 December 2016 and accessed by JBS&G on 5 February 2018

3. Summary of Previous Assessments

A summary of the previous environmental assessments completed at the site is provided below.

3.1 Environmental Site Assessment (JBS&G 2019)

JBS&G conducted an ESA to characterise potential contamination at the site that will require to be addressed by the proposed site preparation and construction works for the fish markets development. The scope of works comprised:

- A review of previous site contamination assessment/investigation reports as made available to JBS&G with respect to the suitability of the data for use in evaluating the current contamination conditions across the various properties within the extent of the site. The ESA was substantially prepared on the basis of previously collected environmental data as documented in PB (2009), JBS&G 2015a and EIS 2017 assessments;
- Review of available geotechnical investigation reports as made available; and
- Development of a conceptual site model (CSM) as specific to the environmental characterisation of the site and the proposed development.

The key findings of the ESA are summarised below:

- Review of currently available previous site assessment documents has identified that there is sufficient existing data to characterise soil, sediment and groundwater conditions within the area of the proposed development in order to establish a CSM. Notwithstanding, a number of data gaps were identified as follows that will require additional data to refine specific management/remedial actions during application of a future RAP:
    - Shallow soils at PBHA01 and PBHA02 with TPH impacts that may pose a risk to groundwater quality discharging from the site;
    - Groundwater assessment hydraulically downgradient from identified PAH and heavy metal impacts and potential risks to off-site ecological receptors;
    - Additional ground gas and soil vapour investigation to assess the inhalation risks to future site users of the commercial building;
    - Additional characterisation of sediment conditions, particularly in areas where proposed construction activities will result in movement or otherwise, disturbance of sediments to facilitate the implementation of appropriate management measures in relation to contaminant concentrations and acid sulfate soil conditions; and
    - Characterisation of site soils with respect to sampling density as provided in EPA (1995[16]) guidance for the land portion of the site and consideration as to the uncertainty associated with the status of historical remediation of former fuel storage facilities. Whilst any potential soil impacts may not affect site suitability (under the proposed development), the impacts (if any) may require appropriate management during development and construction works. Such potential impacts requiring further assessment include asbestos in soils, characterisation of fill material and natural soils for such that material requiring management in future development works can be refined and leachate data of soils to inform potential waste classification of surplus soils to the development.
- Each of the environmental data sets (as sourced from PB (2009), JBS&G (2015a) and EIS (2017) were found to be reliable for the purposes of making decisions as part of this

[16] *Contaminated Sites Sampling Design Guidelines*, NSW Environment Protection Authority, September 1995 (EPA 1995).

assessment. It is noted that data collected as part of PB (2009) is approximately eight years old. However, from a review of the site history since 2009, the site use and immediate surrounds have remained relatively unchanged and therefore the data is considered to be sufficiently representative of current conditions for the purposes of developing the CSM. Groundwater analytical results as reported in PB (2009) were also found to have elevated laboratory LORs that did not allow for a direct comparison to the adopted criteria, whilst some sediment analysis data in EIS (2017) had elevated LORs once consideration was given to normalisation to organic carbon concentrations as per CSIRO (2013);

- Based on the CSM presented, the potential exposure pathways for commercial users of the site will include inhalation (gas or vapours) pathways. On-site ecological receptors will be limited as the whole site will be covered in hardstand. Exposure pathways for off-site receptors will include contaminated groundwater (if any) migrating off-site and contaminant up-take from sediments;
- Based on the results and CSM presented, there were no potential unacceptable health risks identified with respect to the proposed development. Notwithstanding, this is required to be confirmed with the results of a data gaps assessment;
- Heavy metal, PAH and TRH contaminated sediments have been identified within the extent of the development site that were reported to exceed both low and high trigger value sediment quality guidelines protective of ecological communities. UNSW (2017) reported sediments within Blackwattle Bay had significant metal and nutrient contamination that were indicative of highly disturbed conditions. This is supported by the results reported in EIS (2017) in which sediment data collected from sampling points outside the proposed development area (but in Blackwattle Bay) had similar levels of impact to those reported within sediments of the site.
- As reported in ANZECC/ARMCANZ (2000) sediment remediation is not straightforward and should only be undertaken where absolutely warranted. To this extent, UNSW (2017) recommended the following with respect to increasing biodiversity and restore ecosystem services within the Bays Precinct:
    - Reduction of contaminant loads through the treatment of storm water and land runoff; and
    - Prevention of the resuspension of sediments during development by minimising sediment disturbance and using sediment curtains during construction activities.
- Consistent with EPA (2017) guidance, in which remediation should not proceed in the event that it is likely to cause a greater adverse effect than leaving the site in its current condition with regard to contamination, it is considered that sediments should not be actively remediated as it will likely result in adverse impacts through requirements for excavation, dewatering, ASS treatment and off-site disposal of the resulting stabilised material to landfill. Moreover, it will likely not result in any meaningful environmental outcomes within the context of the highly disturbed conditions of Blackwattle Bay in which sediments with elevated levels of contaminants have been reported throughout the entire Bay.
- It is noted that sediments adjacent to the existing sea wall and typically beneath the proposed new Sydney Fish Market building envelope will require adjustment in location within the current site extent to facilitate continued discharge from existing stormwater culverts and allow design levels to be reached for the construction of the basement. It is understood that the adjustment sediments will extend to a maximum depth of approximately 1.4 m in minor areas of the site. Review of the existing data has identified that, consistent with sediments more broadly at the site, near surface sediments (0-0.4 m)

are impacted with heavy metals, PAHs and TRH. Sediment samples were further collected from depths of 0.5-1.0 m and 1.0-1.5 m at PBSS05 in which the concentrations of heavy metals and PAHs were consistent with those in the overlying surface sample (0-0.4 m) and additional surface sediment samples collected throughout the investigation area. On this basis, it is considered that these sediments are suitable from a contamination perspective to placed elsewhere within the proposed basement footprint. In addition, the removal of the surface sediments from within these locations is not expected to expose any underlying sediments (at depth) with greater contaminant concentrations that would result in a net-increase in contaminant exposure risks to ecological receptors on or in the vicinity of the site.

Consistent with the previous point, the potential for resuspension of sediments during development works is required to be minimised such that mobilisation of contaminants and associated short-term ecological risks are appropriately managed. To enable an appropriate understanding of sediment characteristics within areas of disturbance, it is recommended that further site investigation activities be undertaken across the development works footprint prior to the commencement of any works that will result in disturbance of the sediments. These additional works will be designed to provide a suitable data set to guide management and if required, rehabilitation of these sediments during/following the required disturbance activities.

- A temporary a coffer dam will be constructed at the limits of the development works area prior to construction activities that will isolate the construction works footprint from the balance of the Bay. This will minimise the risk of any environmental impacts beyond the site boundary. Within the site, potential environmental impacts associated with localised movement of the sediment to achieve the construction requirements will be managed via selection of a methodology to minimise the suspension of sediments in the water column. It is expected that this will include use of either a long arm excavator, clam shell apparatus or similar to collect and locally transport small quantities of saturated sediment across the bed floor, within a silt curtain surround, followed by gentle placement at the final location. Resuspension of sediment will be minimised and with consideration to the continued saturated condition of the sediment, the low concentration of oxygen in water when compared to the atmosphere, the high buffering capacity of the marine Bay waters and the isolated nature of the works area from the balance of the surrounding environment, it is considered that the environmental (contamination and acid sulfate soil) risks associated with disturbance of the sediments may be suitably managed.
- The site is situated within an area of high probability of ASS. Indicators of potential ASS comprising sulfide odours and the presence of sea shells were observed within media inspected from boreholes conducted on both the land and water portion of the site. On this basis, the disturbance of materials during site redevelopment works will be required to be conducted in accordance with an acid sulfate soils management plan (ASSMP)(JBS&G 2019b).

It was recommended that a RAP be prepared to establish a suitable framework for management of potentially contaminated media such that upon completion of works, the site will be considered suitable for the proposed use.

3.2 Data Gap Assessment (JBS&G 2019c)

JBS&G completed a data gap assessment at the site to inform the remedial/management requirements to make the site suitable for the proposed development. The scope of works included:

- A targeted soil investigation comprising the installation of 13 boreholes to adequately characterise site soils for the identified COPCs and potential ASS;

- The installation and subsequent sampling of 6 new and 4 existing groundwater monitoring wells as part of a groundwater investigation to further delineate the lateral extent of the identified groundwater impacts at the site;
- A grid based sub-slab vapour assessment completed at 20 locations within the proposed Sydney Fish Market building envelope; and
- A hazardous ground gas assessment conducted within the groundwater monitoring well network (comprising 10 locations) installed on site.

The key findings of the data gap assessment are summarised below:

- Soil sampling was conducted in order to appropriately characterise site soils for the identified COPCs (from JBS&G 2019) at a sampling density consistent with the minimum specified in EPA (1995). The concentration of all COPCs in site soils were below the adopted site assessment criteria. On this basis, there are no identified impacts to site soils that require management or remediation with respect to making the site suitable for the proposed development. Notwithstanding, the presence of trace asbestos at SB06 0.2-1.0 and PASS within saturated silty clay and sandy clay materials (sediments) will require appropriate management during future construction activities. It is noted that SB06 is located on the western boundary of the site, and therefore, the trace levels of friable asbestos reported in this sample is likely not indicative of site wide friable asbestos in soil impacts;
- With the exception of copper, lead and zinc, the concentration of COPCs within site groundwater samples collected as part of this assessment were below the adopted criteria. It was considered that groundwater metal concentrations are likely to be representative of natural background conditions in the urban city environment. On this basis, site groundwater is considered not to require specific management or remediation with respect to making the site suitable for the proposed development;
- The concentration of VOCs in sub-slab vapour were reported to be below the laboratory LOR indicating no potential health risks for future occupants of the commercial Fish Market building via vapour intrusion from these constituents;
- Hazardous ground gas monitoring was conducted within the existing groundwater monitoring well network. Review of the data set has identified the highest gas screening value (GSV) was attributable to carbon dioxide gas within PMW4A on 11 February 2019. In accordance with EPA (2020[17]), the data indicates ground gas conditions fall within 'characteristic gas situation 2' comprising low risk conditions. From a review of Table 7 in EPA (2020), a characteristic gas situation of 2 requires a gas protection value of 3 as applicable to public buildings and shopping centres. It is understood the building design of the proposed Sydney Fish Market (fully tanked and ventilated basement) will provide adequate protection relative to the hazardous ground gas conditions assessed as part of this investigation, such that no further management of potential risks is required;
- With regard to potential removal of excess (or impacted material) during development works, based on the observation of ash and slag within fill on-site, it is considered that the General Approval of the Immobilisation of Contaminants in Waste (EPA 1999/05[18] and EPA 2009/07[19]) may be applied for fill material at the site. When considered with the limited

[17] Assessment and management of hazardous ground gases, NSW EPA (2020).
[18] *1999/05 – General Immobilisation Approval: Ash, ash contaminated natural excavated materials or coal contaminated natural excavated materials*.
[19] *2009/07 – General Immobilisation Approval: Metallurgical furnace slag or metallurgical furnace slag contaminated natural excavated materials.*

TCLP data presented herein, it is anticipated that excess fill material to be excavated and removed from the site during the works will be consistent with General Solid Waste, potentially mixed with Special (asbestos) Waste owing to the trace levels of asbestos reported at SB06. Given the organotin concentrations identified in the soil, liaison with the NSW EPA in conjunction with additional asbestos in soil and TCLP metals and PAH results will be required to finalise waste classifications prior to off-site disposal of fill material.

- Natural soil/sediment to be excavated during the proposed works will comprise PASS. Where disturbed during development works, this material will require management in accordance with the standalone (JBS&G 2019b). Further, if material is to be removed from site, this material will require off-site disposal to a NSW EPA licensed waste facility.

Based on the results and findings of the data gaps assessment, it was considered that the remedial framework outlined in the Development Application stage RAP (JBS&G 2019d) is valid, and when implemented will ensure the site is suitable for the proposed development. Notwithstanding, it was recommended that the RAP be updated to include the additional results and findings of the assessment such that the final remedial scope/management requirements can be defined prior to the commencement of the redevelopment works.

4. Contamination Status / Conceptual Site Model

A refined conceptual site model (CSM) based on the results presented in JBS&G (2019 and 2019c) with consideration to the proposed development is presented in **Table 4.1** following.

Table 4.1: Refined Conceptual Site Model

CSM Aspect	Summary of Available Information
Current Extent of Known Impacts	**Soils** The concentration of COPCs within all historical soil samples were below the adopted health based criteria. On this basis, there are no identified impacts to site soils that require management or remediation with respect to making the site suitable for the proposed development. It is noted that trace asbestos was detected in a single soil sample (SB06 0.2-1.0) that will require management from a work health and safety (WHS) perspective during ground disturbance activities – the single detection may indicate the occurrence of further asbestos impacts within site soils in which it is noted that the potential impacts will not affect suitability of the site in the absence of any exposure pathways to site soils (see section below). However, as noted, the potential impacts will require management during future construction activities (from an WHS perspective) that result in the disturbance of these soils. In addition, fine grained soils and sediments at an approximate depth of >2m bgs comprise ASS and will require management during future construction works. Elevated concentrations of metals and TRH within historical soil samples were reported to exceed criteria protective of ecological receptors – the exceedances suggest that site soils are likely not appropriate for use as a growing medium. However, given that the site will be sealed in hardstand with limited on-site ecological receptors (within the land-based portion) – the exceedances are not considered significant with respect to site suitability. **Groundwater** With the exception of copper, lead and zinc, the concentration of COPCs within groundwater samples collected as part of this assessment were below the adopted criteria. Given that there was no significant change in copper, lead or zinc concentrations between up gradient and down gradient monitoring wells in addition to no high levels of these metals were reported in soils at the site, it was considered that groundwater metal concentrations are likely to be representative of natural background conditions in the urban city environment. On this basis, site groundwater is not considered to require management or remediation with respect to making the site suitable for the proposed development. **Ground Gases and Vapour** The highest GSV values recorded during the monitoring event are attributable to carbon dioxide gas within PMW4A on 11 February 2019 comprising a value of 0.12 CO_2/hr. Reference to the modified Wilson and Card Classification (EPA 2020), indicates that the reported GSV falls within a 'characteristic gas situation 2' comprising low risk conditions. The concentration of VOCs in sub-slab vapour were reported to be below the laboratory LOR, indicating no potential health risks for future occupants of the commercial fish market building via vapour intrusion. **Sediments** Heavy metals, total PAH, (limited) total PCBs and TRH contaminated sediments have been identified within the extent of the development site. A baseline ecological assessment (UNSW 2017[20]) was conducted within the Bays Precinct and included sediment sampling within the greater area of Blackwattle Bay. The report found that the sediments of Blackwattle Bay had significant metal and nutrient contamination that were indicative of highly disturbed conditions. On this basis, the elevated contaminant concentrations reported in sediments within the subject site are likely reflective of conditions throughout the extent of Blackwattle Bay as a result of historical industrial activities along the foreshore of the Bay.

[20] *Baseline Assessment of Ecological Structure and Environmental Conditions at the Bays Precinct*, University of New South Wales, March 2017 (UNSW 2017).

CSM Aspect	Summary of Available Information
	All sediments are also anticipated to be ASS. As such, management of the potential for acid generation conditions will be required during all ground/sediment disturbance activities completed at the site.
Human and Ecological Receptors	**Human** The primary human receptors of concern are future users of the site comprising commercial patrons and workers who will be exposed to potential site contaminants through inhalation of vapours and/or gas from site soils and/or groundwater. In addition, maintenance workers conducting excavations may be periodically exposed to contaminants in site soils, groundwater and/or sediments through inhalation, oral and/or dermal exposures. **Ecological** The site will be sealed as a result of building and/or accessway construction. As such, ecological receptors are limited to off-site receptors which have the potential to be impacted as a result of groundwater or surface water (if present) migrating from the site to the surface waters of Blackwattle Bay. These receptors can be identified from the water quality objectives (WQO) from the Parramatta River/Sydney Harbour catchment and include 'Aquatic ecosystems' and 'Aquatic foods'.
Potential and Complete Exposure Pathways	No current ecological or human health risks have been identified within site soils or groundwater under the proposed development scheme. The primary pathway of concern for the site is gas/vapour intrusion. Gases from the sub-surface can potentially migrate into buildings by diffusion and advective processes. Gases can further potentially accumulate in buildings due to reduced ventilation. Concentrations of VOCs in sub-slab vapour have been below laboratory detection limits indicating an incomplete pathway for these constituents. From a review of the existing ground gas dataset, the maximum gas screening value for the site falls within 'characteristic gas situation 2' comprising low risk conditions.
Potential for Off-site Migration	The potential for off-site migration of contaminants is primarily limited to COPCs in groundwater migrating from the site. The concentration of COPCs in site groundwater has been reported to be below the adopted site assessment criteria or representative of natural background conditions in the urban city environment. On this basis, the potential for off-site migration of contaminants as related to site activities is considered low.
Data Gaps	A data gap relates to the final waste classification of materials requiring off-site disposal during future development works. The data gap primarily relates to further leachability analysis of contaminants in site soils to inform final waste classifications. It is understood that this is proposed to be assessed when future detailed in ground service plans and structural design have been completed such that the sample locations may be targeted to these areas. Alternatively, material may be excavated/stockpiled and assessed prior to removal from the site to an appropriate facility. In addition, based on a review of the data gaps assessment (JBS&G 2019c), the Site Auditor identified the following additional data gaps that will require further assessment during works: • *Soil in the eastern land-based portion of the site has not been assessed at an adequate density*. Noting that the excavation to allow for the construction of the future basement will likely result in the removal of the majority of these materials, the identified data gap is considered to not be significant in the context of the development scheme. However, should some residual materials from this portion of the site be retained on-site, an appropriate assessment will be required to ensure that they do not pose an unacceptable risk to human health or the environment under the proposed land-use, or otherwise appropriate management measures are implemented to address the identified risk prior to completion of the development. • *The footprint of the electrical substation requires assessment for PCBs and PAHs following demolition.* Once existing infrastructure has been decommissioned appropriate assessment/validation of underlying material will be undertaken to enable decision making with regard to any potential management requirements for material. • *Characterisation of fill materials for the presence of asbestos was limited* – as a result of the methodology adopted during JBS&G (2019c) in which boreholes were conducted within the operational site at the time of the assessment. As noted, the potential asbestos impacts within site soils is not expected to impact site suitability in the absence of any future exposure pathways to site soils – however, the potential impacts

CSM Aspect	Summary of Available Information
	will require management during future construction related activities from a WHS perspective. The management requirements during construction will be informed by the site-specific construction EMP (**Section 8** and **9**). • *There is the potential for additional USTs to be present on site* given that historical site records are not complete. Noting that the bulk excavation of the site will likely identify any remaining USTs if present, there are appropriate management procedures outlined in **Section 7** should additional USTs be identified during the bulk earthworks. • *Further characterisation of sediments is required to inform management during excavation and construction*. Pending further design of the proposed development work and evaluation of construction methods, it is anticipated that a site sampling program to further characterise sediments in areas of the site to be the subject of disturbance and areas where the previous sampling density was not sufficient (e.g. western portion) will be undertaken. The scope and nature of the assessment, to be confirmed with the auditor prior to implementation, will be sufficient to enable a suitable data set to guide management of potential contaminant and acid release during the construction works.

5. Remediation Options

5.1 Remedial Goals

The goal of the site management/remediation works is to ensure that the following is achieved:

- Prevention of exposure of human populations occupying/working on/using the site to impacted soils etc underlying the site;
- Prevent potential phyto-toxicity effects on flora and fauna contact to impacted soils and/or sediments;
- Appropriate management and/or disposal of soil, water and/or sediment disturbed during development activities in accordance with in force regulations and relevant EPA guidelines;
- Removal of potential ongoing sources of environmental contamination (unexpected finds such as historical sub-surface petroleum storage, if encountered); and
- Validation of site management and remedial works in accordance with the relevant EPA guidelines; and
- Documentation of works as completed is appropriate to demonstrate the suitability of the site for the proposed land use and compliance with applicable legislation, regulations, guidelines and development consent conditions as may apply to the site.

5.2 Guidance Framework

The RAP has been prepared with consideration to the following list of NSW EPA endorsed guidelines:

- *National Environment Protection (Assessment of Site Contamination) Measure 1999, Amendment No.1 2013,* National Environment Protection Council (NEPC 2013).
- *Contaminated Sites: Sampling Design Guidelines, September 1995* (EPA 1995).
- *Consultants Reporting on Contaminated Land Contaminated Land Guidelines*, NSW Environment Protection Authority, April 2020, updated 5 May 2020 (EPA 2020).
- *Contaminated Sites: Guidelines for NSW Site Auditor Scheme*, 3rd edition October 2017 (NSW EPA 2017).
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZAST 2018).
- *Guidelines for the Assessment and Management of Groundwater Contamination*, DECC March 2007 (DECC 2007).

In addition, consideration is also required to guidelines made or endorsed by the EPA under the Protection of the Environment Operations (POEO) Act 1997 and associated regulations, including:

- *Guidelines for Implementing the POEO (Underground Petroleum Storage Systems) Regulation 2008*.
- *Waste Classification Guidelines, Part 1 - Classifying Waste*. NSW EPA 2014
- *Waste Classification Guidelines, Part 2 – Immobilising Waste*. NSW EPA 2014
- *Waste Classification Guidelines, Part 3 - Waste Containing Radioactive Material*. NSW EPA 2014
- *Waste Classification Guidelines, Part 4 – Acid Sulfate Soils*. NSW EPA 2014.

Other guidance that should also be considered in relation to site conditions includes:

- *Work Health and Safety Act 2011* and *Work Health and Safety Regulation 2017*.

- *Managing Land Contamination, Planning Guidelines, SEPP 55 – Remediation of Land* (DUAP 1998).
- *Code of Practice: How to Safely Remove Asbestos* (SafeWork NSW 2019).
- *Assessment and management of hazardous ground gases*, NSW EPA (2020).
- *Acid Sulfate Soil Manual*, Acid Sulfate Soil Management Advisory Committee 1998.
- *Organotin Waste Materials Chemical Control Order 1989.*
- *National Acid Sulfate Soils Guidance – Guidelines for the Dredging of acid sulfate soil sediments and associated dredge spoil management*. Water Quality Australia, June 2018 (WQA, 2018a)
- *National Acid Sulfate Soils Guidance – Guidance for dewatering of acid sulfate soils in shallow groundwater environments.* Water Quality Australia, June 2018 (WQA, 2018b)

5.3 Regulatory and Planning Requirements

Where a proponent seeks approval for a change of permitted use of the land, either in the form of a rezoning, sub-division or project approval, it is required that the proponent satisfies the consent authority, and relevant regulator (including the NSW EPA), that contamination conditions as may be present at the site will be appropriately managed such that the site may be considered suitable for the proposed use.

5.3.1 Requirements in Relation to Planning Approvals

Under SEPP55 it is noted that the consent authority must not consent to the carrying out of development on the subject land unless:

a) It has been considered whether the land is contaminated; and

b) If the land is contaminated that the planning authority is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for all purposes for which the development is proposed to be carried out; and

c) If the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, the planning authority is satisfied that the land will be remediated prior to use for that purpose.

Further, it is required that the planning authority obtains from the proponent a report specifying the findings of an investigation of the land prepared in accordance with the contaminated land planning guidelines. The consent authority may also require the applicant to provide further information if the findings of the preliminary investigation warrant such additional assessment.

With regard to classification as Category 1 or 2 works, given the proposed remediation works are considered to be "ancillary to the proposed development works" development consent for the remediation works will be obtained as part of the broader State Significant Development (SSD) and as such are de facto Category 1 works.

5.3.2 Other Requirements

In addition to the requirements of SEPP55 as outlined above, consideration of the regulatory requirements under NSW legislation will also necessary as briefly outlined following:

- *POEO Act (1997)* – All potential discharges from the site during remediation works will require to be maintained below applicable assessment criteria/threshold guidelines during the remediation/development works. This would apply to potential emissions in air, water and discharges to surface and groundwater. Levels of discharges are typically assessed at a site boundary. The RAP prepared for the assessment area has provided a

process to be followed during the remediation activities and subsequent development works to ensure that the beneficial re-use of materials does not cause pollution of groundwater and/or waters by reference to any applicable criteria as may be used to assess pollution under the POEO Act (including s120).

Evaluation of the proposed remediation/validation activities in relation to the categories and/or thresholds presented in Schedule 1 of this Act. Where works trigger one or more categories presented in Schedule 1, the works will require to be licensed by the EPA in addition to the requirements of the consent authority. These activities may for this project relate to: the treatment of contaminated soil and/or groundwater, dredging and/or quarrying activities, etc.
The proposed remediation/validation activities are not expected to require a license given the will not treat more than 1000 m^3 per year of contaminated soil received from off-site, or involve the treatment of contaminated soil originating on-site with the capacity: (i) to incinerate more than 1000 m^3 per year of contaminated soil, or (ii) to treat (otherwise than by incineration) and store more than 30 000 m^3 of contaminated soil, or (iii) disturb an aggregate area of 3 hectares of contaminated soil

- *Water Management Act (2000)* – Where remediation works require the extraction (and treatment, reinjection or otherwise) of groundwater, consent for these works may be required under a temporary dewatering licence even if the triggers for an EPL are not met. Such requirements may potentially be stipulated as a condition of the development consent via the integrated development approvals process.
- *POEO (Waste) Regulation 2014* – In addition to triggers for an EPL, consideration will be needed with respect to the POEO Waste Regulation in relation to non-licensed waste activities and waste transporting. This includes requirements for management of asbestos waste during transport/disposal, the approval of methods associated with the immobilisation of specific waste streams etc. as may be required under this RAP.
- *Work Health and Safety Act 2011* and associated *Regulations* including those related to Asbestos – Where asbestos impacts in soil are identified during either site investigation works, or during/following demolition of existing improvements, the site will be required to be considered as having asbestos contaminated soils and appropriate protections implemented with respect to the exposure of site workers and nearby sensitive receptors. In such instances, management requirements are outlined in *How to Manage and Control Asbestos in the Workplace Code of Practice*, WorkSafe NSW (2016). Given asbestos in soil has not currently been identified during limited intrusive investigation activities, should asbestos be identified, its occurrence will be assessed and managed via application of the Unexpected Finds Protocol (UFP) outlined in **Section 8.6**.
- *Waste Classification Guidelines (2014)* - All wastes generated and proposed to be disposed offsite shall be assessed, classified and managed in accordance with this guideline. Where wastes require immobilisation prior to offsite disposal (to reduce waste classifications) an immobilisation approval shall be sought in accordance with Part 2 of this guideline. Immobilisations are only anticipated to be required with unexpected finds that cannot be retained on site and cannot be disposed directly offsite to a licensed facility. Material identified as ASS will be required to be disposed of from the site in accordance with Part 4 of this guideline.
- *Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019* - The removal of USTs and associated infrastructure will be undertaken in accordance with WorkSafe NSW requirements and a validation report will be provided in accordance with the provisions of the *Protection of the Environment Operations (UPSS) Regulation 2019*. The removal of underground petroleum storage infrastructure will be

undertaken in accordance with *The Removal and Disposal of Underground Petroleum Storage Tanks – Australian Standard 4976-2008*.

- *City of Sydney (2004) "Contaminated Land Development Control Plan"* - The Council development control plan (DCP) provides a number of environmental and site management provisions required to be employed during remediation works. These have been incorporated into this RAP as minimum standards for the environmental management of remediation works.
- *Organotin Waste Materials Chemical Control Order 1989 (CCO)* – The CCO defines the management requirements for activities related to waste material contaminated with organotin contaminated waste, including the manufacture, storage and disposal of such waste. This includes material containing tributyltin or other organotin compounds either individually or in combination, including but not limited to paint waste, soil/sediment/water contaminated with organotins and materials to which paint remains adhered. Where appropriate, the requirements of this CCO have been incorporated into this RAP.

5.4 Extent of Remediation and/or Management Required

5.4.1 Soil

The identified environmental impacts at the site that require management will generally comprise material (fill material and natural soil) identified during the early works and future main works periods as excess to site requirements. This is anticipated to generally comprise piling spoil, trenching spoil associated with foundations, services infrastructure, or other works requiring below ground activities to achieve construction objectives. Based on the existing general site observations, it is anticipated that such materials will also require treatment in accordance with the ASSMP (JBS&G 2019b) prior to off-site disposal.

It is noted that some data gaps were identified in **Section 4** that require further assessment prior to the finalisation of the complete appropriate definition of the management/ remedial scope.

Given the preliminary nature of inground design activities to date, no specific identified areas of the site requiring management have been specifically identified, however it is noted that there is the potential that some areas of bay sediments may require movement to adjust sediment bed levels to facilitate ongoing use of the existing stormwater culvert and construction of the suspended basement structure.

For the purposes of this RAP, it has been assumed that soil and sediment conditions at the site may require some remediation and/or management where disturbed during development activities to ensure the site is suitable upon completion of the development works. It is envisaged that once the proposed detailed development scheme (Construction Certificate stage civil/structural design) information is available, the extent of site areas/proposed works requiring management will be apparent.

5.4.2 Sediment

As discussed in **Section 4**, sediments at the site and in the surrounding Blackwattle Bay are impacted with heavy metals, total PAHs and (limited total PCBs) and TRH with regard to ecological concerns. The elevated contaminant concentrations reported in sediments within the subject site are considered to be likely reflective of conditions throughout the extent of Blackwattle Bay as a result of historical industrial activities along the foreshore of the Bay. On this basis, no active remediation of the in-situ sediment is required.

Notwithstanding, a minor area of sediment located adjacent to the existing sea wall beneath the proposed new Sydney Fish Market building envelope will require adjustment in location to facilitate

continued discharge from existing stormwater culverts. These works will require management, from both a contamination and ASS view point. The management measures will primarily comprise controlling the potential for resuspension of sediments during development works such that mobilisation of contaminants and changes in the sulfate-sulfide equilibrium of the sediment are minimised such that associated short-term ecological risks are appropriately mitigated. It is expected that best-practice management procedures will be informed by development of a site-specific CEMP based on management principles provided in a separate ASSMP (JBS&G 2019b) and therefore the appropriate management of sediments during development works requires no further detail herein.

5.5 Consideration of Possible Remedial Options

The preferred hierarchy of options for remediation (clean up) and/or management adopted by NSW EPA has been established within the NEPC (2013) *Assessment of Site Contamination Policy Framework* as follows:

- On-site treatment of the material so that the contaminant is either destroyed or the associated risk is reduced to an acceptable level; and
- Off-site treatment of excavated material so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site; or

if the above options are not practicable:

- Consolidation and isolation of the material on site by containment with a properly designed barrier; and
- Removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material; or
- Where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

In addition, when deciding which option to choose, consideration is also required to be given to the sustainability (environmental, economic and social) aspects of each option to ensure an appropriate balance between the benefits and effects of undertaking remedial/management options.

In cases where no readily available or economically feasible method is available for remediation, it may be possibly to adopt appropriate regulatory controls or develop other forms of remediation.

Consideration of each of the approaches (EPA 2017), is presented in **Table 5.1**.

Table 5.1: Remedial Options Screening Matrix

Remedial Option	Applicability	Assessment
1. On-site treatment so that the contaminants are either destroyed or the associated hazards are reduced to an acceptable level.	Soils Although any excavated soils will require on-site management in accordance with an ASSMP (JBS&G 2019b), there are surplus soils on-site with respect to the proposed development. These surplus materials will originate from piling spoil, installation of services, and excavation of land-based soils to accommodate a portion of the basement.	Not a viable option.
2. Off-site treatment so that the contaminants are either destroyed or the associated hazards are reduced to an acceptable level, after which the soil is returned to the site.	Soils As above (**Option 1**).	Not a viable option.
3. On-site in-situ management of the material by capping and cover, and ongoing management.	Soils As with Option 1, the material requires management as it has been identified as surplus material on-site with respect to the proposed development. On this basis, this is not a viable option.	Not a viable option.
4. Excavation and off-site removal of the impacted material.	Soils/Sediments For this option material is required to be transported to a facility lawfully able to accept the type of waste and associated fees including government waste levies apply. There are facilities within the Sydney region able to accept material classified as General Solid Waste (GSW), Special (asbestos) Waste and Restricted Solid Waste (RSW). In the unlikely event that material is identified to be impacted such that contaminant concentrations exceed the thresholds for characterisation as GSW, GSW mixed with Special or RSW, material may require to be treated prior to off-site disposal to a lawful facility as discussed above. Social impacts, including high volume truck movements and potential environmental emissions associated with on-site activities and vehicle movements also require consideration with regard to this strategy. Material will also require management in accordance with the ASSMP (JBS&G 2019b) requirements prior to removal from the site.	This is the preferred option for all surplus materials.

Should the additional assessment of remaining data gaps presented in **Section 4** identify any impacts that require remediation, the remedial options screening matrix in **Table 5.1** will be required to be reviewed. Notwithstanding, it is anticipated that any impacts will be relatively isolated and could be appropriately managed through the controlled excavation and off-site disposal of impacted materials acting as source material. On this basis, the remaining data gaps identified in **Section 4** are not considered to affect the successful execution of this RAP.

6. Remediation Plan

A summary of the remedial scope of works is provided in the following sections.

6.1 Data Gap Assessment

In order to refine the finalised remedial scope, an assessment of remaining data gaps as outlined in **Section 4** is required to be completed following the demolition of buildings and structures (**Section 6.3**) and during excavation of the basement area.

6.2 Site Establishment

All safety and environmental controls are to be implemented as the first stage of remediation works. These controls will include, but not be limited to:

- Locate and isolate all required underground utilities within the site such that excavation works can safely proceed;
- Assess the potential impacts of the excavation works to neighbouring properties. It is recommended that a suitably qualified engineer be consulted prior to any excavation works, such that appropriate controls (if required) can be implemented;
- Assess need for traffic controls;
- Work area security fencing;
- Site signage and contact numbers; and
- Sediment fencing (attached to security fencing) and silt curtains adjacent to the site in Blackwattle Bay.

6.3 Buildings and Structure Demolition

Existing structures on the site require demolition and removal from the site prior to remedial works. The key processes are briefly summarised below:

- Consult the findings and recommendations of a pre-demolition HMBS prepared for all structures to be demolished in order to safely and lawfully remove hazardous material previously identified prior to commencement of general demolition activities;
- Removal and disposal of hazardous materials in accordance with relevant regulatory guidance including SWA 2016 and the Waste Classification Guidelines 2014 (EPA 2014);
- Conduct hazardous materials clearances to confirm the successful removal of all HBMs;
- Demolish remainder of buildings/structures and remove redundant infrastructure;
- Beneficial reuse of environmentally validated material onsite (i.e., reuse of crushed recycled concrete) or lawfully remove all materials off-site; and
- Expose underlying soils as required to facilitate the commencement of construction activities.

6.4 Disturbed/Excavated Material Management Principles

As part of site remediation/redevelopment works it is anticipated that material excavated during works will fall into one of a number of categories, comprising material:

- required to be removed from the site as a result of contaminant characteristics identified during the data gap and/or unexpected find investigation activities. Such material is characterised as having contaminant concentrations in exceedance of site validation criteria for the proposed landuse and so will require disposal to a lawful waste facility; or

- required to be removed from the specific location to achieve site development objectives (ie. piling spoil, material excavated for foundations, services installation etc), that could potentially be reused within the broader development site should material be required, but will otherwise require disposal as waste if it could not be reused on site.

Appropriate sampling protocols including the required density of sampling for differing materials types, sampling methodology and documentation requirements will be required for each material type to ensure compliance with NSW EPA Regulations and guidance.

Based on assessment outcomes, material falling within the first category will automatically require classification and off-site disposal to a lawful facility. Tracking of this material will be required with resulting documentation to be included in the relevant validation report. Material for the second category will require management under a material tracking plan appropriate to document the source, temporary storage and final placement locations for inclusion of such information in the final validation report.

6.5 Excavation of Impacted Materials / Generation of Material Excess to Site Requirements

Should the assessment of remaining data gaps identify the requirement to remediate environmental impacts, it will be required to be undertaken through the controlled excavation of impacted materials. The excavation will be designed to remove source material as potentially causing impacts to soil, soil gas and/or groundwater. Remediation activities associated with the removal of impacted source materials will include:

- Excavation of the contaminated material to the depth of identified contamination as delineated via visual/olfactory observations by the remediation consultant during remedial works. The excavated material will be required to be stockpiled on plastic sheeting with appropriate environmental controls.
- Excavations are to be validated as per **Section 7.2.1** by the remediation consultant. Should validation fail, the failed wall/s or base of the excavation will be excavated a further 0.3 m in the direction of the failure, or as otherwise indicated by visual/olfactory observations and the validation process repeated until validation is achieved.
- Following validation of the excavation as outlined in **Section 7.2.1**, the excavations generated by the removal of impacted soil will be backfilled using fill material validated in accordance with **Section 7.2**.
- Stockpiled (impacted) material is to be sampled by the remediation consultant for the purposes of waste classification for off-site disposal to an appropriately licensed facility lawfully able to accept the waste in accordance with EPA (2014).

It is noted that depending on the nature of the impact (soil, soil gas or groundwater), final validation will be required to be tailored to confirm that the affected media has been successfully remediated.

6.6 Off-site Disposal

Material identified as requiring management/remediation is proposed to be disposed of off-site to a facility lawfully able to receive it. Materials shall be classified in accordance with EPA (2014) requirements or an appropriate exemption as created under the *Protection of the Environment Operations (Waste) Regulation* 2015.

Details of completed additional assessment activities including material characterisation reports will be included in the final validation documentation to be prepared in accordance with the requirements of an area specific RAP. Records associated with material tracking, including trucking receipts, landfill disposal records, etc will also be reviewed to ensure material removed from the site can be accounted for and has been disposed of lawfully.

6.7 Material Importation

Based on the scope of remedial works described herein, it is not anticipated that there will be a significant requirement to import materials to establish site levels. However, it is noted that detailed excavations may result in requirements for importation of select materials, potentially including trench backfill aggregate, pavement backfill, growing media, etc, such materials.

Prior to importation of all material, appropriate assessment of such materials must be completed to demonstrate the material is both fit for purpose and suitable from a contamination view point. In accordance with EPA requirements, the extent of assessment will be determined by the type of material proposed to be imported. Whilst it is anticipated that an appropriate assessment strategy (including sampling methodology, density and analysis details) will be developed at a site specific RAP level once details of likely importation details can be considered, the following overall principles will require consideration.

Where material proposed to be imported is Virgin Excavated Natural Material (VENM), an assessment must demonstrate that the material is compliant with the definition of VENM as presented in the POEO Act 1997, adopting in the minimum requirements for characterisation of fill material as presented in EPA (1995).

Where material proposed to be imported has been characterised under the Resource Recovery Framework (Order/Exemption), the material must firstly be demonstrated by the supplier as suitable for use in accordance with the requirements of the Order via provision of a statement of compliance. Such materials are anticipated to comprise, but will not necessarily be limited to: excavated natural material – ENM, recycled aggregate, basalt fines, compost, mixed organic waste, pasteurised garden organics and recovered fines, with reference to the list of current orders and exemptions on the NSW website required to be reviewed.

In addition to the testing completed by the supplier, given the low frequency of compliance testing required under these Exemptions, the specific material proposed to be imported will require an additional compliance assessment prior to approval to import. The additional assessment is required to ensure that the incoming material does not pose an unacceptable risk to human health and/or environment at the placement site and is therefore suitable for use. It is anticipated that such assessment activities will include visual inspections, representative sampling and laboratory analysis of material to demonstrate the material meets the requirements to be outlined in the site specific RAP in relation to use of material on-site. As for VENM assessments, it is considered suitable to define such requirements on a specific site basis given the potential variability of project site requirements.

Material tracking records in addition to the import assessment report are required to be included in the final validation report for each site specific area.

6.8 Validation

Validation of the remedial works will be conducted by the Remediation Consultant to demonstrate the remediation/management objectives have been achieved and to document the final condition of the site at the completion of works such that conclusions may be drawn on the end use suitability of the site for the proposed development. Details of the validation program are provided in **Section 8**.

6.9 Site Dis-establishment

On completion of the remediation works all plant/equipment and safety/environmental controls shall be removed from the site. Details are provided in the Site Management Plan in **Section 9**.

7. Validation Plan

Data will be required to be collected during remediation/management and developments works to assess the effectiveness of the implemented management actions and document the final condition of the site at the completion of all works such that conclusions may be drawn on the end suitability of the site for the proposed development use. The general principles to be implemented with regard to the validation assessment are discussed in accordance with EPA (2017) requirements in the following sections.

It is anticipated that the validation assessment will be required to address the following broad issues:

- Confirm the site conditions are consistent with those identified during previous site investigation activities as documented herein and characterise identified data gaps (**Section 4**) identified in preparation of this RAP;
- Removal of any contaminated material and/or contamination sources as may be identified during the data gap assessment;
- Verification that uncapped / accessible soils (including imported filling and growing media) are suitable for the proposed use;
- Characterisation and off-site disposal and/or beneficial use of materials excess to development requirements;
- Characterisation of material required to be imported to achieve development objectives, potentially including subgrade material, trench aggregate, growing media, etc to demonstrate its suitability for use at the site; and
- Assessment and close out of any Unexpected Finds assessments.

7.1 Data Quality Objectives

Data quality objectives (DQOs) have been developed for the validation assessment, as discussed in the following sections.

7.1.1 State the Problem

The site, which has historically been used for a range of commercial/industrial uses, is proposed to be redeveloped as the Sydney Fish Markets. Previous investigations as evaluated in JBS&G (2019 and 2019c) have identified that management of a number of potential site contamination issues is required such that at the completion of works, a final validation assessment may confirm the suitability of the site for the proposed use as required under the NSW planning framework.

As such, during remediation activities, sufficient validation of site activities is required to demonstrate that the identified environmental and health based risks (if any) to site users have been adequately managed to render the site suitable for the proposed land use.

7.1.2 Identify the Decision

The following decisions are required to be made during the validation works:

- Are there any unacceptable risks to future on-site receptors from any residual contamination following the implementation of the proposed in-ground development works at the site?
- Have all aesthetic issues been addressed?
- Has the potential for migration of contaminants from the site been appropriately addressed?

- Have the Site remediation activities been undertaken in compliance with the regulatory requirements set by the EPA, WorkSafe NSW, local government and other agencies?
- Was the impacted/surplus materials classified and disposed off-site to a facility licensed to accept the classified waste?
- Has all material imported to site to achieve development objectives been demonstrated as suitable for use?
- Have Site works been completed in accordance with the RAP requirements, or where variations to the works required by the RAP have occurred, have these been appropriate to meet the objectives of the RAP, with respect to site validation?
- Is the site suitable for the proposed land use?

During the remediation/management activities, sufficient validation of Site activities is required to demonstrate that the identified environmental and health based risks to future use(s) of the Site have been adequately managed to render the Site suitable for the proposed land use and future construction works.

7.1.3 Identify Inputs to the Decision

The inputs to the decisions are:

- Previous investigation results including the data gaps assessment to be completed prior to the remediation works;
- Field observations in relation to inspection of all excavation bases, walls and stockpiles for odours, sheen, discolouration, and other indicators of potential contamination;
- Environmental data as collected from the validation of remedial excavations (if required);
- Waste classification and material characterisation data obtained during assessment of surplus material prior to off-site disposal;
- Disposal dockets and relevant documents in relation to appropriate disposal of material to be removed from site as part of the remediation works (landfill dockets, beneficial reuse / recycling dockets, trade waste disposal, etc.);
- Material characterisation data (including field observations, sampling and analytical data) obtained during assessment of material proposed to be imported to the site;
- Relevant guideline criteria for validation and waste classification; and
- Data quality indicators (DQIs) as assessed by quality assurance / quality control (QA/QC).

Specifically, sufficient data needs to be collected from each of the identified potentially impacted media (e.g. fill material and natural soils) across the Site for associated COPC (**Section 4**).

7.1.4 Define the Study Boundaries

The validation study boundaries are restricted to the lateral extent of the approved development works, comprising the site as shown on **Figure 1**. The vertical extent of the validation study is anticipated to be restricted to soils extending to the maximum depth of disturbance as part of piling activities.

Due to the nature of potential contaminants identified, temporal variables will not be assessed as part of this investigation. The temporal boundaries of this investigation will be limited to the period of field validation assessment works.

7.1.5 Develop a Decision Rule

The decision rules adopted to answer the decisions identified in **Section 7.1.2** are discussed below.

Table 7.1: Summary of Decision Rules

Decision Required to be Made	Decision Rule
1. Are there any unacceptable risks to future on-site receptors from any residual contamination following the remediation of contaminated materials on-site?	Environmental analytical data will be compared against EPA endorsed criteria established as validation criteria. For the validation sample sets, statistical analysis of the data will be undertaken in accordance with relevant guidance documents, as appropriate, to facilitate the decisions. The following statistical criteria will be adopted: Either: the reported concentrations will be all below the site criteria; Or: the average site concentration for each analyte will be below the adopted HILs / HSLs criterion; no single analyte concentration exceeded 250% of the adopted site criterion; and the standard deviation of the results will be less than 50% of the site criteria. And: the 95% UCL of the average concentration for each analyte will be below the adopted site criteria. If the statistical criteria stated above is satisfied, the answer to the decision will be No. If the statistical criteria are not satisfied, the answer to the decision will be Yes.
2. Are there any aesthetic issues remaining following remediation works?	If there are any remaining unacceptable inclusions or soil discolouration, the answer to the decision will be Yes. Otherwise, the answer to the decision will be No.
2. Are there any unacceptable risks to future off-site receptors from site impacted groundwater and/or soil vapour?	Are site-related contaminants present in groundwater and/or soil vapour migrating off-site at concentrations exceeding levels found to present a potential health risk (recreational exposure) or ecological risk? If the answer to the decision is Yes, further assessment and/or management is required. Otherwise, the answer to the decision is No.
3. Are there any outstanding regulatory compliance issues associated with Site remediation activities?	Qualitative assessment of the works in relation to EPA, WorkSafe NSW, Department of Planning, etc. approvals will be undertaken during and following the completion of remediation/management activities. If there are any outstanding requirements with respect to the regulatory approvals, the answer to the decision will be Yes. Otherwise, the answer to the decision will be No.
4. Was all material required to be removed from site classified and disposed of off-site to a facility lawfully able to accept the classified waste?	Soil/sediment analytical data will be compared against EPA (2014) criteria. Statistical analysis of the data in accordance with relevant guidance documents will be undertaken, where appropriate, to facilitate the decisions (as detailed above). Documentation from the operation receiving the material including the dates, tonnage and classification of the accepted material will be required to facilitate the decision. If the statistical criteria stated above are satisfied, the decision is Yes, and if receipts are provided recording the disposal of material to an off-site licensed facility, the decision is Yes. If the material fail the criteria, and no disposal receipts are provided, the answer is No.

Decision Required to be Made	Decision Rule
5. Where material is imported to site for development purposes are there any outstanding issues identified in relation to documentation of the material's suitability for use?	Analytical data sets and inspection data will be reviewed for each proposed material type/source against established definitions for acceptable material (ie. VENM, resource recovery exemptions, etc) and EPA endorsed criteria as established in the RAP as validation criteria. If the complete data set for the applicable material meet the requirements relevant to the material type, the answer to the decision is No and material may be imported to site. If the data set exceeds the adopted criterion, the answer to the decision is Yes and the material cannot be imported to site for use in development activities.
6. Have remedial works met requirements of the RAP?	Were any of the answers to Question 1 to 5 Yes, the answer to the decision is No. Further assessment is required to establish the nature and extent of additional remediation/management as may be required. If the RAP requirements were addressed, and there are no outstanding issues, the answer to the decision is Yes.
7. Is the Site considered suitable for the proposed use?	With the exception of question 6, is the answer to any of the above decisions Yes? If yes, have the outstanding issues appropriately addressed by further assessment/remediation/management or implementation of an EMP? If the issues have been appropriately addressed, the answer to the decision is Yes, potentially subject to ongoing implementation of the EMP. Otherwise, the decision is No and the requirements for further remediation of the Site and/or implementation of additional management measures (as documented in an amended EMP) are required to be documented such that the answer to the decision can be Yes.

7.1.6 Specify Limits of Decision Error

This step is to establish the decision maker's tolerable limits on decision errors, which are used to establish performance goals for limiting uncertainty in the data. Data generated during this project must be appropriate to allow decisions to be made with confidence.

Specific limits for this project have been adopted in accordance with the appropriate guidance from the NSW EPA, NEPC (2013), appropriate indicators of data quality (DQIs used to assess quality assurance / quality control) and standard JBS&G procedures for field sampling and handling.

To assess the usability of the data prior to making decisions, the data will be assessed against pre-determined DQIs for to precision, accuracy, representativeness, comparability, completeness and sensitivity (PARCCS parameters). The acceptable limit on decision error is 95% compliance with DQIs.

The pre-determined DQIs established for the project are discussed below in relation to the PARCC parameters, and are shown in **Table 7.2**.

- **Precision** - measures the reproducibility of measurements under a given set of conditions. The precision of the laboratory data and sampling techniques is assessed by calculating the Relative Percent Difference (RPD[21]) of duplicate samples.

[21] $$RPD(\%) = \frac{|C_o - C_d|}{C_o + C_d} \times 200$$

Where C0 is the analyte concentration of the original sample
Cd is the analyte concentration of the duplicate sample

- **Accuracy** - measures the bias in a measurement system. The accuracy of the laboratory data that are generated during this study is a measure of the closeness of the analytical results obtained by a method to the 'true' value. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards.
- **Representativeness** –expresses the degree which sample data accurately and precisely represent a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples on a representative basis across the site, and by using an adequate number of sample locations to characterise the site to the required accuracy.
- **Comparability** - expresses the confidence with which one data set can be compared with another. This is achieved through maintaining a level of consistency in techniques used to collect samples; and ensuring analysing laboratories use consistent analysis techniques; and reporting methods.
- **Completeness** – is defined as the percentage of measurements made which are judged to be valid measurements. The completeness goal is set at there being sufficient valid data generated during the study.
- **Sensitivity** – expresses the appropriateness of the chosen laboratory methods, including the limits of reporting, in producing reliable data in relation to the adopted site assessment criteria.

Table 7.2: Summary of Data Quality Indicators

Data Quality Indicators	Frequency	Data Quality Criteria
Precision		
Split duplicates (intra laboratory)	1 / 20 samples	<50% RPD[1]
Blind duplicates (inter laboratory)	1 / 20 samples	<50% RPD[1]
Laboratory Duplicates	1 / 20 samples	<50% RPD[1]
Accuracy		
Surrogate spikes	All organic samples	70-130%
Laboratory control samples	1 per lab batch	70-130%
Matrix spikes	1 per lab batch	70-130%
Representativeness		
Sampling appropriate for media and analytes	All samples	-[2]
Samples extracted and analysed within holding times.	All samples	Soil: organics (14 days), inorganics (6 months) Water: organics (7 days to extract and 14 days to analyses). Metals (6 months)
Laboratory Blanks	1 per lab batch	<LOR
Trip spike	1 per lab batch	70-130% recovery
Storage blank	1 per lab batch	<LOR
Rinsate sample	1 per sampling event/media	<LOR
Comparability		
Standard operating procedures for sample collection & handling	All Samples	All Samples
Standard analytical methods used for all analyses	All Samples extracted and analysed within holding times	NATA accreditation
Consistent field conditions, sampling staff and laboratory analysis	All Samples	All samples[2]
Limits of reporting appropriate and consistent	All Samples extracted and analysed within holding times	All samples[2]
Completeness		
Sample description and COCs completed and appropriate	All Samples	All samples[2]
Appropriate documentation	All Samples	All samples[2]
Satisfactory frequency and result for QC samples		95% compliance
Data from critical samples is considered valid	-	Critical samples valid
Sensitivity		
Analytical methods and limits of recovery appropriate for media and adopted Site assessment criteria	All samples	LOR<= Site assessment criteria

(1) If the RPD between duplicates is greater than the pre-determined data quality indicator, a judgment will be made as to whether the excess is critical in relation to the validation of the data set or unacceptable sampling error is occurring in the field.

(2) A qualitative assessment of compliance with standard procedures and appropriate sample collection methods will be completed during the DQI compliance assessment.

7.1.7 Optimise the Design for Obtaining Data

The purpose of this step is to identify a resource-effective field validation sampling design that generates data that are expected to satisfy the decision performance criteria, as specified in the preceding steps of the DQO process. The output of this step is the sampling design that will guide development of the field sampling and analysis plan. This step provides a general description of the activities necessary to generate and select data collection designs that satisfy decision performance criteria.

The remediation validation and subsequent laboratory analysis program as outlined in the following sections will need to be implemented during site remediation activities to demonstrate the successful completion of works in compliance with the RAP goals. The validation / characterisation sampling and analytical program for the site is outlined in **Table 7.3** in **Section 7.2** below.

7.2 Validation Inspections and Sampling

The validation inspections, sampling and analysis required for remediation of potential impacts arising from the data gaps assessment are summarised in **Table 7.3** and detailed in the following sections.

Table 7.3: Validation Sampling Plan

Item	RAP Sampling Frequency			Analytical Suite
Potential Source Removal Remedial Excavation				
	Excavation Floors	Excavation Walls	Materials	
Excavations formed by the removal of impacted materials	1 / 100 m^2 (10 m grid)	1 / 10 m (from each distinct horizon / material type / 1 m vertical soil profile)	N/A	As determined by the nature of the impact
Materials Importation				
Imported VENM	Minimum of 3 samples per source site / material type to 500 m^3 then 1 sample per 500 m^3 thereafter			TRH/BTEX PAH Heavy Metals OCP/PCBs Asbestos (500 ml)
Quarry VENM Materials (e.g. blue metal, sandstone, shale)	Confirmation that the material is quarried rock (VENM) prior to importation, and visual confirmation.			Site Inspection required.
Material subject to a NSW EPA Resource Recovery Order/Exemption	Confirmation by the supplier that the material meets the terms of the order. Then Remediation Consultant sampling at a minimum of 3 samples per source site / material type to 500 m^3 then 1 sample per 500 m^3 thereafter, prior to importation			TRH/BTEX PAH Heavy Metals OCP/PCBs Asbestos (500 ml)
Export of Materials				
Surplus materials for off-site disposal are to be classified in accordance with NSW EPA (2014) and ASSMP (JBS&G 2019b)	Stockpiled materials for off-site disposal require a sampling density of 1/100 m^3 to 500 m^3 then 1 sample per 500 m^3 thereafter			TRH/BTEX PAH Heavy Metals OCP/PCBs Asbestos sPOCAS / pH

Notes: 1) The sampling density proposed for assessment of stockpiles is derived from Table 4 of Schedule 2 from the NEPM. The measure recommends that three samples are collected from homogeneous material suspected of contamination to a maximum volume of 75 m^3. Given the anticipated type and quantities of material a reduced rate has been adopted where less than 75 m^3 of material is produced.

In addition to the validation sampling required in **Table 7.3,** with respect to soil gas and groundwater impacts, the final successful validation of the impacts will be required to be demonstrated by the installation and sampling of either a groundwater monitoring well or soil gas monitoring well or probe in the area of the previously identified impact**.**

7.2.1 Impacted Material Removal

The validation program for the removal of impacted materials (should they be identified in the data gaps assessment) comprises:

- Inspection of the excavated areas by a suitably trained and experienced environmental consultant to confirm the extent of potentially impacted materials have been removed. If additional potentially impacted material is identified, further excavation will be conducted and the affected area will be re-inspected until such time as visual and olfactory validation is obtained.

- Following visual and olfactory validation, soil or soil gas (as appropriate to the nature of the impact) samples will be collected from the remediation area walls at a rate of 1 sample per 10 linear m, and from the excavation bases at a rate of 1 sample per 100 m^2;
- Excavation validation samples will be analysed at a laboratory NATA accredited for the required analyses. If the concentration of COPCs are identified in any of the excavation validation samples exceeding criteria, then the soils will be excavated 0.3 m further in the direction of failure and the validation process repeated. Alternatively, where impact exceeding criteria is not identified by the laboratory, the remedial areas will be deemed to have been successfully remediated and validated;
- Excavated soils shall be stockpiled and the materials will be required to be classified in accordance with NSW EPA (2014) and disposed off-site to a facility legally able to accept the waste.

7.2.2 Sampling Methodology

Soil

The soil sampling method shall be determined by the Remediation Consultant as consistent with the observations of the site sub-surface and appropriate to generate representative samples. The soil sampling method shall be consistent with the data quality indicators in **Table 7.2**.

Where sample locations are placed by boreholes, undisturbed samples as collected by push tube or SPT sampler, are preferred if able to be effectively implemented. Otherwise samples may be recovered from solid flight augers (sampled off the piling auger in concurrence with the piling operations), via test pitting or direct sampling of stockpiles as per the below. Re-usable equipment shall require to be decontaminated between sampling locations.

Samples of near surface material and stockpiled soils shall be collected by appropriately trained and experienced personnel by the use of a stainless steel hand trowel. The hand trowel will be thoroughly decontaminated using phosphate free detergent and distilled water before each sample is collected. Where deeper soil samples are required from excavation walls or floor, the material shall be retrieved using an excavator. Samples of the retrieved material shall be collected from the centre of the excavator bucket ensuring that no part of the sample has contacted the sides of the excavator bucket.

Sufficient sample material will be collected to allow both field and laboratory analyses. Additional samples will be collected from any soil horizons which exhibit staining, odours, or other physical evidence of potential contamination.

During the collection of soil samples, features such as seepage, discolouration, staining, odours and other indications of contamination will be noted on the field documentation. Collected soil samples will be immediately transferred to laboratory supplied sample jars, which will be sealed with Teflon lined screw closures. The sample containers will be transferred to a chilled esky for sample preservation prior to and during shipment to the testing laboratory. A chain-of-custody form will be completed and forwarded with the samples to the testing laboratory.

Groundwater

The groundwater sampling method shall be determined by the Remediation Consultant as consistent with the observations of the site sub-surface and appropriate to generate representative samples. The groundwater sampling method shall be consistent with the data quality indicators in **Table 7.2**.

Any newly installed monitoring wells will be constructed in accordance with relevant NSW EPA endorsed guidance such as National Uniform Drillers Licensing Committee, 2012, *Minimum Construction Requirements for Water Bores in Australia*, and Victoria EPA, 2000, Publication 669 *Groundwater Sampling Guidelines*.

Monitoring wells will be constructed out of Class 18 uPVC (50mm) screen (3 m) and casing. A gravel filter pack will be placed adjacent to the screened interval with a 0.5 m bentonite seal above. The remaining bore annulus in shallow wells will be backfilled with soil cuttings to the ground surface.

Subsequent to well construction, each newly installed monitoring well will be developed to remove fines, settle the filter pack and ensure representative groundwater samples will be able to be collected. Well development will be undertaken using an inertial pump to remove a volume of water until visible indicators of turbidity and field-measured water quality parameters (electrical conductivity, pH, dissolved oxygen, redox and temperature) have stabilised.

Wastewater will be required to be appropriately managed and disposed of in accordance with relevant regulatory requirements. Following a five-day (at least) stabilisation period, sampling will be undertaken including measurement of the depth to standing water and assessment of the presence of light non-aqueous phase liquid (LNAPL)/dense non-aqueous phase liquid (DNAPL) using an interface probe.

Wells will be purged and sampled using a low-flow methodology. Purging will be undertaken to ensure the sample collected is representative of groundwater. Field parameters of pH, conductivity, redox and temperature will be measured using a flow cell and samples obtained once the parameters have stabilised such that:

- Consecutive EC readings are within 3 %;
- Consecutive Eh readings are within 10 mV;
- Consecutive DO readings are within 10 %; and
- Consecutive pH readings are within 0.5.

A low-flow peristaltic pump with dedicated tubing will be used to purge and sample wells. Submersible micro-purge sample pumps may be used when the depth to water exceeds 6 m. It is noted that EPA Victoria (2000) indicates use of pumps which induce a vacuum are not preferred in Victoria for assessment of volatile organic compounds. However, JBS&G considers that there will not be a measurable loss of VOCs when sampling at low flow rates, with small diameter tubing and shallow groundwater; and there is a lower risk of cross-contamination between locations due to use of dedicated materials.

Soil Vapour

The soil vapour sampling method shall be determined by the Remediation Consultant as consistent with the observations of the site sub-surface and appropriate to generate representative samples in which the probes will be required to be installed at the location/depth of identified impact. The soil vapour sampling method shall be consistent with the data quality indicators in **Table 7.2**.

The following methodology will be adopted for the sampling of soil vapour points:

- Placement of a shroud around the sample point, and sealing by placement of clay or 'blue-tack' around the shroud edge;
- Purging of the sub-slab vapour point or soil vapour probe for a period using a calibrated photo-ionisation detector (PID) (10.6 eV lamp) and multi-gas meter to measure and record oxygen and methane (as lower explosive limit, LEL) concentrations until the parameters stabilise;
- Assessment of leaks, by placing a rag soaked in 2-propanol around the probe/tubing within the shroud at the ground surface and continue purging with the PID. In the event of PID readings increasing significantly this would be considered to indicate a potential leak and mitigation measures will be required to adequately seal the point. The 2-propanol soaked rag and shroud remained in place during the sampling process as an indicator of leaks;

- Removal of tips from a carbon sorbent tube and connect to vapour point tubing. Connection of the downstream end of carbon sorbent tube to a closed three-way valve and syringe of known volume (100 mL);
- Collection of an approximate 6 L volume vapour sample by hand use of the syringe to draw the vapour sample through the carbon sorbent tube, using the three-way valve to prevent back-flow from the syringe through the tube. The volume of air can be confirmed by the known volume of the syringe used to collect samples and by counting the number of syringe volumes passed through the carbon tube;
- Disassembly of the syringe and tubing, removal of the carbon tube, replacement of tube caps and placement in Zip-Lock bag; and
- Submission carbon tube for analysis.

Duplicate vapour samples will be collected at a rate of one per 20 primary samples by splitting the flow into three carbon tubes using a three-way valve. One field blank will be collected by sampling a 6 L volume of ambient air.

7.2.3 Laboratory Analyses

Laboratory methods and LOR as summarised in **Table 7.4** are proposed to be adopted for analysis of soil samples collected during remediation/validation activities. All laboratories are required to be National Association of Testing Authorities (NATA) registered for the relevant analyses. Appropriate methods and LORs are required for comparison to relevant criteria.

Table 7.4: Soil Laboratory Analysis Methods (all units in mg/kg unless stated)

Analyte	Limit of Reporting	Laboratory Method
METALS		
Arsenic	4.0	ICP-AES (USEPA 200.7)
Cadmium	1.0	ICP-AES (USEPA 200.7)
Chromium (total)	1.0	ICP-AES (USEPA 200.7)
Chromium (VI)	1.0	Alkali leach colorimetric (APHA3500-Cr/USEAP3060A)
Copper	1.0	ICP-AES (USEPA 200.7)
Lead	1.0	ICP-AES (USEPA 200.7)
Nickel	1.0	ICP-AES (USEPA 200.7)
Zinc	1.0	ICP-AES (USEPA 200.7)
Mercury (inorganic)	0.05	ICP-AES (USEPA 200.7)
TRH		
F1 C_6-C_{10}	10	Purge Trap-GCMS (USEPA8260)
F2 >C_{10}-C_{16}	50	Purge Trap-GCFID (USEPA8000)
F3 >C_{16}-C_{34}	100	Purge Trap-GCFID (USEPA8000)
F4 >C_{34}-C_{40}	100	Purge Trap-GCFID (USEPA8000)
BTEX		
Benzene	1.0	Purge Trap-GCMS (USEPA8260)
Toluene	1.0	Purge Trap-GCMS (USEPA8260)
Ethylbenzene	1.0	Purge Trap-GCMS (USEPA8260)
Total Xylenes	3.0	Purge Trap-GCMS (USEPA8260)
PAH		
Benzo(a)pyrene as TEQ	0.5	GCMS (USEPA8270)
Total PAHs	0.5	GCMS (USEPA8270)
PCBs		
PCBs (total)	0.9	GCECD (USEPA8140,8080)
OCP/OPP		
Aldrin + Dieldrin	0.2	GCECD (USEPA8140,8080)
Chlordane	0.1	GCECD (USEPA8140,8080)
DDT + DDD + DDE	0.3	GCECD (USEPA8140,8080)
Heptachlor	0.1	GCECD (USEPA8140,8080)
PHENOLS		
Total Phenols	5	Distillation-Colorimetric (APHA 5530)
VOC		
PCE	1.0	Purge Trap-GCMS (USEPA8260)
TCE	1.0	Purge Trap-GCMS (USEPA8260)
Cis 1,2 DCE	1.0	Purge Trap-GCMS (USEPA8260)
Trans 1,2 DCE	1.0	Purge Trap-GCMS (USEPA8260)
VC	1.0	Purge Trap-GCMS (USEPA8260)
OTHER		
Asbestos	Presence/0.1 g/kg	PLM / Dispersion Staining as per AS4964:2004
Soil pH	0.1	5:1 leach

7.3 Validation Criteria

The site is to be used for commercial purposes and is required to be validated as suitable for commercial and industrial land use, pursuant to the NEPC (2013). As such, health-based criteria for Commercial/Industrial (HIL-D) will be adopted for remedial excavation / site validation. The criteria are based on NSW EPA endorsed investigation levels which, while being used as clean-up levels instead of site-specific criteria derived through a process of risk assessment, are considered adequately conservative for the purposes of characterising and validating the site.

Decisions with respect to criteria have been developed based on the proposed end uses as follows:

- HILs for commercial/industrial land use - HIL-D;
- HSL for petroleum hydrocarbons considering potential for vapour intrusion, coarse grained soil for commercial/industrial land use at 0.0-1.0 m depth;

- As a conservative measure, generic and site specific EILs derived through the added contaminant limits for commercial/industrial land use;
- Management Limits for TRH, coarse grained soils for commercial/industrial land use;
- ESLs for TRH fractions, BTEX and benzo(a)pyrene in coarse grained soil for commercial/industrial land use; and
- Where there are no NSW EPA endorsed thresholds the laboratory LOR has been adopted as an initial screening value for the purposes of this assessment.

Given the adopted validation criteria will in some instances be dependent upon soil texture and depth below final ground level, final site validation criteria will only be defined at the time of data evaluation.

Where consideration of potential ecological risk is required for validation of sediment and/or exposed soil media, representative soil samples will be the subject of total organic carbon (TOC %), cation exchange capacity (CEC) and soil pH analysis to support the development of the assessment criteria. Where multiple soil validation criteria can be derived based on the above, as for example in the case for F4 TRH, the lowest of the possible applicable values will be adopted as the validation criteria.

Where a valid data set can be generated as based on assessment of the soils within the Site and the potential exposure scenarios, the following statistical criteria will apply:

Either:

- all contaminant concentrations were less than the adopted site assessment criteria,

Or:

- The 95 % upper confidence limit (UCL) average concentrations shall be below the soil criteria;
- The standard deviation of the generated data set shall be below 50 % of the soil criteria; and
- The maximum concentration shall be below 250 % of the soil criteria.

Existing data for chemical constituents (not asbestos) from materials remaining at the Site shall also be included in analytical data sets created for the soils.

In the event of accessible soils, further consideration is also required to the following, observations will also supplement the validation process:

- There shall be no visible asbestos in addition to laboratory analyses results; and
- Soils shall not emit recognisable odours, be discoloured as a result of contamination and/or have any significant additional aesthetic concerns with respect to future site users.

7.4 Validation Reporting

At the completion of the remedial works, a validation report will be prepared in general accordance with the *Guidelines for Consultants Reporting on Contaminated Sites* (OEH 2011), documenting the works as completed. The report will contain information including:

- Update relevant portions of the site description and CSM as prepared in this RAP to the condition of the validation assessment footprint at the time of the validation assessment;
- Present all sampling field notes and laboratory data including calibration certificates for field monitoring equipment, environmental monitoring etc.;
- Undertake an assessment of QA/QC of analytical data generated by the works and identify data that is reliable for use in characterising the applicable portion of the Block 15 Site;

- Sort data into data sets as required by the decision rules;
- Assess whether sufficient data has been obtained to meet required limits on decision error;
- Undertake assessment to the decision rules and identify any environmental data which causes decision rules to be failed;
- Provide a summary of waste disposal/off-site removal activities and volumes of material removed from the Site including supply of all waste disposal dockets confirming final waste disposal/landfill destination;
- Provide a summary of material importation activities (general fill soil/crushed rock, growing media, earthworks aggregates, drainage backfill etc), including material source, type, assessment of suitability, approximate quantities, date of importation and final placement location;
- Details of the remediation works conducted;
- Information demonstrating that the objectives of the RAP have been achieved, in particular the validation sample results and assessment of the data against both the pre-defined data quality objectives and the remediation acceptance (validation) criteria;
- Information demonstrating compliance with appropriate regulations and guidelines;
- Document any variations to the strategy undertaken during the implementation of the remedial works;
- Details of any environmental incidents occurring during the course of the remedial works and the actions undertaken in response to these incidents;
- Other information as appropriate, including requirements (if any) for ongoing monitoring / management; and
- Provide a comment on the suitability of the Site (or portions thereof) for the proposed use and requirements for any ongoing monitoring/management (where applicable).

The report will serve to document the remediation works for future reference.

7.5 Contingency Plan

Given the development history of the site and that the existing assessment data does have a number of identified data gaps, consideration has been given to the potential for additional small scale issues that may arise during works (from a contamination viewpoint). Contingency plans for a range of potential identified scenarios are discussed following to ensure firstly the safety and health of people and the environment and secondly that the overall project objectives are achieved.

7.5.1 Identification of an Underground Storage Tank

There is the potential that one or more USTs may be encountered during demolition of the pavements or subsequent earthworks. In the event of such an occurrence, the Unexpected Finds Protocol as presented below (**Figure 7.1**) will be implemented and remedial actions defined EPA (2014b[22]) implemented as summarised below.

In general, the procedure will comprise:

- Documentation of work instructions and preparation of relevant permits to work prior to the commencement of decommissioning works;

[22] *Technical Note: Investigation of Service Station Sites.* NSW EPA dated April 2014 (EPA 2014b)

- Removal of any tank and pipework contents using equipment suitable for operation in hazardous areas and off-site disposal of resulting liquid by a licensed contractor;
- Isolation of ground level connections to the tanks (if present) via sealing and exposure of subsurface lines back to the tank via removal of concrete/asphalt pavements;
- Purging of vapours within the tank removal of all pipework, followed by plugging of openings, other than one hole to act as a pressure equalising vent;
- Excavation to expose the total width and length of the tank and removal of any identified anchors (where present);
- Removal of the tank from the excavation followed by cleaning down to remove any excess soil to provide for inspection of the tank base condition. Identified holes should be patched/plugged prior to loading onto a transport vehicle for off-site disposal to a licensed destruction facility. The tank should be appropriately labelled with spray paint to warn of its previous contents and the associated dangers.
- Excavation and stockpiling of surrounding and underlying backfill and apparent impacted natural soils using observations including odour, staining/discolouration and/or a photo-ionisation detector (PID).

Subsequent to the removal of the petroleum infrastructure and associated backfill, validation requirements, consistent with NSW EPA (2014b) shall include:

- Sample locations from the walls of excavations formed by the removal of USTs/backfill sands at the frequency of one sample per 5 m of excavation wall, with a minimum of one per wall;
- Sample locations from the base of excavations formed by the removal of USTs at the frequency of one sample per 25 m^2, with a minimum of one per former UST location;
- Discrete sample locations under other petroleum infrastructure (i.e. remote fill points, fuel dispensers). In the event that significant impacted soil volumes are removed from these areas, the adopted sampling frequency for excavation bases and walls following UST removal will be adopted; and
- Sample locations at a linear spacing of 5 m underlying pipelines.

Soil samples shall be analysed for TRH, lead and VOCs.

Excavated backfill/surrounding soils shall be characterised in accordance with EPA (2014a) Waste Classification Guidelines.

7.5.2 Identification of Oily Materials

In the event that oily materials are encountered, the provisions outlined in the unexpected finds protocol will be implemented, comprising inspection, testing and appropriate action as advised by the Remediation Consultant (**Figure 7.1**).

Any suspected oily materials must be segregated from other excavated materials and placed in a designated area with appropriate odour and sediment controls until such time as appropriate assessment is completed and a methodology is confirmed for their appropriate management. In the event that the oily materials do not meet the Site Validation Criteria, then they shall removed from the site and disposed of at an appropriately licensed facility.

7.5.3 Material Storage Breach

In the event that any materials storage containment controls are breached and stockpiled materials classified as asbestos contaminated soil or otherwise have escaped (or have the potential to escape), then the management controls shall be rectified and investigations undertaken to review the

adequacy of the controls and any improvements implemented. The REMP (**Section 8.1**) shall include a documented process for identifying and responding to such incidents.

7.5.4 Emissions Complaints

Due to the nature of the activities and type of contaminants identified at the Site, there is a potential for complaints to be received from members of the public relating to environmental emissions including:

- Odour emissions arising from handling of malodorous soil;
- Noise and vibration arising from excavation, piling and other works;
- Dust emissions arising from excavation, material handling and placement; and
- Visibly impacted surface water quality in stormwater system in proximity of the site.

Monitoring of all environmental emissions shall be undertaken during the works as detailed in the REMP (discussed in **Section 8.1**) and appropriate actions taken to further control emissions following receipt of a complaint. Such additional controls may include the following actions, required to be detailed in the REMP (discussed in **Section 8.1**):

- Increased application of odour masking chemicals on odorous materials;
- Revision of odour control provided to open excavations, stockpiled materials, etc;
- Disturbance of soils during meteorologically favourable periods only; and/or
- Covering highly impacted soils which are potentially generating asbestos fibres.

7.5.5 Groundwater Dewatering

As referenced above in **Section 5.3**, in the event that groundwater is encountered during redevelopment works that will require dewatering, a dewatering license shall be obtained in accordance with the *Water Management Act 2000*. The license must be obtained prior to the installation of the dewatering system. The license application must be submitted to the WaterNSW, and a Dewatering Management Plan should be included as part of the submitted licence application.

It is noted that excavation dewater may require treatment prior to disposal, potentially including pH correction, sediment concentrations and potentially chemical contaminants. Procedures for treatment and validation of water will be documented in the Dewatering Management Plan.

In accordance with the Council development controls, no wastewater, chemicals or other substances harmful to the environment shall be permitted to discharge to Council's stormwater system. Only clean, unpolluted water is permitted for discharge. Wastewaters not suitable for discharge to stormwater must be the subject of on-site treatment to address contaminant concentrations prior to stormwater disposal, disposed of using a licensed liquid waste contractor or alternatively directed to the sewer of the Sydney Water Corporation (SWC) under a Trade Waste Agreement (TWA). The pre-treatment of wastewater may be a requirement of SWC prior to discharge.

7.5.6 Excavation Validation Failure

In the unforeseen event that the proposed remediation works do not meet the validation criteria, or if the selected remedial strategy is unsuccessful, the following actions will be considered to ensure firstly the safety and health of people and the environment and secondly that the overall project objectives are achieved:

- Continued controlled excavation and off-site disposal or treatment until validation is achieved; and
- Reassessment of remedial options for excavated materials, including:

- Alternate on-site treatment options; and/or
- Onsite containment.

7.6 Unexpected Finds Protocol (UFP)

It is acknowledged that previous investigations of the site have been undertaken to assess the identified contaminants of potential concern. However, ground conditions between sampling points may vary, and further hazards may arise from unexpected sources and / or in unexpected locations during remediation. The nature of any residual hazards which may be present at the site are generally detectable through visual or olfactory means, for example:

- The presence of significant aggregates of friable asbestos materials (visible) as ACM and or AF/FA impacted material;
- Bottles / containers of chemicals (visible);
- Ash and/or slag and/or tar contaminated soils / fill materials (visible);
- Drums, waste pits, former pipework or unrecorded USTs (visible); and
- Volatile organic compound (VOC) contaminated soils (odorous) and vapours.

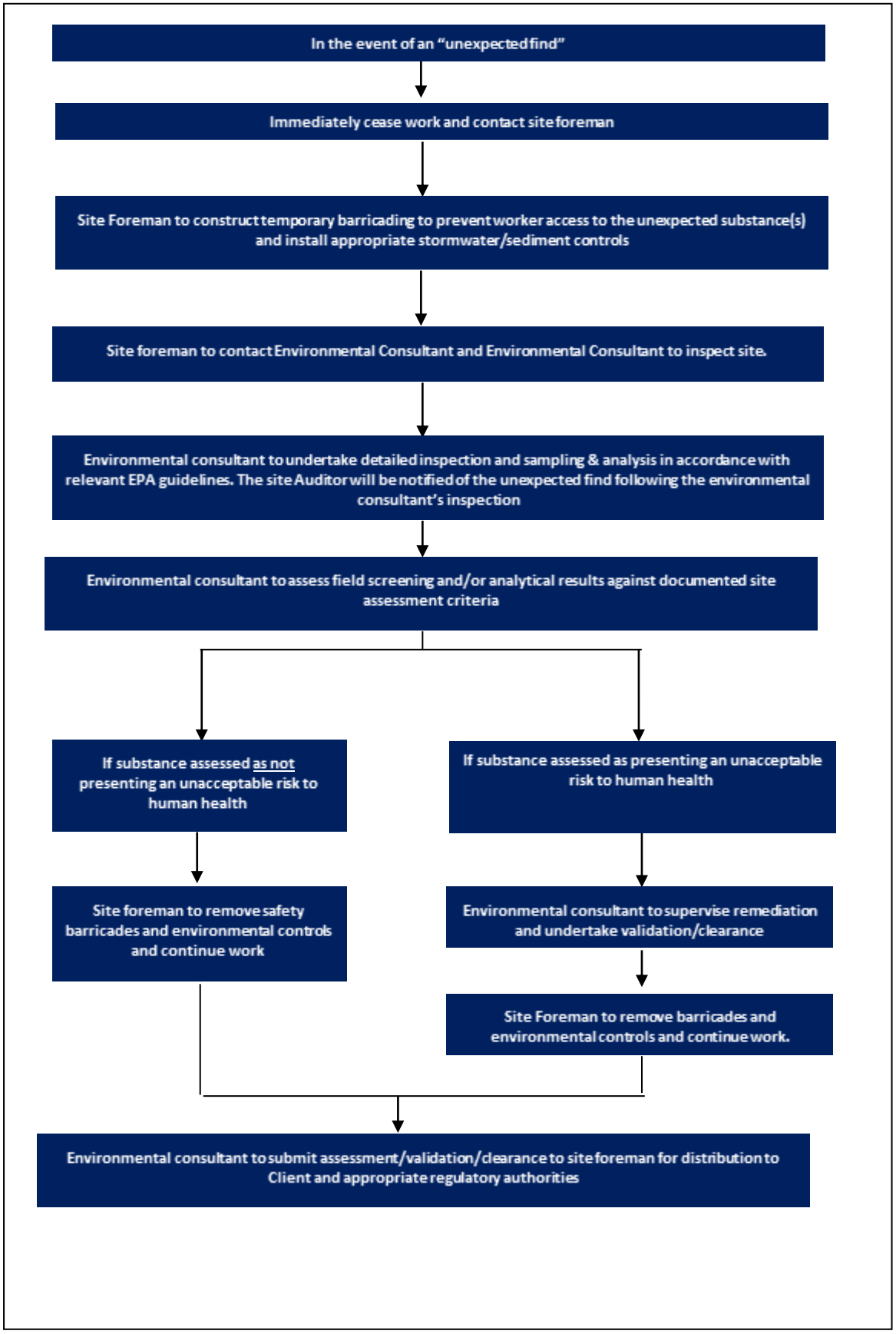
As a precautionary measure to ensure the protection of the workforce and surrounding community, should any of the abovementioned substances be identified (or any other unexpected potentially hazardous substance), the procedure summarised in **Flowchart 7.1** is to be followed.

An enlarged version of the unexpected finds protocol, suitable for use on-site, should be posted in the site office and referred to during the site specific induction by the remedial / principal contractor.

The sampling strategy for each “unexpected find” shall be designed by a suitably qualified environmental consultant. The strategy will, however, be aimed at determining the nature of the substance – that is, is it hazardous and, if so, is it at concentrations which pose an unacceptable risk to human health or the environment.

The sampling frequency of the identified substance/materials shall meet the minimum requirements outlined in EPA (1995) in addition to those outlined in **Section 8.2**. In the event of an Unexpected Find, it is anticipated that the suitability of the implemented characterisation assessment and the proposed validation strategy be discussed with the site auditor prior to finalisation of the Unexpected Find works.

Flowchart 7.1 – Unexpected Finds Protocol



8. Site Management Plan

This section contains procedures and requirements that are to be implemented as a minimum requirement during the remedial works at the site.

8.1 Hours of Operation

It is understood that the hours of operation for remedial works will be conducted in accordance with the recommended site hours suggested by the EPA[23], however hours may vary from typical hours of operation which will be subject to approval.

Typical hours of operation for remedial works are:

- Monday to Friday: 7am to 6pm.
- Saturday: 8 am to 1 pm.
- Sunday and public holidays: No work permitted.

8.2 Preparation of a Remediation Environmental Management Plan

Prior to commencement of any ground disturbance works, a site specific REMP shall be prepared by the early works Principal Contractor, which documents the environmental monitoring and management measures required to be implemented during the remediation and construction related activities associated with the construction of development. The Contractor is required to have the REMP reviewed and endorsed as acceptable by the Environmental Consultant and/or the Site Auditor prior to the commencement of remediation works.

The REMP shall address each of the nominated items in **Section 8.2.1** and shall include the Contingency Plan, referred to in **Section 7**, above.

8.2.1 Required Elements

An assessment of the proposed activities and the associated elements required to be incorporated into the REMP is provided in **Table 8.1**. The REMP is required to address each of the required elements and procedures in full detail and to include detailed monitoring processes and procedures, corrective actions and reporting requirements. **Table 8.1** below has been developed with consideration of City of Sydney (2004) 'Contaminated Land Development Control Plan'. Following receipt of the Development Consent, any additional terms and conditions not discussed below should be incorporated in the REMP.

Table 8.1: Required Elements of the REMP

Element	Specific Minimum Requirements to be included in REMP
1. Dust and Airborne Hazard Control	Asbestos air monitoring Provisions for dust control based on monitoring results In accordance with DA conditions
2. Flora and Fauna	As appropriate
3. Heritage/Archaeological	In accordance with relevant heritage/archaeological studies
4. Visual Impacts	Visual monitoring at site boundary Specific colour requirements for various controls/measures, including PPE
5. Emergency Response	As appropriate Procedures required for spill incident response including material storage breach
6. Noise Control	Hours of operation, consistent with the consent conditions Boundary monitoring at commencement of work site activities with potential for environmental noise emissions Potential noise monitoring at nearest receptors Procedures for control and management of noise emissions, as appropriate (e.g., restricted hours)

[23] *Interim Construction Noise Guideline.* Department of Environment & Climate Change NSW. DECC 2009/265. July 2009.

Element	Specific Minimum Requirements to be included in REMP
	In accordance with DA conditions, all works must be carried out in accordance with the appropriate Demolition/Construction management plan documentation prepared at Consent Stage. Reference should be made to DA conditions with regards to control measures, noise criteria, hours during which noisy works can occur and Council/Community liaison requirements
7. Traffic	Controls on vehicle movements on public roads Reference should be made to Consent Condition requirements including loads covering and vehicle cleaning requirements
8. Protection of Adjoining Structures	As appropriate and in accordance with any DA conditions (where relevant)
9. Odour Control	Enclosure of all potential odour generating activities (i.e., excavation of petroleum hydrocarbon contaminated soils) with appropriate odour controls incorporating safeguards and monitoring Daily monitoring of odour levels at boundary during handling of malodorous materials. Procedures for addressing elevated odour monitoring results, including, but not limited to: reduction in earthworks activities within odorous material areas during adverse meteorological conditions; application of odour masking solutions at the odour source or between identified source(s) and receptor(s); review of stockpiling measures and covering identified potential odour sources by hydromulching or with less odorous materials
10. Handling of Contaminated Soil and Sediment and Water	Soil and water management (stockpiling, site access, excavation pump out, reinstatement). Reference should be made to DA conditions. No wastewaters, chemicals or other substances harmful to the environment shall be permitted to be discharged to Blackwattle Bay or the stormwater system. Only unpolluted water is permitted to discharge from the site
11. Soil Storage/Placement Areas	Soil and water management (stockpiling, site access, excavation pump out, reinstatement) Bunding. Heavy vehicle/personnel decontamination Interim storage requirements for materials requiring later treatment Site drainage requirements, incorporating clean/dirty areas and modifications to existing surface water and drainage controls beneath retained pavements Monitoring as required
12. Sediment Control	Bunding Collection/treatment/handling impacted sediments Reference should be made to DA conditions
13. Acid Sulfate Soil/Sediments	All site activities with the potential to disturb known or suspected ASS/PASS material will be required to comply with the procedures and management controls presented in the ASSMP.
14. Operation of Site Office	As appropriate
15. Decontamination of Heavy Equipment	As appropriate Reference should be made to DA conditions
16. Environmental Monitoring	Monitoring of dusts, noise, odour and fibres Monitoring as required for vibration and water releases Inspection checklists and field forms Reference should be made to DA conditions
17. Environmental Criteria	Soil criteria as sourced from RAP
18. Material Classification	As detailed in this RAP which have included NSW EPA and Consent authority requirements Materials tracking, including QA/QC inspection and sampling
19. Community Relations Plan	Refer to project specific communication commitments, incorporating nomination of specific contact persons & details and requirements for communications/response register Reference should be made to DA requirements
20. Incident Reporting	As appropriate, including standard form/checklist
21. Security and Signage	Secure site perimeter Site boundary signage
22. EMP Review	As appropriate
23. Training	As appropriate
24. Contact Details	Company/personnel details, including names/phone numbers for: - Principal Contractor - Site Auditor - Remediation Consultant - Remediation Contractor - OH&S Compliance - Environmental Compliance

8.3 Health and Safety

8.3.1 Work Health and Safety Management Plan

A WHSP shall be prepared by the early works Principal Contractor prior to commencement of any ground disturbance works. The Plan shall contain procedures and requirements that are to be implemented as a minimum during the works, in addition to the Contingency Plan, referred to in **Section 7**.

The objectives of the WHSP are:

- To apply standard procedures that minimises risks resulting from the works;
- To ensure all employees are provided with appropriate training, equipment and support to consistently perform their duties in a safe manner; and
- To have procedures to protect other site workers and the general public.

These objectives will be achieved by:

- Assignment of responsibilities;
- An evaluation of hazards;
- Establishment of personal protection standards, mandatory safety practices and procedures;
- Monitoring of potential hazards and implementation of corrective measures; and
- Provision for contingencies that may arise while operations are being conducted at the Site.

8.3.2 Additional Site-Specific Elements/Procedures

In addition to the normal construction-related matters, the WHSP shall address the following site-specific specific hazards associated with the works relating to the management of contaminated soil and groundwater:

- Use of plant and machinery within confined spaces (i.e. remedial excavations);
- Potential for contact to asbestos contaminated soils and/or airborne fibres;
- Contact with contaminated soil (incl. dust), groundwater and vapours, including requirements for specific Personal Protective Equipment (PPE);
- Potential for under/aboveground services, specifically former petroleum infrastructure (if encountered); and
- Heat/cold stress.

8.4 Air Quality

During remedial works, dust emissions and any odours will be confined within the site boundary. This will be assessed by a program of air monitoring undertaken during remediation works (if asbestos impacts are identified) and implemented by air emission controls as required by the Contractor. Air monitoring requirements are summarised in this section.

8.4.1 Air Monitoring

Where asbestos and/or contaminated soil is being disturbed during the proposed works, applicable air monitoring activities will be employed on a daily basis at relevant locations to demonstrate the suitable application of contaminant migration control measures. Monitoring activities as may be employed are discussed following.

During the remedial works, perimeter asbestos in air monitoring will be conducted at each applicable remedial works area boundary when soils impacted with asbestos are being disturbed.

Air monitoring will be conducted on a daily basis at relevant locations during any ground disturbance activities within impacted soil within the Site to verify that implementation of appropriate control measures have been successful at managing the risk of air borne fibre generation.

Air monitoring will be undertaken in accordance with the requirements of the National Occupational Health and Safety Commission (NOHSC) *Asbestos Code of Practice* and Guidance Notes, in particular the *Guidance note for the estimation of airborne asbestos dust* [NOHSC 3002:2005]. Air filters shall be analysed by a NATA accredited laboratory and results shall be required to be below 0.01 fibres/mL. All detections of fibres shall be further analysed by scanning electron microscope (SEM) to confirm the fibres are asbestos.

Should friable asbestos be identified, air monitoring will be conducted by Licensed Asbestos Assessor (LAA, as per Safe Work NSW requirements).

In establishing site trigger levels for evaluation of the monitoring results, reference is made to the appropriate TWA (NOHSC) levels:

- Amosite - 0.1 fibre/mL;
- Chrysotile – 0.1 fibre/mL;
- Crocidolite - 0.1 fibre/mL;
- Other forms of asbestos - 0.1 fibre/mL; and
- Any mixture of these, or where the composition is unknown - 0.1 fibre/mL.

With consideration to these levels the following trigger levels have been developed:

- If airborne fibre levels reach 0.01 fibres/mL the source of fibre release is to be found and rectified. Work in the affected area does not have to stop; and
- If airborne fibre levels reach 0.02 fibres/mL work in the work area should stop and additional controls measures employed. This will involve additional water spraying during excavations.

Air monitoring results will be obtained within 24 hours of sample collection on week days. While this precludes “real time” monitoring, inspections will be made during all excavation works and, if there are any visible dusts, light water sprays will be used to wet the excavation and prevent the release of any airborne asbestos fibres.

If respirable asbestos fibres are confirmed and present between 0.01 and 0.02 fibres/mL, the following controls must be implemented by the licensed asbestos removalist, in accordance with SWA 2016;

- Review control measures;
- Investigate the cause; and
- Implement controls to eliminate or minimise exposure and prevent further release.

If respirable asbestos fibres are confirmed and present above 0.02 fibres/mL, the following controls must be implemented by the licensed asbestos removalist, in accordance with SWA 2011;

- Stop removal work;
- Notify Safe Work NSW by phone, then by fax or written statement that work has ceased;
- Investigate the cause;
- Implement controls to eliminate or minimise exposure and prevent further release; and
- Do not recommence removal work until further air monitoring is conducted and fibre levels are detected below 0.01 fibres/mL.

A daily report air monitoring report will be prepared documenting the previous/same days airborne asbestos fibre air monitoring results. This report will be made available to all relevant stakeholders, upon request, including but not limited to:

- Site workers;
- Council and, WorkSafe NSW and/or EPA officers;
- Neighbouring facilities; and
- Unions.

8.4.2 Additional Consideration of Chemical Contaminants

In addition to general assessment of the potential for exposure to chemical contaminants, the WHSP should also include specific consideration of additional contaminants such as PAHs and heavy metal distributed throughout fill materials.

As a precautionary measure, the WHSP should include the requirement for the plan to be revised in the event of an unexpected find of contaminated material during remediation and/or construction.

When working with contaminated materials in general, care needs to be taken to ensure that the contamination is not introduced to the worker via ingestion, inhalation or absorption. The WHSP must detail the PPE and decontamination requirements to be followed to control the risks posed by potential exposure to chemical contaminants at the site.

8.5 Materials Tracking

It is anticipated that disturbed materials will require removal from the site or placement in other areas of the site. A Materials Compliance Management System (MCM) shall be developed for the documentation of material movement and reuse of materials at the site to ensure that it can be demonstrated all material has been appropriately managed. The MCM is required to consider both the quality and quantity of material for each element.

The MCM will include the following specific details:

- Definition of responsibilities, including the early works Principal Contractor(s), other contractor(s) e.g. Remediation Consultant and the Site Auditor;
- Procedures for confirming material quality, summarising existing analytical (in-situ) data, additional analytical (ex-situ) data, additional observations to satisfy other acceptance criteria (e.g., occurrence of asbestos containing materials) and alignment of any environmental data to enable beneficial re-use of the material at the point of placement (where appropriate) and/or provide a waste classification for off-site removal of the material;
- Procedures for confirming where the materials have originated and what classification have they been given, noting that source depths are not critical if tied to material type, while placement depths are critical since tied to potential future exposures on the site;
- Procedures for recording where the materials have been placed (lateral & vertical limits) and inspections during placement and/or where the material has been disposed of;
- Identification of hold points where materials are proposed to be temporarily stockpiled;
- Procedures for recording the quantity of placed materials;
- Site grid squares or sub zones/site survey data (GPS/GIS), noting size of grid and elevations;
- Frequency of data collection, with consideration to both program (time) and area/material type;

- Material Tracking Records;
- Standard forms/documentation;
- Non-conformances/Unexpected Finds; and
- QA/QC.

The MCMS may also need to include or make reference to additional material placement requirements to meet design elements such as those relating to subsurface drainage or compatibility with service corridors, and engineering properties of materials to be placed, which are outside the scope of this RAP.

8.6 Disposal of Waste Material

All waste materials including soil, sediment and liquids to be removed from the site will classified, managed and disposed in accordance with the requirements of the *NSW Protection of the Environment Operations Act 1997* (POEO Act), the *NSW POEO Waste Regulation* (2015) and/or exemptions issued under these regulations. Waste materials will be classified in accordance with the requirements of the *Waste Classification Guidelines* (EPA 2014) prior to off-site disposal. In addition, given the probability of encountering acid sulfate soils at the site, all materials requiring off-site disposal will require to be managed and classified in accordance with Part 4 of this guideline.

Consideration will also be required of the potential for the waste to contain organotins, in which case, liaison will be required with the NSW EPA waste unit and potential receiving facilities to ensure appropriate disposal of the material.

For discharge of collected surface water, appropriate monitoring and validation of conditions will be required such that it can be demonstrated water quality is suitable for discharge to the environment in accordance with the POEO Act provisions on water pollution. Where water does not meet the appropriate standards, consideration will be required to either on-site treatment opportunities, or alternatively off-site disposal as liquid waste to an appropriately licensed facility.

Documentary evidence for all waste disposal shall be kept for inclusion in the Validation Report/s.

9. Environmental and Health and Safety Management

9.1 Environmental Management

9.1.1 Environmental Management Plan

Prior to commencement of remediation works on the site, a Construction Environmental Management Plan (EMP) or similar shall be prepared by the remedial contractor, which documents the environmental monitoring and management measures required to be implemented during remediation of the site.

The EMP shall address each of the nominated items in **Section 9.1.2** and shall include the contingency plan, referred to in **Section 9.5** above.

9.1.2 Required Elements/Procedures

An assessment of the proposed activities and the associated elements required to be incorporated into the EMP is provided in **Table 9.1**. The EMP is required to address each of the required elements and procedures in full detail and to include detailed monitoring processes and procedures, corrective actions and reporting requirements.

Table 9.1: Required Elements of the EMP

Element	Specific Minimum Requirements to be included in EMP
1. Dust and Airborne Hazard Control (for asbestos materials disturbance and/or removal – if required)	Asbestos air monitoring (if conducted). Provisions for dust control based on monitoring results.
2. Flora and Fauna	Consider requirements as drafted in Marine Ecology Assessment (MEA 2018[24]) and subsequent plans
3. Heritage/Archaeological	Consider requirements as drafted in Maritime Heritage Impact Statement (MHIS 2018[25]) and subsequent reports/plans as may be developed specific to the project
4. Visual Impacts	Potential surface water impacts in Blackwattle Bay from site based run-off.
5. Emergency Response	As appropriate. Procedures required for spill incident response including material storage breach.
6. Noise Control	Hours of operation. Boundary monitoring at commencement of work site activities that have the potential for excessive environmental noise emissions. Potential noise monitoring at nearest receptors if required. Procedures for control and management of noise emissions, as appropriate (e.g., restricted hours).
7. Traffic	Site access to be restricted to authorised personnel only
8. Protection of Adjoining Structures	As appropriate after consideration to the required remediation works and potential effects (if any) to neighbouring properties.
9. Odour Control	Procedures for management of potentially odorous works.
10. Handling of Contaminated Soil and Groundwater	Soil and water (if encountered) management (stockpiling, site access, excavation pump out, reinstatement).
11. Soil Storage/Placement Areas	Soil and water management (stockpiling, site access, excavation pump out, reinstatement). Bunding. Heavy vehicle/personnel decontamination. Interim storage requirements for materials requiring later treatment. Site drainage requirements, incorporating clean/dirty areas and modifications to existing surface water and drainage controls beneath retained pavements. Monitoring as required.

[24] *Marine Ecology Assessment – Stage 1 Concept and Demolition*, Sydney Fish Market, Eco Logical Australia Pty Ltd, 20 February 2018 (MEA 2018)

[25] *Maritime Heritage Impact Statement*, Sydney Fish Market Redevelopment, Comber Consultants Pty Ltd, February 2018 (MHIS 2018)

Element	Specific Minimum Requirements to be included in EMP
12. Sediment Control	Bunding and silt curtains within land and surface water areas respectively. Collection/treatment/handling impacted sediments.
13. Acid Sulfate Soil/Sediments	All site activities with the potential to disturb known or suspected ASS/PASS material will be required to comply with the procedures and management controls presented in the ASSMP.
14. Operation of Site Office	As appropriate.
15. Asbestos Works (if any)	Required notifications, permits, signage and exclusion zones. Required personal (e.g. Class A removalist). PPE and decontamination. Staging of asbestos and non-asbestos works.
16. Environmental Monitoring	Monitoring of dusts, noise, odour and fibres (if required). Monitoring as required for vibration and water releases. Surface water quality monitoring in Blackwattle Bay as required. Inspection checklists and field forms.
17. Environmental Criteria	Soil criteria as sourced from RAP.
18. Material Classification	As detailed in this RAP.
19. Waste Management	All waste materials classified in accordance with the RAP are required to be disposed of at a licensed waste facility that are lawfully able to accept such materials. Material tracking in the form of disposal dockets will be required for the purposes of satisfying the validation report.
20. Community Relations Plan	Client to provide project specific communication protocols, incorporating nomination of specific contact persons & details and requirements for communications/response register.
21. Incident Reporting	As appropriate, including standard form/checklist.
22. Security and Signage	Secure site perimeter. Site boundary signage. Remediation exclusion zone signage where required.
23. EMP Review	As appropriate.
24. Training	As appropriate. Contamination awareness training for all workers.
25. Contact Details	Company/personnel details, including names/phone numbers for: - Principal Contractor - Site Auditor (if involved) - Environmental Consultant - Contractor - OH&S Compliance - Environmental Compliance

9.2 Health and Safety Management

A Work Health & Safety Management Plan (WHSP) shall be prepared by the contractor prior to commencement of remediation works on the site. The Plan shall contain procedures and requirements that are to be implemented as a minimum during the works.

The objectives of the WHSP are:

- Ensure all regulatory requirements for the proposed works are satisfied;
- To apply standard procedures that minimises risks resulting from the works;
- To ensure all employees are provided with appropriate training, equipment and support to consistently perform their duties in a safe manner; and
- To have procedures to protect other site workers and the general public.

These objectives will be achieved by:

- Assignment of responsibilities;
- An evaluation of hazards;
- Establishment of personal protection standards, mandatory safety practices and procedures;

- Monitoring of potential hazards and implementation of corrective measures; and
- Provision for contingencies that may arise while activities are being conducted at the site.

10. Conclusions

Overall, it is considered that the proposed actions outlined in this RAP conform to the requirements of the *Contaminated Sites Guidelines for the NSW Site Auditor Scheme (3rd Edition)* (EPA 2017) because they are: technically feasible; environmentally justifiable; and consistent with relevant laws policies and guidelines endorsed by NSW EPA.

Subject to the successful implementation of the measures described in this RAP and with consideration to the Limitations presented in **Section 11**, it is considered that the Site can be made suitable for the intended uses and that the risks posed by contamination can be managed in such a way as to be adequately protective of human health and the environment.

11. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own enquires.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Figures



Legend

New Sydney Fish Market Development Footprint

JBS&G

Job No: 54578

Client: Infrastructure NSW

Version: R02 Rev 4	Date: 08-Jul-2020
Drawn By: RF/RH	Checked By: CB

Scale 1:8,000

0 100 200
metres

Coor. Sys. GDA 1994 MGA Zone 56

1A-1C Bridge Road
Glebe, NSW

SITE LOCATION

FIGURE 1

File Name: 54578_01_SiteLocation
Service Layer Credits: © OpenStreetMap (and) contributors, CC-BY-SA



Legend:

- New Sydney Fish Market Development Footprint
- Cadastral Boundary
- Approximate Land Area
- Approximate Seawall Extent
- ACM Fragments Observed on Ground Surface

Proposed Landuse

- Fish Market Building Envelope
- Public Domain
- Approximate Fish Market Basement Footprint

JBS&G

Job No: 54578

Client: Infrastructure NSW

Version: R02 Rev 4	Date: 08-Jul-2020
Drawn By: RF/RH	Checked By: CB

Scale 1:2,000

0 25 50
metres

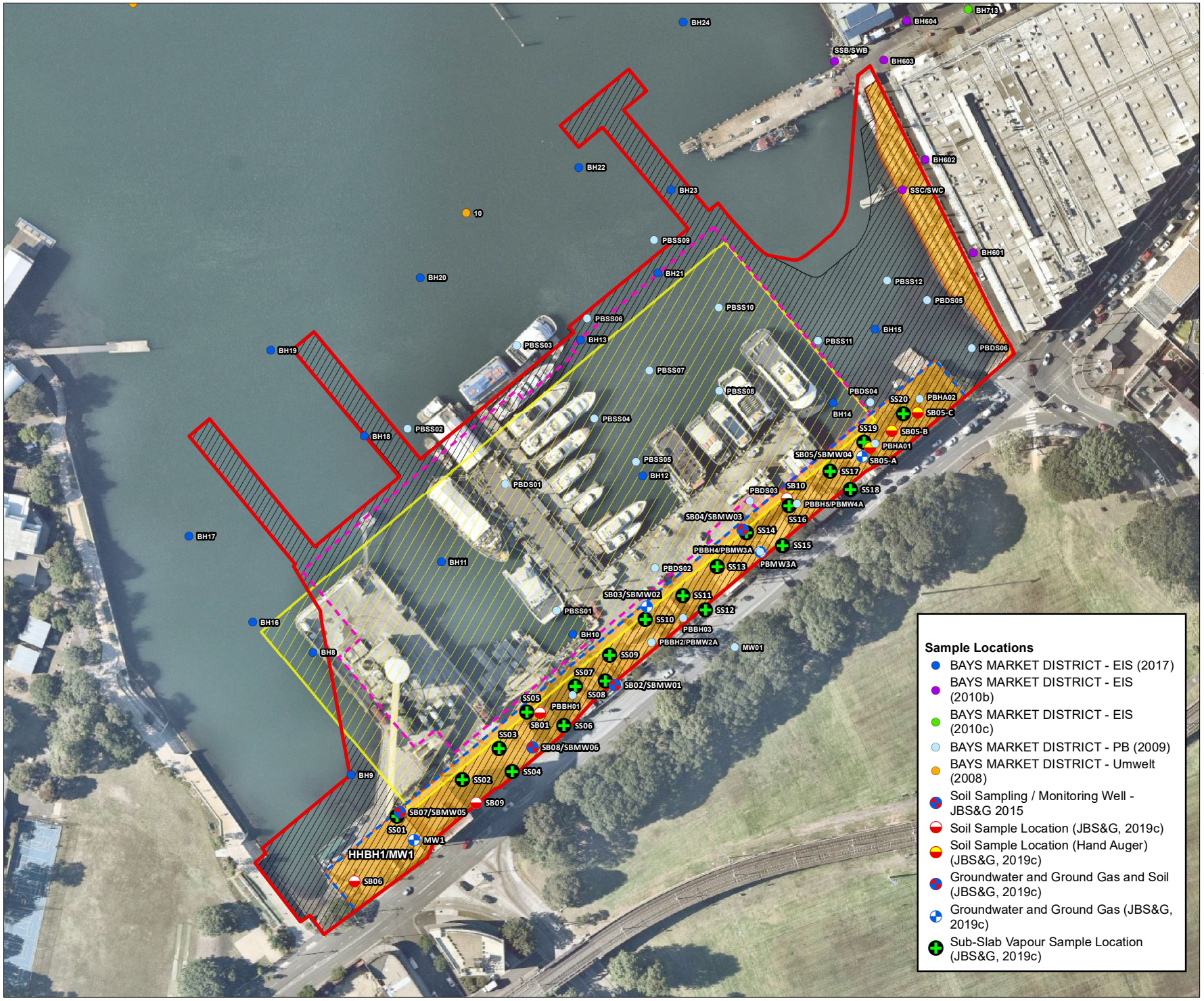
Coor. Sys. GDA 1994 MGA Zone 56

1A-1C Bridge Road
Glebe, NSW

SITE LAYOUT

FIGURE 2

File Name: 54578_02_SiteLayout
Reference: Near Map - http://www.nearmap.com.au/. Imagery - 18-01-2018.



Legend:

- New Sydney Fish Market Development Footprint
- Approximate Land Area
- Approximate Seawall Extent

Proposed Landuse

- Fish Market Building Envelope
- Public Domain
- Approximate Fish Market Basement Footprint

JBS&G

Job No: 54578

Client: Infrastructure NSW

Version: R02 Rev 4	Date: 08-Jul-2020
Drawn By: RF/RH	Checked By: CB

Scale 1:2,000

0 25 50

metres

Coor. Sys. GDA 1994 MGA Zone 56

1A-1C Bridge Road
Glebe, NSW

HISTORICAL SAMPLE LOCATIONS

FIGURE 3

File Name: 54578_03_SamplingLocations
Reference: Near Map - http://www.nearmap.com.au/. Imagery - 18-01-2018.

Appendix A – Proposed Development Plans

N E W S Y D N E Y F I S H M A R K E T

STATE SIGNIFICANT DEVELOPMENT APPLICATION STAGE 1



SHEET LIST_STAGE 1

SHEET NUMBER	SHEET NAME	REVISION	REVISION DATE	A1 SCALE	REVISION DESCRIPTION
S1-A00 AAA-01	COVER SHEET	F	18/09/19	NTS	ISSUE FOR SSDA
S1-A20 AAA-01	SITE SURVEY	F	18/09/19	1:1000	ISSUE FOR SSDA
S1-A20 AAA-02	LOCALITY / CONTEXT PLAN	F	18/09/19	1:2500	ISSUE FOR SSDA
S1-A20 AAA-03	SITE PLAN	F	18/09/19	1:1000	ISSUE FOR SSDA
S1-A21 L00-01	DEMOLITION PLAN	F	18/09/19	1:1000	ISSUE FOR SSDA
S1-B10 L00-01	FLOOR PLAN GROUND	F	18/09/19	1:500	ISSUE FOR SSDA
S1-B10 L01-01	FLOOR PLAN UPPER GROUND	F	18/09/19	1:500	ISSUE FOR SSDA
S1-B10 L02-01	FLOOR PLAN MEZZANINE	F	18/09/19	1:500	ISSUE FOR SSDA
S1-B10 L10-01	TOP OF BUIDLING ENVELOPE	F	18/09/19	1:500	ISSUE FOR SSDA
S1-C10 AAA-01	EAST & WEST ELEVATION	F	18/09/19	1:500	ISSUE FOR SSDA
S1-C10 AAA-02	NORTH & SOUTH ELEVATION	F	18/09/19	1:500	ISSUE FOR SSDA

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No.....SSD - 8924.....

Granted on the.....12 June 2020.....

Signed.....Rodger Roppolo.....

Sheet No.....1..... **of**.....11.....

BIM 360:\NEW SYDNEY FISH MARKET\NSFM_RVT_AR001_Building.rvt 18/09/2019 11:16:14 PM

3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	27/08/19	ISSUED FOR REVIEW
F	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

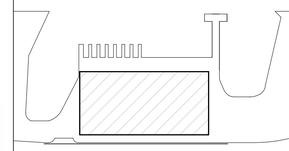
THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013
DRAWING KEY



GRAPHIC SCALE

SCALE

@A1
STATUS

DRAWING

COVER SHEET

	ISSUE
AR-S1-A00 AAA-01	F

NSW GOVERNMENT | Planning, Industry & Environment

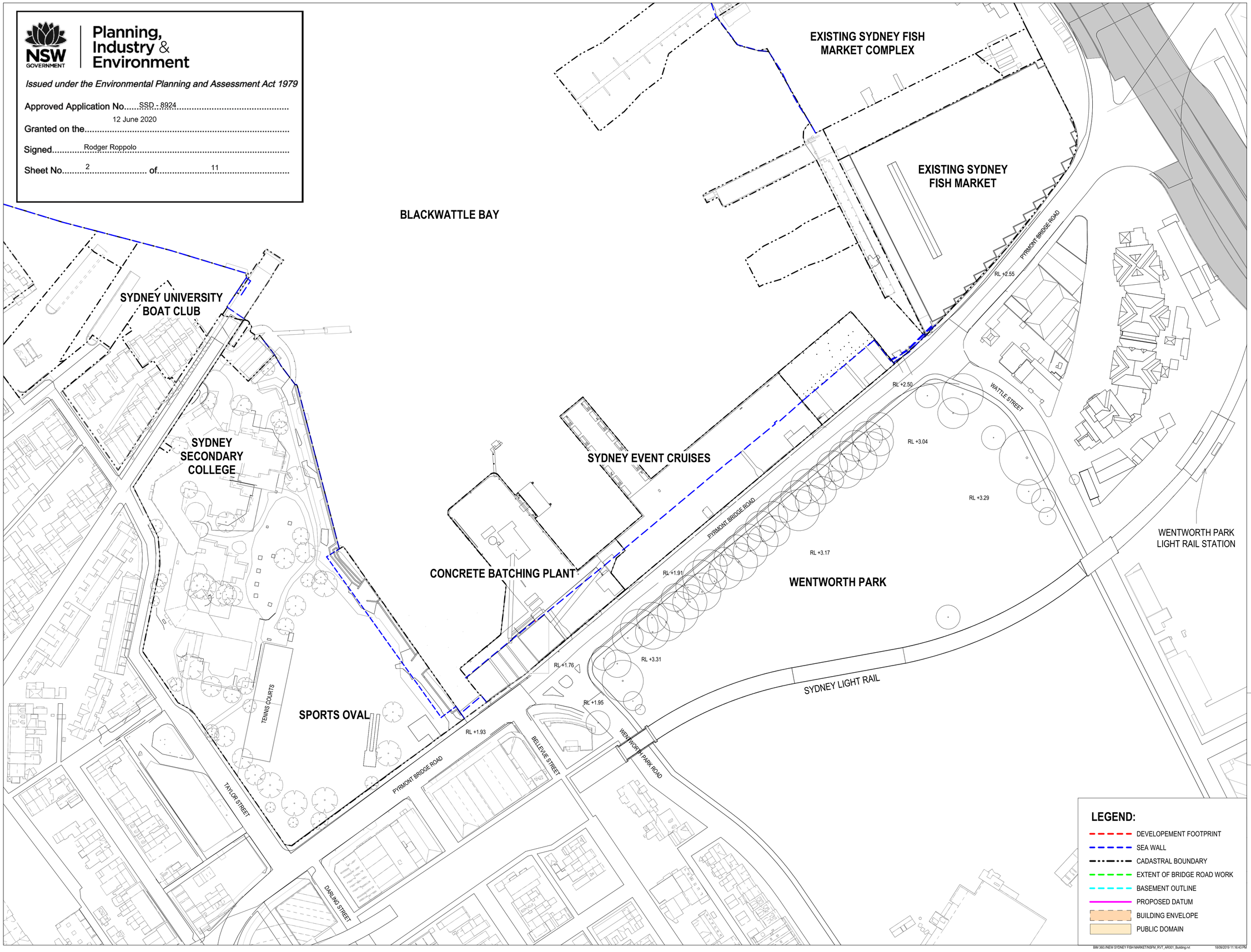
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No.....SSD - 8924.....

Granted on the.....12 June 2020.....

Signed.....Rodger Roppolo.....

Sheet No.....2..... of.....11.....



LEGEND:

- DEVELOPEMENT FOOTPRINT
- SEA WALL
- CADASTRAL BOUNDARY
- EXTENT OF BRIDGE ROAD WORK
- BASEMENT OUTLINE
- PROPOSED DATUM
- BUILDING ENVELOPE
- PUBLIC DOMAIN

BIM 360:\NEW SYDNEY FISH MARKET\NSFM_RVT_AR001_Building.rvt 18/09/2019 11:16:43 PM

3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	27/08/19	ISSUED FOR REVIEW
F	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

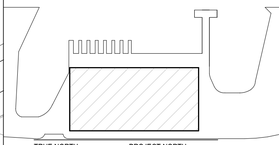
THIELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013
DRAWING KEY



TRUE NORTH PROJECT NORTH

GRAPHIC SCALE

0 20000 50000

SCALE

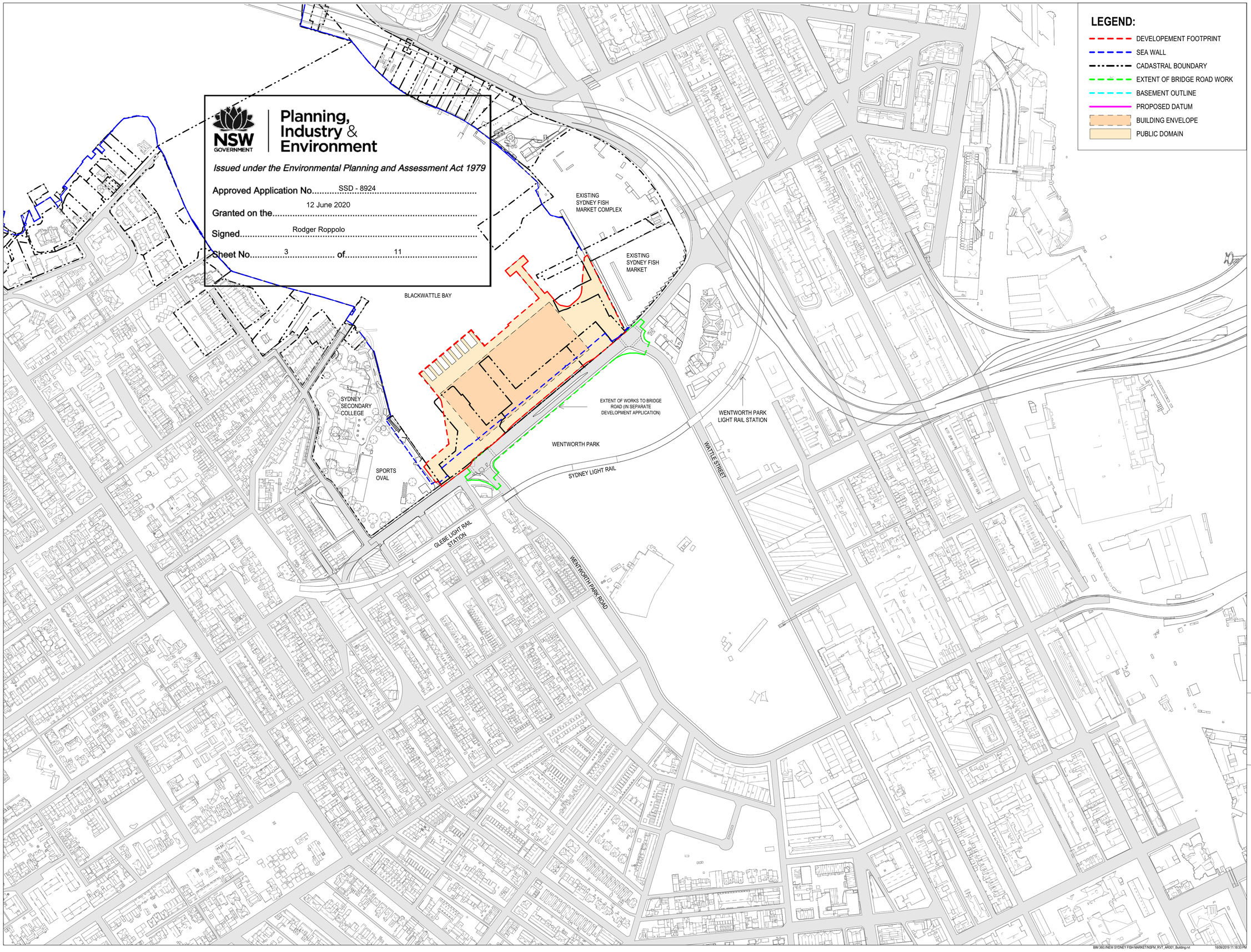
1 : 1000@A1

STATUS

DRAWING

SITE SURVEY

AR-S1-A20 AAA-01 | ISSUE F



3XN
BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY
COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S.
UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE
CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	27/08/19	ISSUED FOR REVIEW
F	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

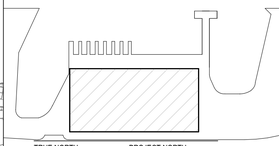
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



TRUE NORTH PROJECT NORTH

GRAPHIC SCALE
0 50000 125000

SCALE
As indicated@A1

STATUS

DRAWING
LOCALITY / CONTEXT PLAN

ISSUE
AR-S1-A20 AAA-02 F

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8924

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 4 of 11

SYDNEY SECONDARY COLLEGE

SPORTS OVAL

BLACKWATTLE BAY

EXISTING TIMBER WHARF

EXISTING FISHING FLEET WHARF

EXISTING SYDNEY FISH MARKET COMPLEX

EXISTING SYDNEY FISH MARKET

BUILDING ENVELOPE

PUBLIC DOMAIN

PYRMONT BRIDGE ROAD

BELLEVUE STREET

GLEBE LIGHT RAIL STATION

WENTWORTH PARK

WENTWORTH PARK ROAD

SYDNEY LIGHT RAIL

WATTLE STREET

WENTWORTH PARK LIGHT RAIL STATION

LEGEND:

- DEVELOPEMENT FOOTPRINT
- SEA WALL
- CADASTRAL BOUNDARY
- EXTENT OF BRIDGE ROAD WORK
- BASEMENT OUTLINE
- PROPOSED DATUM
- BUILDING ENVELOPE
- PUBLIC DOMAIN

BIM 360:/NEW SYDNEY FISH MARKET/NSFM_RVT_AR001_Building.rvt 19/09/2019 12:53:23 AM

3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	27/08/19	ISSUED FOR REVIEW
F	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY

TRUE NORTH PROJECT NORTH

GRAPHIC SCALE
0 20000 50000

SCALE
1 : 1000@A1

STATUS

DRAWING

SITE PLAN

AR-S1-A20 AAA-03 | ISSUE F

NSW GOVERNMENT | Planning, Industry & Environment

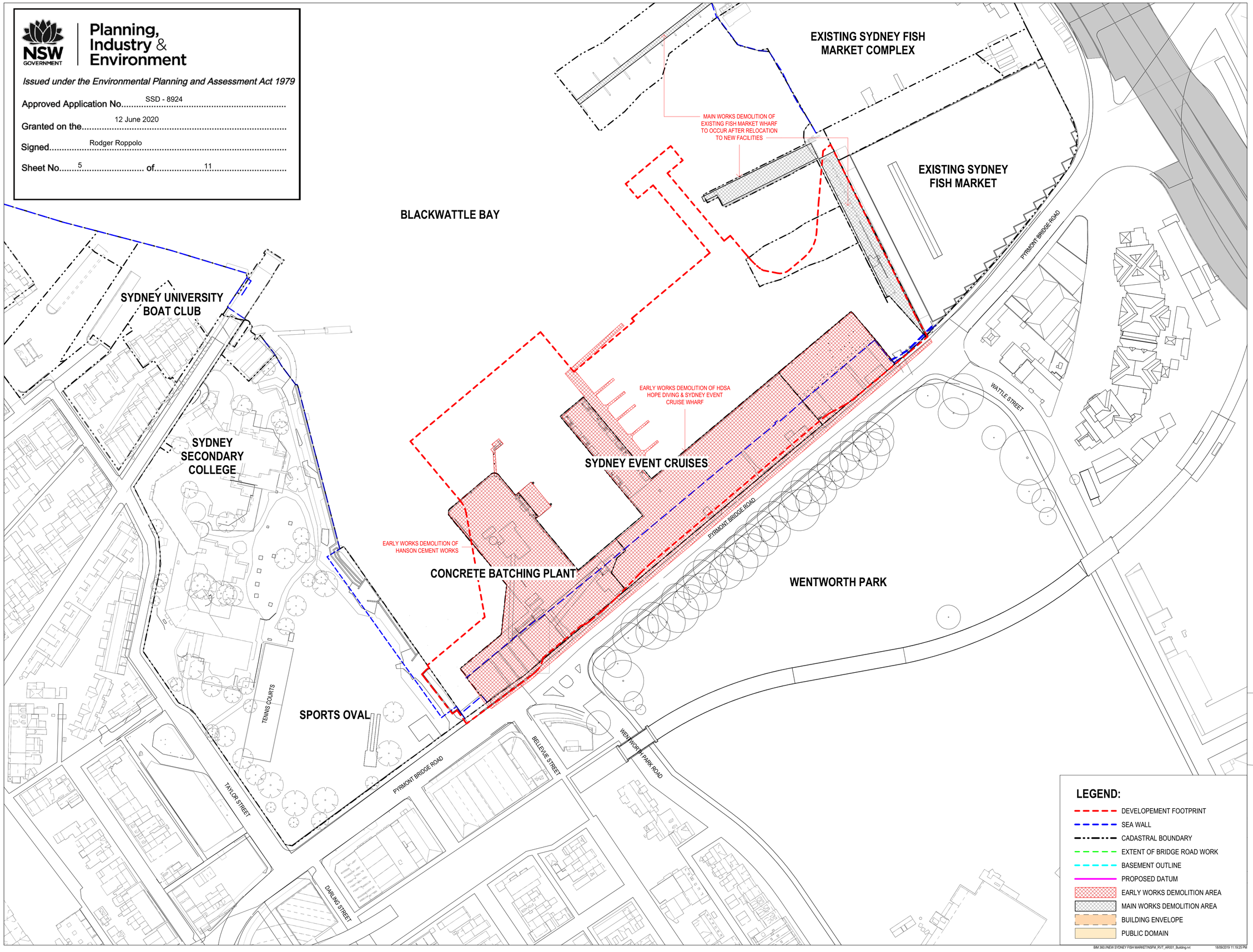
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8924

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 5 of 11



LEGEND:

- DEVELOPEMENT FOOTPRINT
- SEA WALL
- CADASTRAL BOUNDARY
- EXTENT OF BRIDGE ROAD WORK
- BASEMENT OUTLINE
- PROPOSED DATUM
- EARLY WORKS DEMOLITION AREA
- MAIN WORKS DEMOLITION AREA
- BUILDING ENVELOPE
- PUBLIC DOMAIN

BIM 360://NEW SYDNEY FISH MARKET/NSFM_RVT_AR001_Building.rvt 18/09/2019 11:19:25 PM

3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	27/08/19	ISSUED FOR REVIEW
F	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

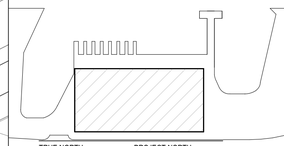
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



TRUE NORTH PROJECT NORTH

GRAPHIC SCALE

0 20000 50000

SCALE

1 : 1000@A1

STATUS

DRAWING

DEMOLITION PLAN

AR-S1-A21 L00-01 | ISSUE F

NSW GOVERNMENT | Planning, Industry & Environment

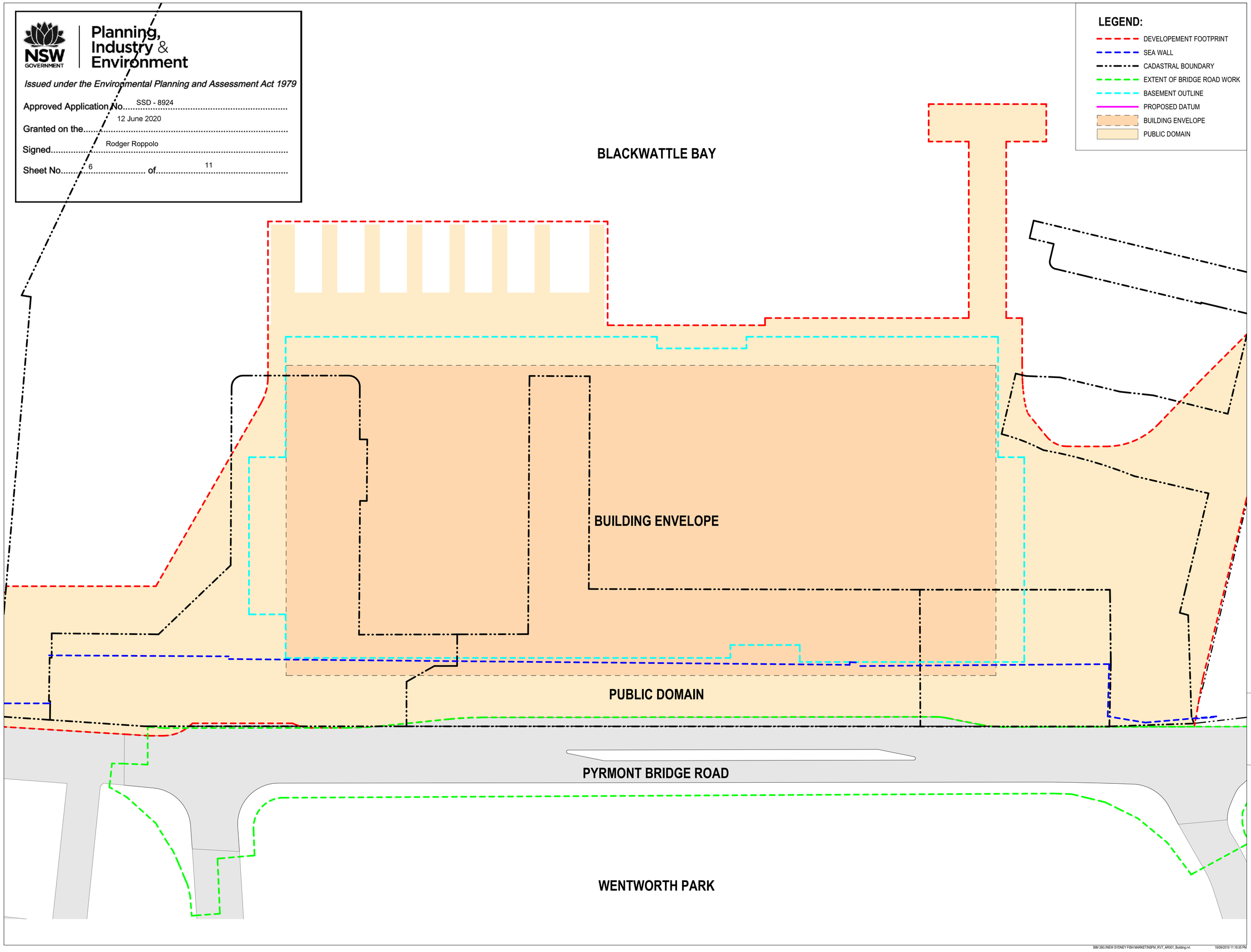
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8924

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 6 of 11



LEGEND:

- DEVELOPEMENT FOOTPRINT
- SEA WALL
- CADASTRAL BOUNDARY
- EXTENT OF BRIDGE ROAD WORK
- BASEMENT OUTLINE
- PROPOSED DATUM
- BUILDING ENVELOPE
- PUBLIC DOMAIN

3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY
COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE, OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE
CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	27/08/19	ISSUED FOR REVIEW
F	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

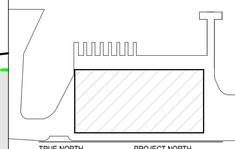
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



TRUE NORTH PROJECT NORTH

GRAPHIC SCALE
0 10000 25000
SCALE

As indicated@A1
STATUS

DRAWING

FLOOR PLAN GROUND

ISSUE

AR-S1-B10 L00-01 F

BIM 360://NEW SYDNEY FISH MARKET/NSFM_RVT_AR001_Building.rvt 18/09/2019 11:19:35 PM

NSW GOVERNMENT | Planning, Industry & Environment

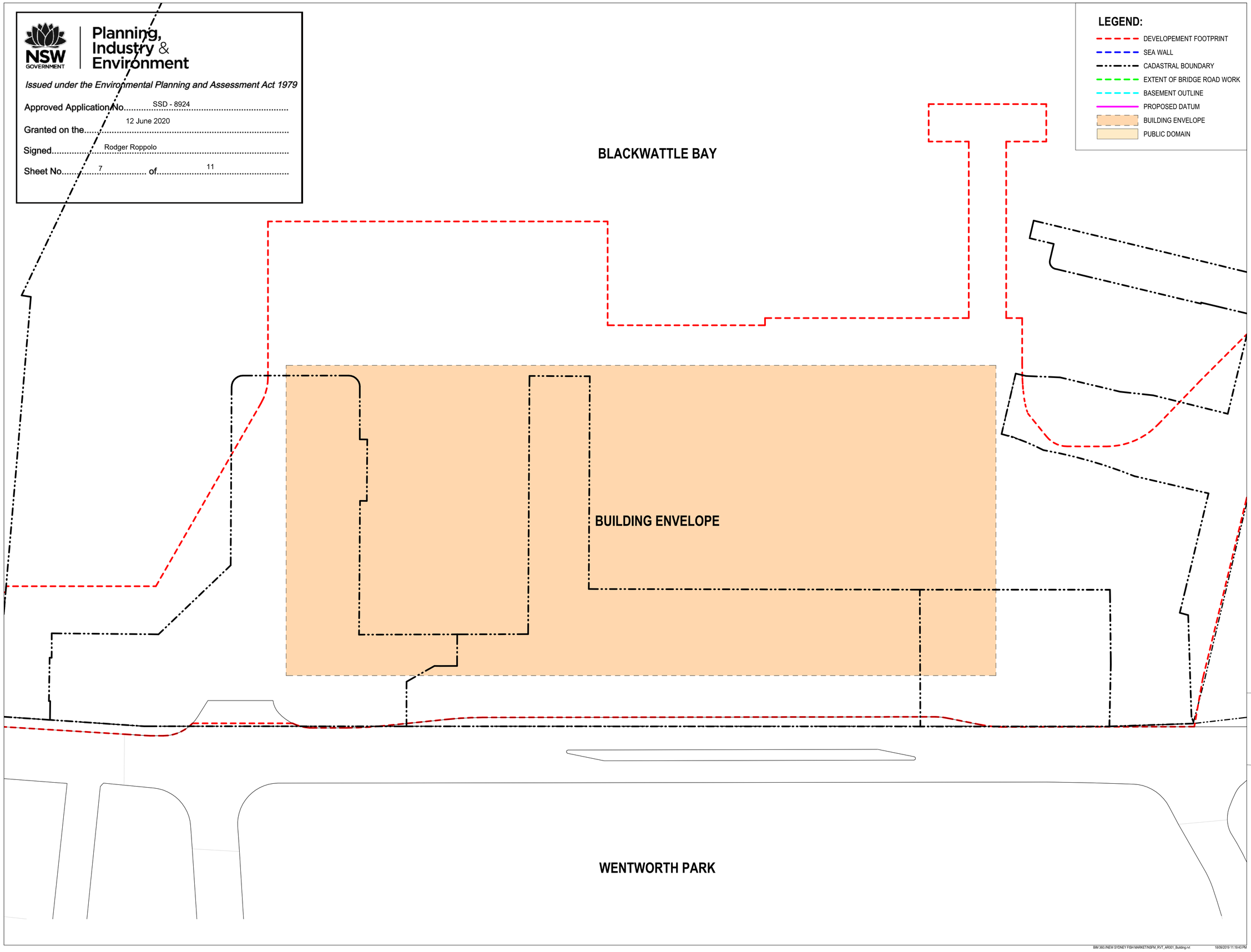
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8924

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 7 of 11



LEGEND:

- DEVELOPEMENT FOOTPRINT
- SEA WALL
- CADASTRAL BOUNDARY
- EXTENT OF BRIDGE ROAD WORK
- BASEMENT OUTLINE
- PROPOSED DATUM
- BUILDING ENVELOPE
- PUBLIC DOMAIN

3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY
COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES;THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S; AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE
CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	27/08/19	ISSUED FOR REVIEW
F	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

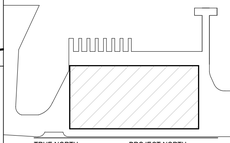
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



TRUE NORTH PROJECT NORTH

GRAPHIC SCALE
0 10000 25000
SCALE

As indicated@A1
STATUS

DRAWING

FLOOR PLAN UPPER GROUND

AR-S1-B10 L01-01 | ISSUE F

BIM 360:/NEW SYDNEY FISH MARKET/NSFM_RVT_AR001_Building.rvt 18/09/2019 11:19:43 PM

NSW GOVERNMENT | Planning, Industry & Environment

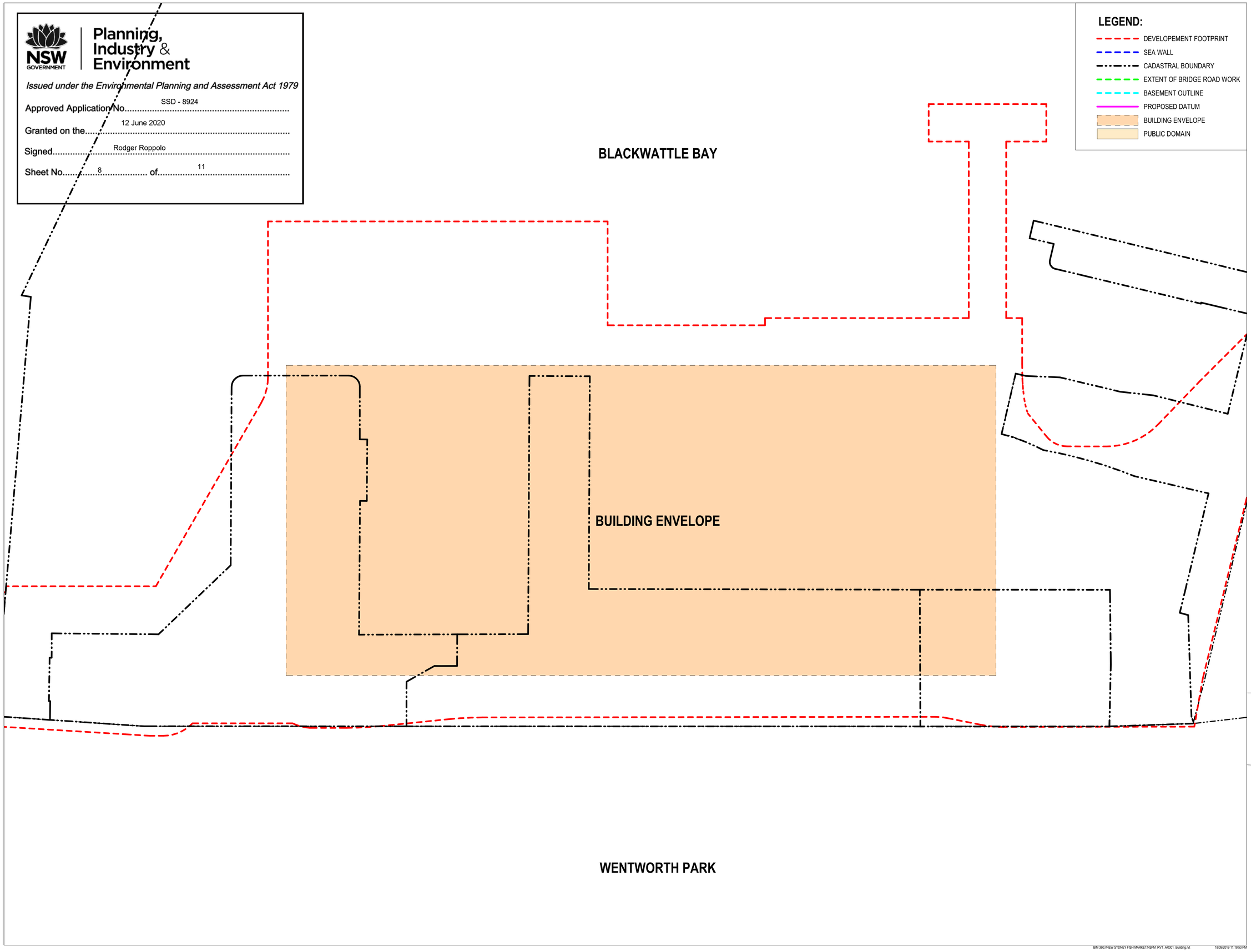
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8924

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 8 of 11



LEGEND:

- DEVELOPEMENT FOOTPRINT
- SEA WALL
- CADASTRAL BOUNDARY
- EXTENT OF BRIDGE ROAD WORK
- BASEMENT OUTLINE
- PROPOSED DATUM
- BUILDING ENVELOPE
- PUBLIC DOMAIN

3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY
COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE
CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	27/08/19	ISSUED FOR REVIEW
F	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

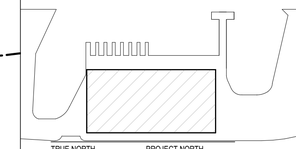
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



TRUE NORTH PROJECT NORTH

GRAPHIC SCALE
0 10000 25000
SCALE

As indicated@A1
STATUS

DRAWING

FLOOR PLAN MEZZANINE

AR-S1-B10 L02-01 | ISSUE F

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8924

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 9 of 11

LEGEND:

- DEVELOPEMENT FOOTPRINT
- SEA WALL
- CADASTRAL BOUNDARY
- EXTENT OF BRIDGE ROAD WORK
- BASEMENT OUTLINE
- PROPOSED DATUM
- BUILDING ENVELOPE
- PUBLIC DOMAIN

TOP OF BUILDING ENVELOPE RL + 28000

BIM 360://NEW SYDNEY FISH MARKET/NSFM_RVT_AR001_Building.rvt 19/09/2019 12:49:43 AM

3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES;THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S, AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	27/08/19	ISSUED FOR REVIEW
F	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

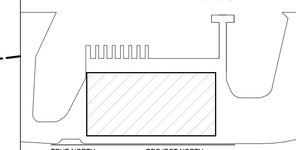
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



TRUE NORTH PROJECT NORTH

GRAPHIC SCALE

0 10000 25000

SCALE

As indicated@A1

STATUS

DRAWING

TOP OF BUILDING ENVELOPE

AR-S1-B10 L10-01 | ISSUE F

NSW GOVERNMENT | Planning, Industry & Environment

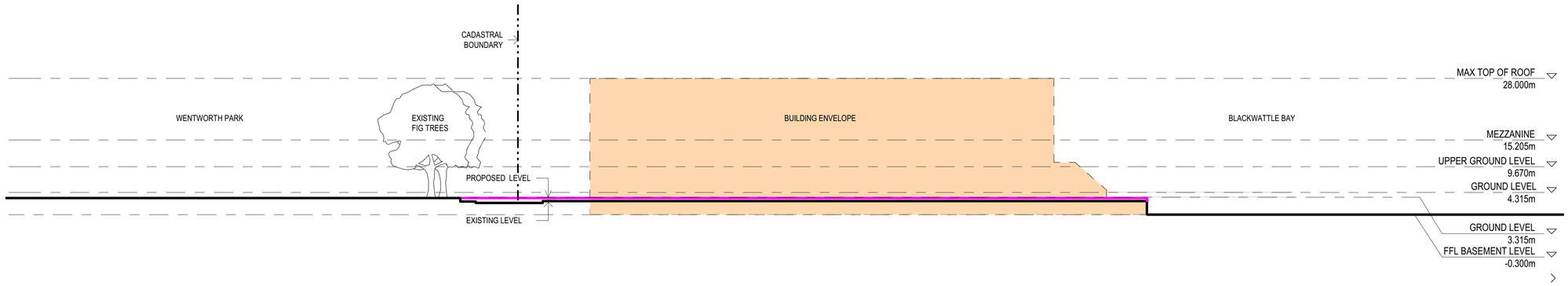
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8924

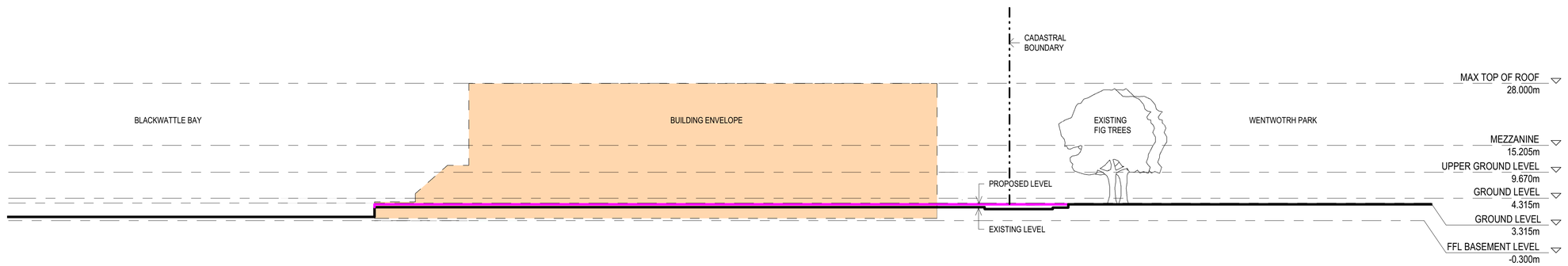
Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 10 of 11



1 EAST ELEVATION
1 : 500



2 WEST ELEVATION
1 : 500

LEGEND:

- DEVELOPEMENT FOOTPRINT
- SEA WALL
- CADASTRAL BOUNDARY
- EXTENT OF BRIDGE ROAD WORK
- BASEMENT OUTLINE
- PROPOSED DATUM
- BUILDING ENVELOPE
- PUBLIC DOMAIN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES;THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S, AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	27/08/19	ISSUED FOR REVIEW
F	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

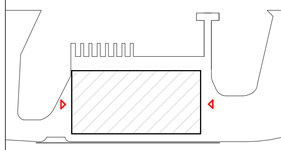
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



GRAPHIC SCALE

0 10000 25000

SCALE

As indicated@A1

STATUS

DRAWING

EAST & WEST ELEVATION

ISSUE

AR-S1-C10 AAA-01 F

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8924

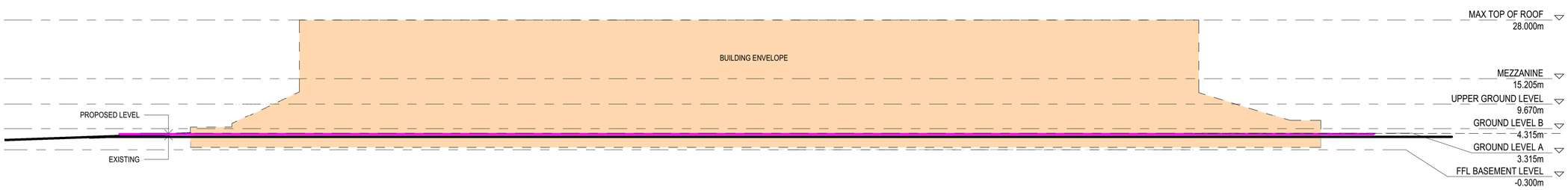
Granted on the 12 June 2020

Signed Rodger Roppolo

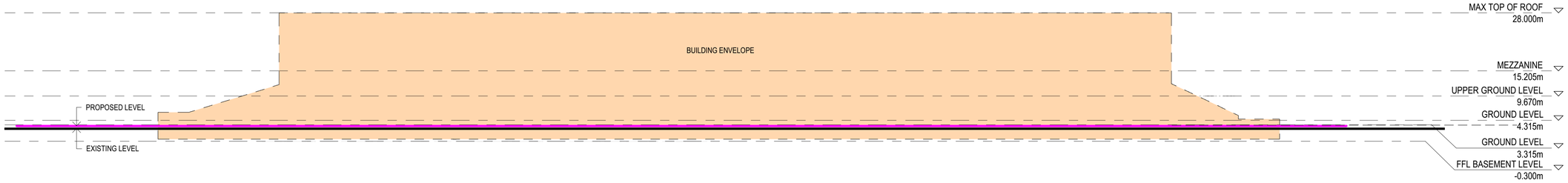
Sheet No. 11 of 11

LEGEND:

- DEVELOPEMENT FOOTPRINT
- SEA WALL
- CADASTRAL BOUNDARY
- EXTENT OF BRIDGE ROAD WORK
- BASEMENT OUTLINE
- PROPOSED DATUM
- BUILDING ENVELOPE
- PUBLIC DOMAIN



1 NORTH ELEVATION



2 SOUTH ELEVATION

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES;THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S; AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	27/08/19	ISSUED FOR REVIEW
F	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

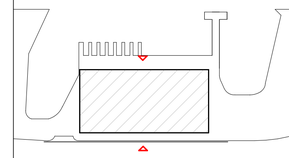
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



GRAPHIC SCALE

0 10000 25000

SCALE

As indicated@A1

STATUS

DRAWING

NORTH & SOUTH ELEVATION

ISSUE

AR-S1-C10 AAA-02 F

N E W S Y D N E Y F I S H M A R K E T

STATE SIGNIFICANT DEVELOPMENT APPLICATION STAGE 2



DRAWING INDEX

SHEET LIST_STAGE 2

SHEET NUMBER	SHEET NAME	REVISION	REVISION DATE	A1 SCALE	REVISION DESCRIPTION
S2-A00 AAA-01	COVER SHEET	H	18/09/19	NTS	ISSUE FOR SSDA
S2-A20 AAA-01	SITE SURVEY	H	18/09/19	1:500	ISSUE FOR SSDA
S2-A20 AAA-02	LOCALITY / CONTEXT PLAN	H	18/09/19	1:2500	ISSUE FOR SSDA
S2-A20 AAA-03	SITE PLAN	H	18/09/19	1:1000	ISSUE FOR SSDA
S2-A20 L01-01	PUBLIC DOMAIN GROUND	G	18/09/19	1:1000	ISSUE FOR SSDA
S2-A20 L02-01	PUBLIC DOMAIN UPPER GROUND	G	18/09/19	1:1000	ISSUE FOR SSDA
S2-B10 L00-01	FLOOR PLAN GROUND	H	18/09/19	1:500	ISSUE FOR SSDA
S2-B10 L01-01	FLOOR PLAN UPPER GROUND	H	18/09/19	1:500	ISSUE FOR SSDA
S2-B10 L02-01	FLOOR PLAN MEZZANINE	H	18/09/19	1:500	ISSUE FOR SSDA
S2-B10 L03-01	MEZZANINE ROOF PLAN	H	18/09/19	1:500	ISSUE FOR SSDA
S2-B10 L10-01	ROOF PLAN	H	18/09/19	1:500	ISSUE FOR SSDA
S2-B10 LB1-01	FLOOR PLAN BASEMENT	H	18/09/19	1:500	ISSUE FOR SSDA
S2-C10 AAA-01	EAST AND WEST ELEVATION	H	18/09/19	1:500	ISSUE FOR SSDA
S2-C10 AAA-02	NORTH AND SOUTH ELEVATION	H	18/09/19	1:500	ISSUE FOR SSDA
S2-D10 AAA-01	CROSS SECTIONS	H	18/09/19	1:500	ISSUE FOR SSDA
S2-D10 AAA-02	LONG SECTIONS	H	18/09/19	1:500	ISSUE FOR SSDA
S2-E43 AAA-01	AUCTION & OFFICE SECTION	H	18/09/19	1:50	ISSUE FOR SSDA
S2-E43 AAA-02	FOOD & BEVERAGE SECTION	H	18/09/19	1:50	ISSUE FOR SSDA
S2-E43 AAA-04	WHOLESALE & CATERING SECTION	H	18/09/19	1:50	ISSUE FOR SSDA
S2-L10 AAA-01	GFA MEASUREMENT SREP 26	H	18/09/19	1:1000	ISSUE FOR SSDA
S2-L10 AAA-02	GFA STANDARD INSTRUMENT	H	18/09/19	1:1000	ISSUE FOR SSDA
S2-L10 AAA-03	NON-RETAIL AREAS	E	18/09/19	1:1000	ISSUE FOR SSDA
S2-L10 AAA-04	RETAIL AREAS	E	18/09/19	1:1000	ISSUE FOR SSDA

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No.....SSD - 8925.....

Granted on the.....12 June 2020.....

Signed.....Rodger Rappolo.....

Sheet No.....1..... of.....44.....

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	16/04/19	ISSUE FOR 50% DD
F	18/04/19	ISSUE FOR 50% DD
G	27/08/19	ISSUED FOR REVIEW
H	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

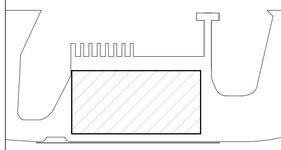
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



GRAPHIC SCALE

SCALE

@A1

STATUS

DRAWING

COVER SHEET

ISSUE

AR-S2-A00 AAA-01 | H

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 2 of 44

BLACKWATTLE BAY

EXISTING SYDNEY FISH MARKET COMPLEX

EXISTING SYDNEY FISH MARKET

PYRMONT BRIDGE ROAD

RL +2.55

RL +2.50

WATTLE STREET

RL +3.04

SYDNEY UNIVERSITY BOAT CLUB

SYDNEY SECONDARY COLLEGE

SYDNEY EVENT CRUISES

RL +3.29

WENTWORTH PARK LIGHT RAIL STATION

CONCRETE BATCHING PLANT

RL +3.17

RL +1.91

WENTWORTH PARK

RL +3.31

RL +1.76

SYDNEY LIGHT RAIL

RL +1.95

TENNIS COURTS

SPORTS OVAL

RL +1.93

BELLEVUE STREET

WENTWORTH PARK ROAD

PYRMONT BRIDGE ROAD

TAYLOR STREET

DARLING STREET

LEGEND:

- SEA WALL
- CADASTRAL BOUNDARY
- EXTENT OF BRIDGE ROAD WORK

BIM 360://NEW SYDNEY FISH MARKET/NSFM_RVT_AR001_Building.rvt 19/09/2019 12:36:22 AM

3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	16/04/19	ISSUE FOR 50% DD
F	18/04/19	ISSUE FOR 50% DD
G	27/08/19	ISSUED FOR REVIEW
H	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THIELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013
DRAWING KEY

TRUE NORTH PROJECT NORTH

GRAPHIC SCALE
0 20000 50000

SCALE
1 : 1000@A1

STATUS

DRAWING

SITE SURVEY

	ISSUE
AR-S2-A20 AAA-01	H

NSW GOVERNMENT

Planning, Industry & Environment

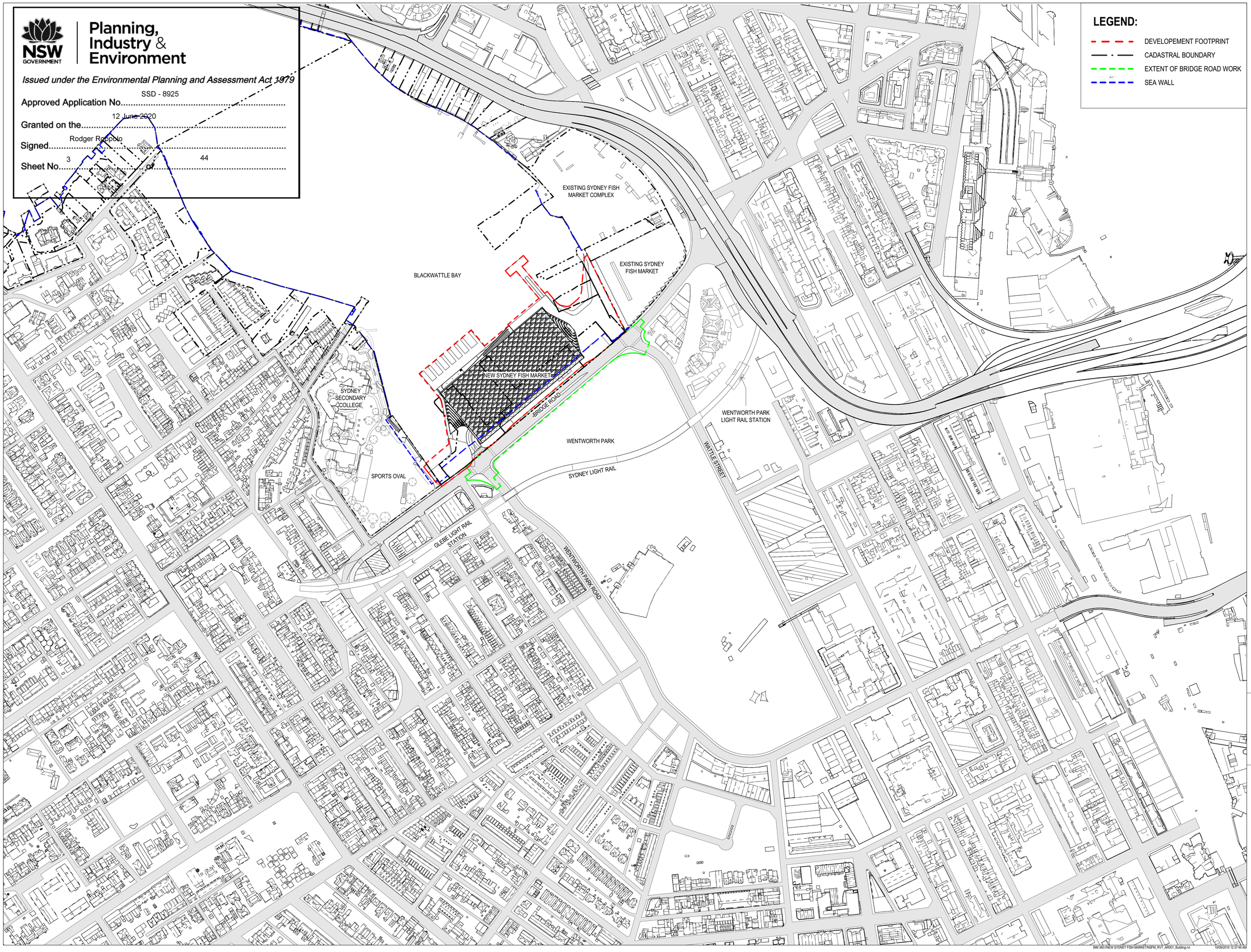
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 3 of 44



3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	16/04/19	ISSUE FOR 50% DD
F	18/04/19	ISSUE FOR 50% DD
G	27/08/19	ISSUED FOR REVIEW
H	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THIELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

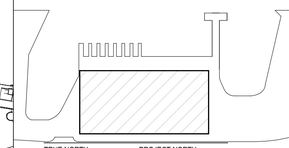
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



TRUE NORTH PROJECT NORTH

GRAPHIC SCALE

0 50000 125000

SCALE

1 : 2500@A1

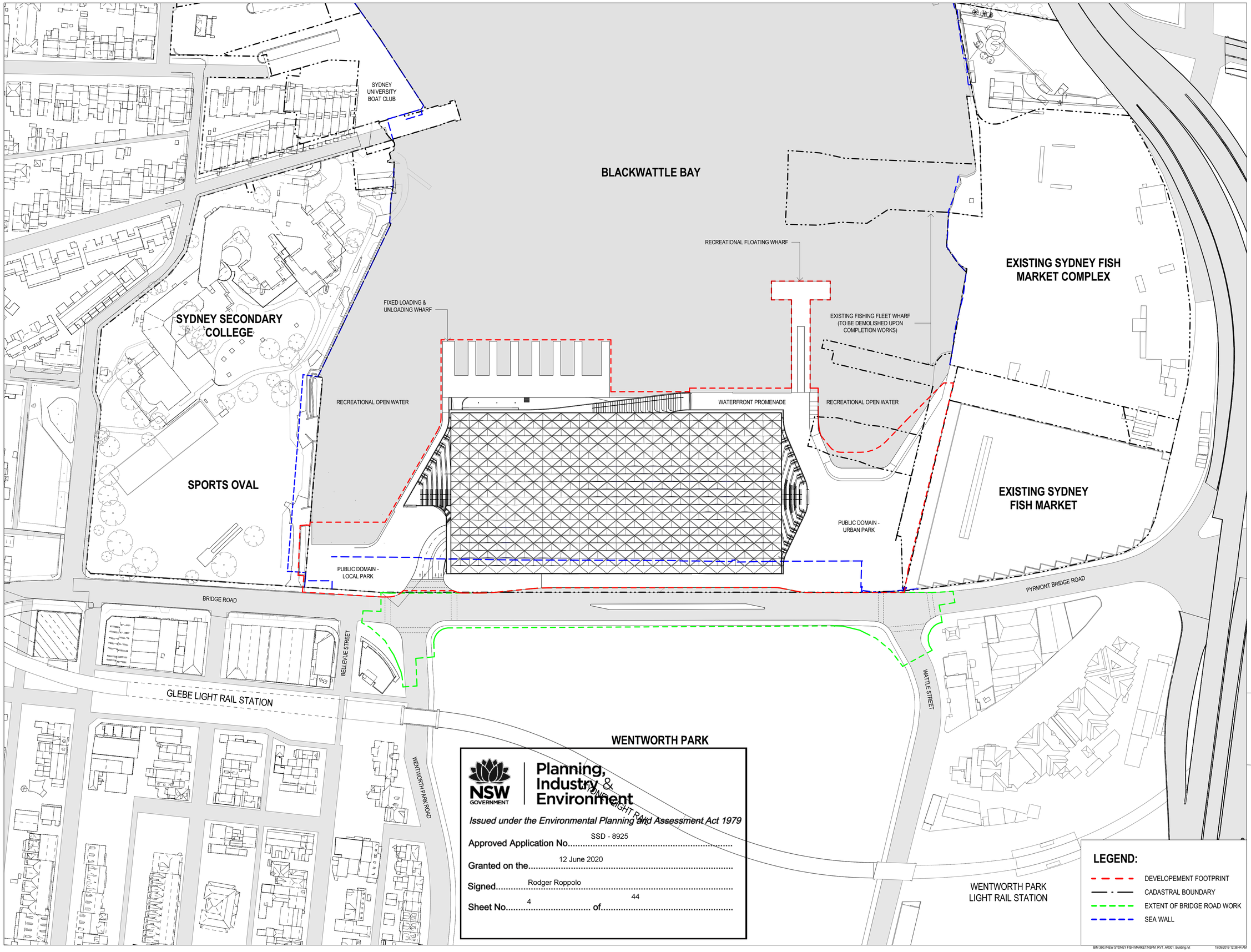
STATUS

DRAWING

LOCALITY / CONTEXT PLAN

ISSUE

AR-S2-A20 AAA-02 H



NSW GOVERNMENT Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 4 of 44

LEGEND:

- DEVELOPEMENT FOOTPRINT
- CADASTRAL BOUNDARY
- EXTENT OF BRIDGE ROAD WORK
- SEA WALL

BIM 360://NEW SYDNEY FISH MARKET/NSFM_R(VT_AR001_Building.rvt 19/09/2019 12:38:44 AM

3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN/S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	16/04/19	ISSUE FOR 50% DD
F	18/04/19	ISSUE FOR 50% DD
G	27/08/19	ISSUED FOR REVIEW
H	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

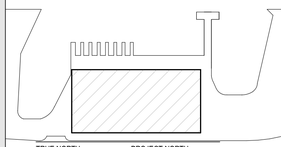
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



TRUE NORTH PROJECT NORTH

GRAPHIC SCALE

0 20000 50000

SCALE

As indicated@A1

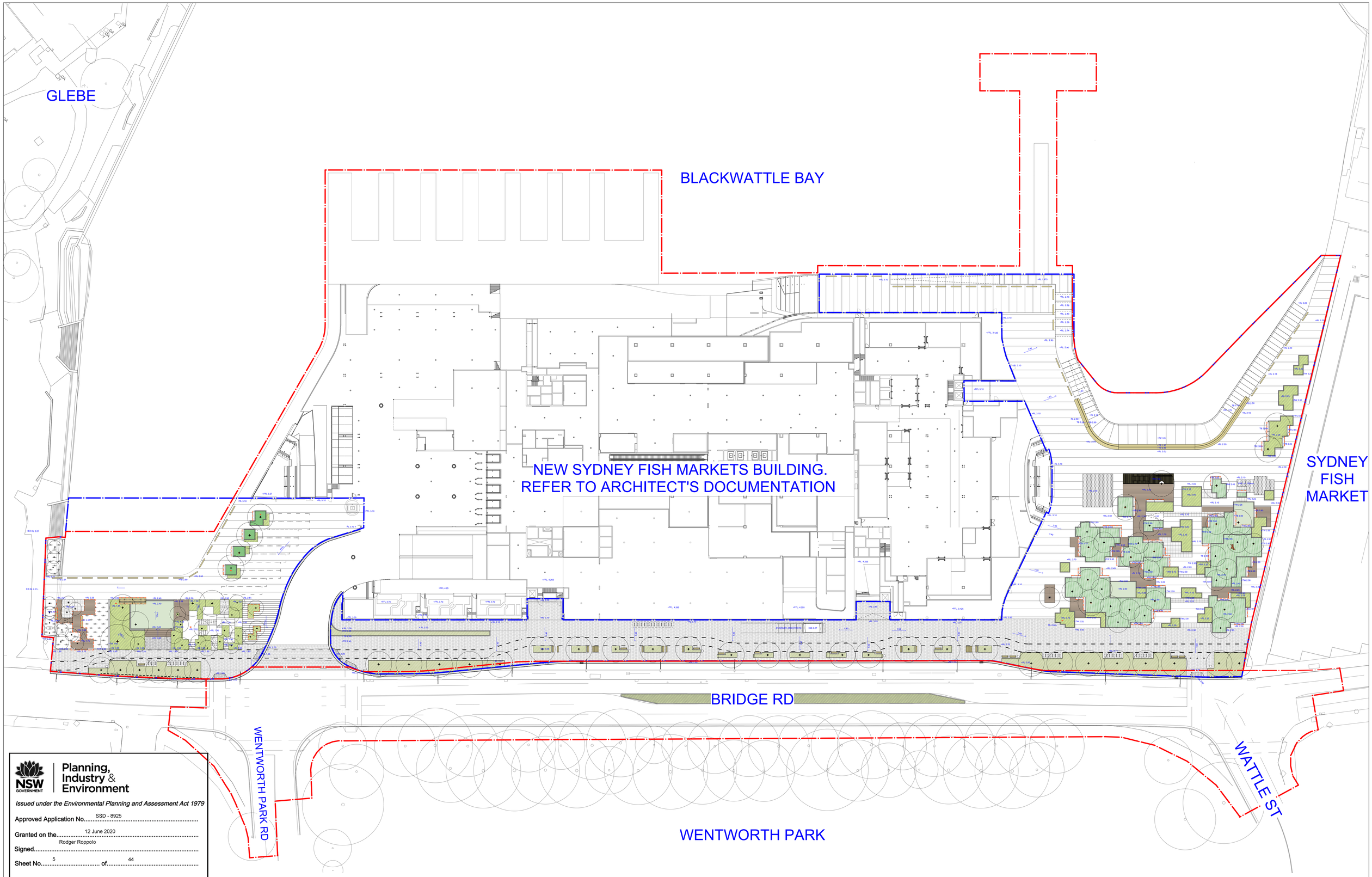
STATUS

DRAWING

SITE PLAN

ISSUE

AR-S2-A20 AAA-03 H



NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 5 of 44

WARNING

DIAL BEFORE YOU DIG www.1100.com.au

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.

These drawings shall be read in conjunction with all relevant information (not limited to legends, schedules, specifications).

These 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 or fabrication 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 ups for services to be 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 RMS for Bridge Road design and Hydraulics to SSD-DA consent and conditions.
- Setout Plans are subject to finalisation of structural and civil engineers drawings and have not been included in this documentation
- Detail of bioffiltration planters subject to future approvals and direction from NSW Final Planting Plans indicating plant setout and species will be provided based on the finalisation of the above

DATE	REV	AMENDMENTS
19/09/18	A	ISSUED FOR SSD-DA
12/11/18	B	ISSUED FOR SSD-DA
22/11/18	C	ISSUED FOR SSD-DA
15/04/19	D	ISSUED FOR SSD-DA
16/04/19	E	ISSUED FOR SSD-DA
17/09/19	F	ISSUED FOR SSD-DA
19/09/19	G	ISSUED FOR SSD-DA

NOTE:

ALL LEVELS ARE INDICATIVE PLEASE REFER TO CIVIL ENGINEER'S DOCUMENTATION

CONSULTANTS

3XN — ARCHITECT, 19A Boundary St, Sydney NSW 2010, T +45 7026 2648

BVN — ARCHITECT, 255 Pitt St, Sydney NSW 2000, T +61 2 8297 7200

MOTT MACDONALD — CIVIL ENGINEER, 383 Kent St, Sydney NSW 2000, T +61 2 9098 6800

AECOM — SERVICES, 420 George St, Sydney NSW 2000, T +61 2 8934 0000

Cardno — HYDRAULICS, 515 St Pauls Ter, Brisbane QLD 4006, T +61 7 3369 9822

ASPECT Studios

ASPECT Studios Pty Ltd
Level 1, 78-80 George Street
Redfern NSW 2016
Australia
T 02 9699 7182
www.aspect-studios.com
sydney@aspect-studios.com
ABN 11 120 219 561

PROJECT: NEW SYDNEY FISH MARKET — S17004
1B Bridge Road, Glebe, NSW

CLIENT: insw Infrastructure New South Wales

NORTH

SCALE A0 | SCALE A2: NOT TO SCALE

DRAWN: AT | TL — CHECKED: EW

Do not scale - use dimensions & callouts on drawings & schedules. Refer discrepancies to Landscape Architect for clarification.

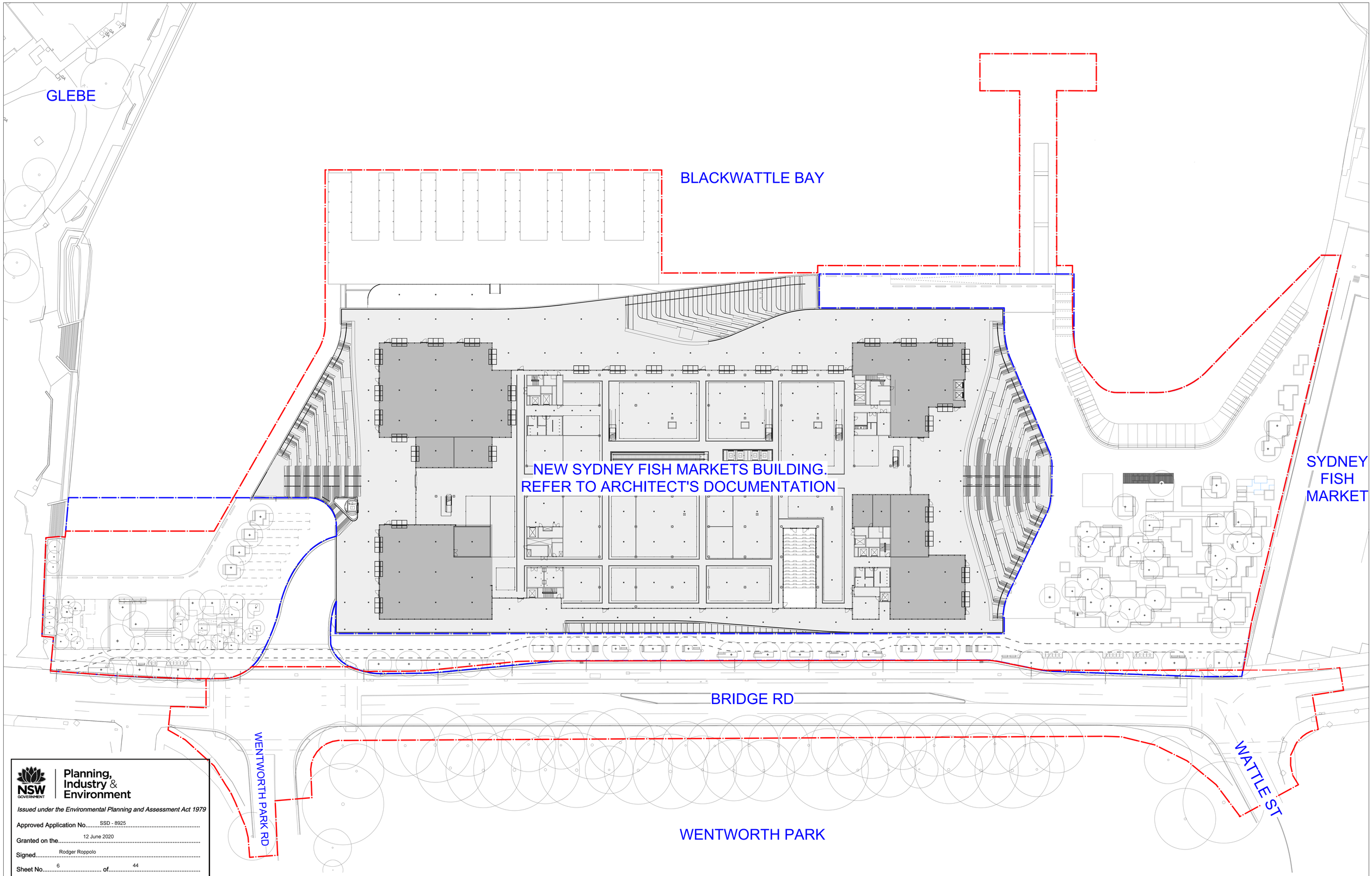
STATUS: Tender Documentation
PRELIMINARY
NOT FOR CONSTRUCTION

DRAWING: MASTERPLAN

DRAWING NO.: AR-S2-A20 L01-01

REVISION: G

S17004\05_PRODUCTION\01_Phase01_CAD\Package Files\



NSW GOVERNMENT **Planning, Industry & Environment**

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No..... SSD - 8925

Granted on the..... 12 June 2020

Signed..... Rodger Roppolo

Sheet No..... 6 of..... 44

WARNING

DIAL BEFORE YOU DIG www.1100.com.au 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.

These drawings shall be read in conjunction with all relevant information (not limited to legends, schedules, specifications).

These 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 or fabrication 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 ups for services to be 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 grades plans require final coordination with civil and hydraulic engineers. Final levels and drainage will depend on final flood modelling, sign-off by RMS for Bridge Road design and responses to SSD-DA comments and conditions
- Setout Plans are subject to finalisation of structural and civil engineers drawings and have not been included in this documentation
- Detail of biofiltration planters subject to future approvals and direction from INSW. Final Planting Plans indicating plant setout and species will be provided based on the finalisation of the above

DATE	REV	AMENDMENTS
19/09/18	A	ISSUED FOR SSD-DA
12/11/18	B	ISSUED FOR SSD-DA
22/11/18	C	ISSUED FOR SSD-DA
15/04/19	D	ISSUED FOR SSD-DA
16/04/19	E	ISSUED FOR SSD-DA
17/09/19	F	ISSUED FOR SSD-DA
19/09/19	G	ISSUED FOR SSD-DA

NOTE:

ALL LEVELS ARE INDICATIVE PLEASE
REFER TO CIVIL ENGINEER'S DOCUMENTATION

CONSULTANTS

3XN — ARCHITECT
19A Boundary St
Sydney NSW 2010
T +45 7026 2646

BVN — ARCHITECT
255 Pitt St
Sydney NSW 2000
T +61 2 8297 7200

M MOTT MACDONALD — CIVIL ENGINEER
383 Kent St
Sydney NSW 2000
T +61 2 9098 6800

AECOM — SERVICES
420 George St
Sydney NSW 2000
T +61 2 8934 0000

Cardno — HYDRAULICS
515 St Pauls Tce
Brisbane QLD 4006
T +61 7 3369 9822

ASPECT Studios

ASPECT Studios Pty Ltd
Level 1, 78-80 George Street
Redfern NSW 2016
Australia
T 02 9699 7182
www.aspect-studios.com
sydney@aspect-studios.com
ABN 11 120 219 561

PROJECT S17004
NEW SYDNEY FISH MARKET
1B Bridge Road, Glebe, NSW

CLIENT
INSW Infrastructure New South Wales

NORTH

SCALE A0 | SCALE A2 NOT TO SCALE

DRAWN AT | TL CHECKED EW

Do not scale - use dimensions & callouts on drawings & schedules. Refer discrepancies to Landscape Architect for clarification.

STATUS
Tender Documentation
PRELIMINARY
NOT FOR CONSTRUCTION

DRAWING
MASTERPLAN

DRAWING NO. AR-S2-A20 L02-01

REVISION G

S17004\05_PRODUCTION\01_Phase01_CAD\Package Files\

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

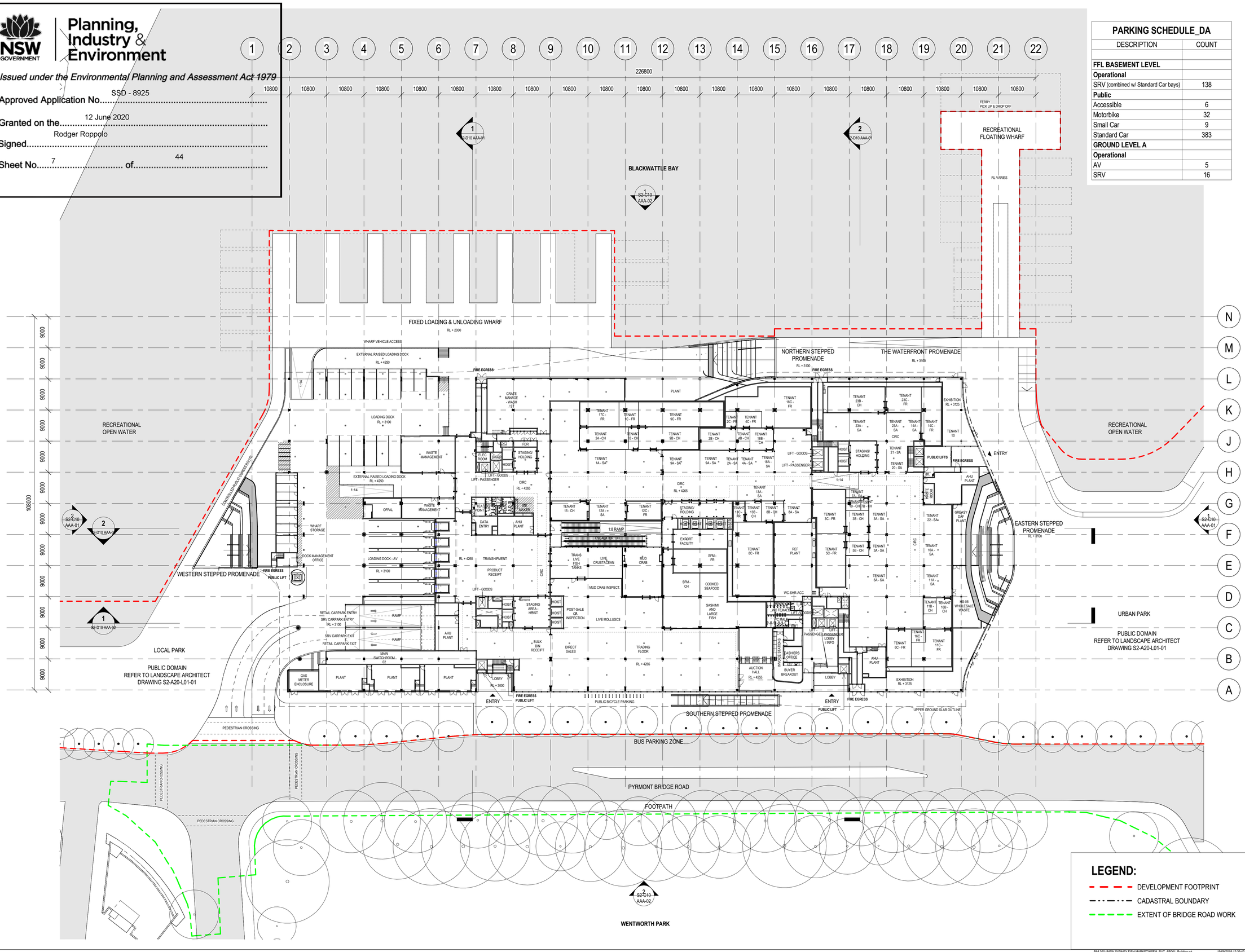
Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 7 of 44

PARKING SCHEDULE_DA	
DESCRIPTION	COUNT
FFL BASEMENT LEVEL	
Operational	
SRV (combined w/ Standard Car bays)	138
Public	
Accessible	6
Motorbike	32
Small Car	9
Standard Car	383
GROUND LEVEL A	
Operational	
AV	5
SRV	16



LEGEND:

- DEVELOPMENT FOOTPRINT
- CADASTRAL BOUNDARY
- EXTENT OF BRIDGE ROAD WORK

BIM 360:\NEW SYDNEY FISH MARKET\NSFM_RVT_AR001_Building.rvt 19/09/2019 12:39:42 AM

3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	16/04/19	ISSUE FOR 50% DD
F	18/04/19	ISSUE FOR 50% DD
G	27/08/19	ISSUED FOR REVIEW
H	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

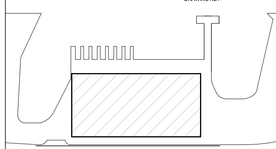
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



TRUE NORTH PROJECT NORTH

GRAPHIC SCALE

0 10000 25000

SCALE

As indicated@A1

STATUS

DRAWING

FLOOR PLAN GROUND

ISSUE

AR-S2-B10 L00-01 H

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 8 of 44

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

226800

10800 10800

108000

9000 9000 9000 9000 9000 9000 9000 9000 9000 9000 9000 9000

38800

N M L K J H G F E D C B A

OUTLINE OF THE ROOF ABOVE
FRAMELESS GLASS BALUSTRADE
NORTHERN STEPPED PROMENADE
EXTENT OF EXTERNAL CATERING AREAS
PUBLIC PROMENADE
RL + 9670
OPERABLE GLAZED FACADE
SEATING
ENTRY
ENCLOSED RETAIL
RETAIL ZONE
RETAIL ZONE RL + 9670
BOH (PLANT OVER)
LIFT - PASSENGER
LIFT - GOODS
LIFT - GOODS/PASSENGER
LIP
PUBLIC LIFT
LINE OF MEZZANINE SLAB ABOVE
OUTLINE OF MEZZANINE SLAB ABOVE
PUBLIC TRAVELATOR
GOODS HOSTS
GOODS PICK UP AREA
RL + 9670
WESTERN STEPPED PROMENADE
EASTERN STEPPED PROMENADE
RETAIL ZONE RL + 9400
RETAIL ZONE RL + 9670
BOH
VOID OVER
AUCTION HALL VOID
OPERABLE GLAZED FACADE
LOCAL PARK
FOR DETAILS AND LEVELS OF PUBLIC DOMAIN, REFER TO DRAWING S2-A20-L01-01
URBAN PARK
FOR DETAILS AND LEVELS OF PUBLIC DOMAIN, REFER TO DRAWING S2-A20-L01-01
SOUTHERN STEPPED PROMENADE
FRAMELESS GLAZED BALUSTRADE
GLAZED FACADE
GLAZED FACADE/ WIND SCREEN
GLAZED FACADE
FRAMELESS GLASS BALUSTRADE
BRIDGE ROAD

S2-C10 AAA-01
S2-D10 AAA-02
S2-C10 AAA-02

LEGEND:

- DEVELOPMENT FOOTPRINT
- CADASTRAL BOUNDARY
- EXTENT OF BRIDGE ROAD WORK

BIM 360://NEW SYDNEY FISH MARKET/NSFM_R/VT_AR001_Building.rvt 19/09/2019 12:40:30 AM

3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	16/04/19	ISSUE FOR 50% DD
F	18/04/19	ISSUE FOR 50% DD
G	27/08/19	ISSUED FOR REVIEW
H	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

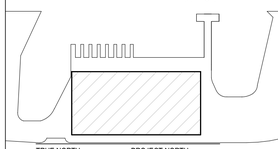
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



TRUE NORTH PROJECT NORTH

GRAPHIC SCALE

0 10000 25000

SCALE

As indicated@A1

STATUS

DRAWING

FLOOR PLAN UPPER GROUND

	ISSUE
AR-S2-B10 L01-01	H

NSW GOVERNMENT | Planning, Industry & Environment

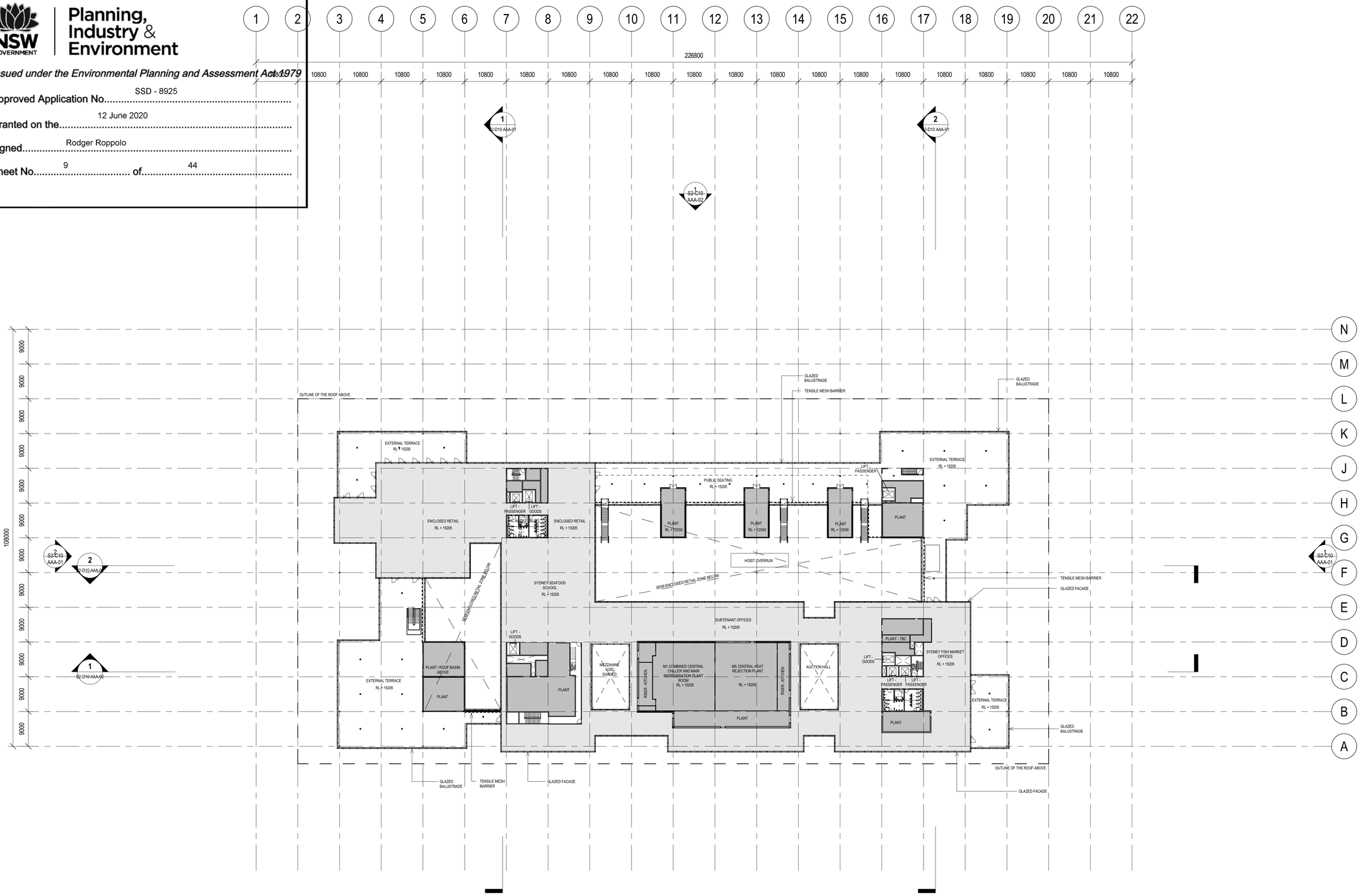
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the. 12 June 2020

Signed. Rodger Roppolo

Sheet No. 9 of 44



3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	16/04/19	ISSUE FOR 50% DD
F	18/04/19	ISSUE FOR 50% DD
G	27/08/19	ISSUED FOR REVIEW
H	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

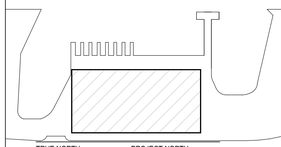
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



TRUE NORTH PROJECT NORTH

GRAPHIC SCALE

0 10000 25000

SCALE

1 : 500@A1

STATUS

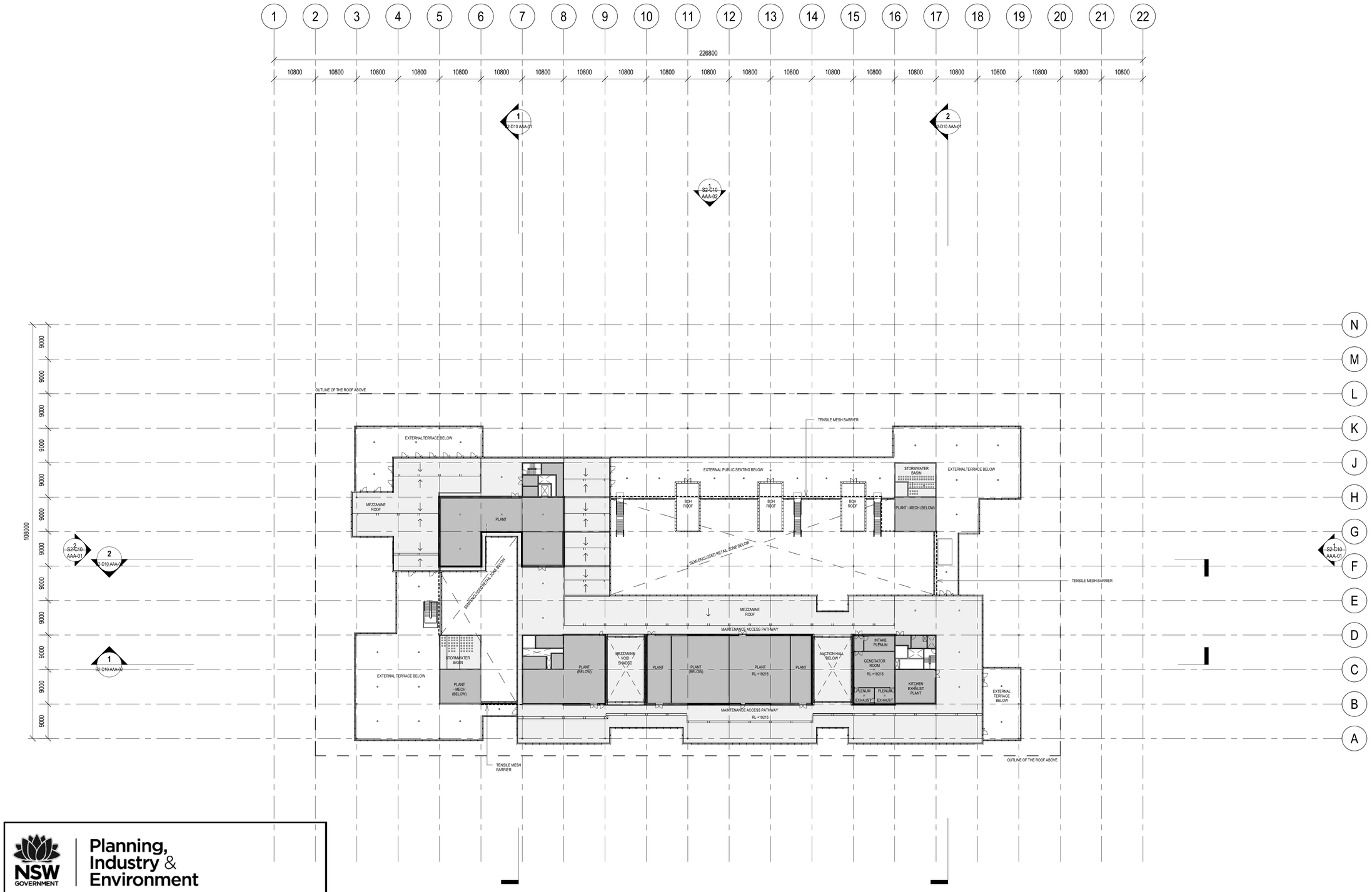
DRAWING

FLOOR PLAN MEZZANINE

ISSUE

AR-S2-B10 L02-01 H

BIM 360://NEW SYDNEY FISH MARKET/NSFM_RVT_AR001_Building.rvt 19/09/2019 12:41:05 AM



NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 10 of 44

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	16/04/19	ISSUE FOR 50% DD
F	18/04/19	ISSUE FOR 50% DD
G	27/08/19	ISSUED FOR REVIEW
H	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

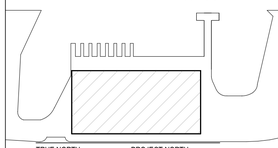
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



TRUE NORTH PROJECT NORTH

GRAPHIC SCALE

0 10000 25000

SCALE

1 : 500@A1

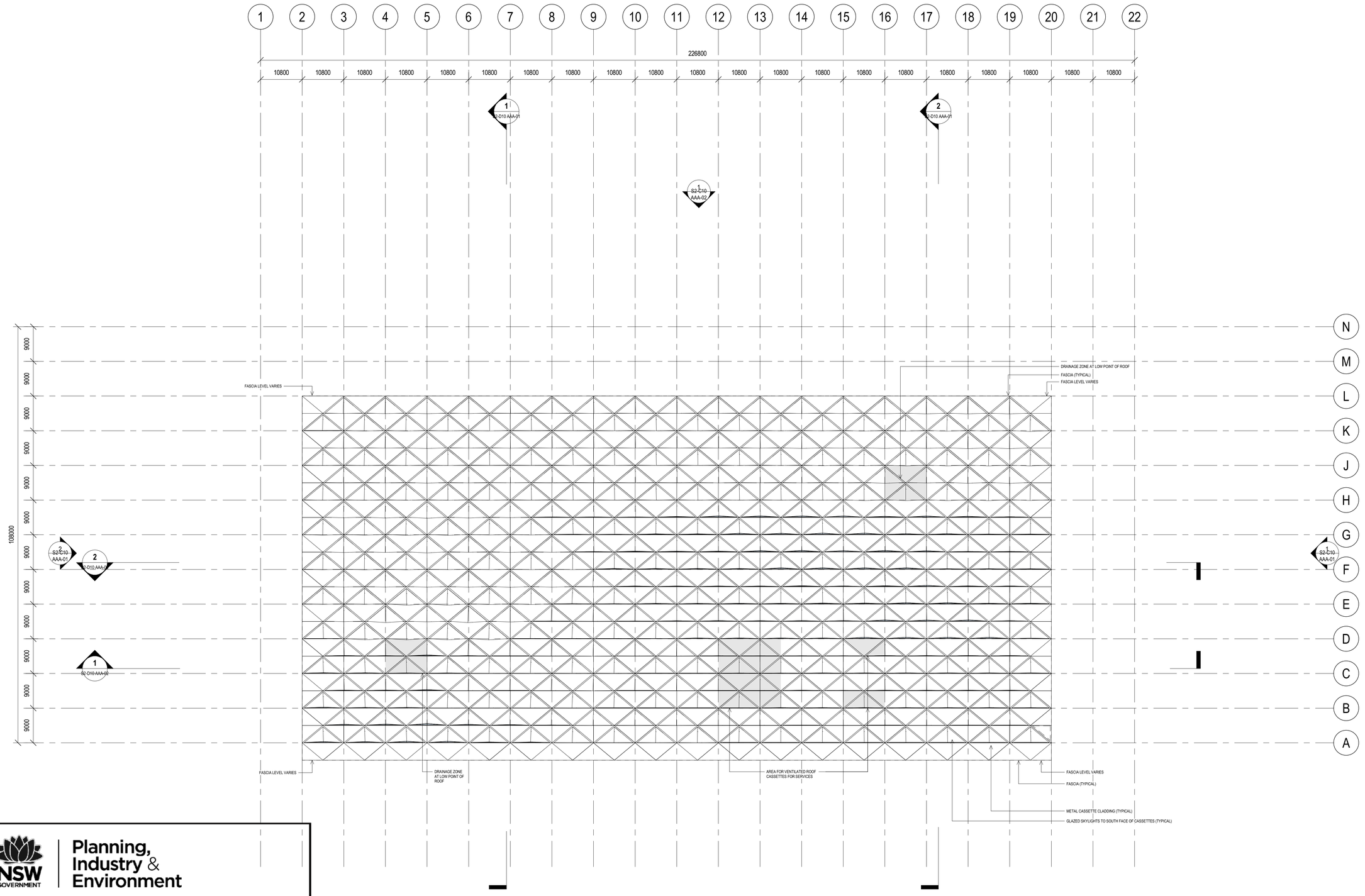
STATUS

DRAWING

MEZZANINE ROOF PLAN

ISSUE

AR-S2-B10 L03-01 H



NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the. 12 June 2020

Signed. Rodger Roppolo

Sheet No. 11 of 44

3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY
COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE
CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	16/04/19	ISSUE FOR 50% DD
F	18/04/19	ISSUE FOR 50% DD
G	27/08/19	ISSUED FOR REVIEW
H	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

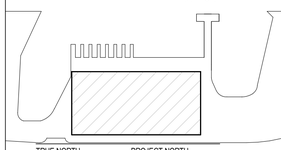
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



TRUE NORTH PROJECT NORTH

GRAPHIC SCALE
0 10000 25000
SCALE

1 : 500@A1

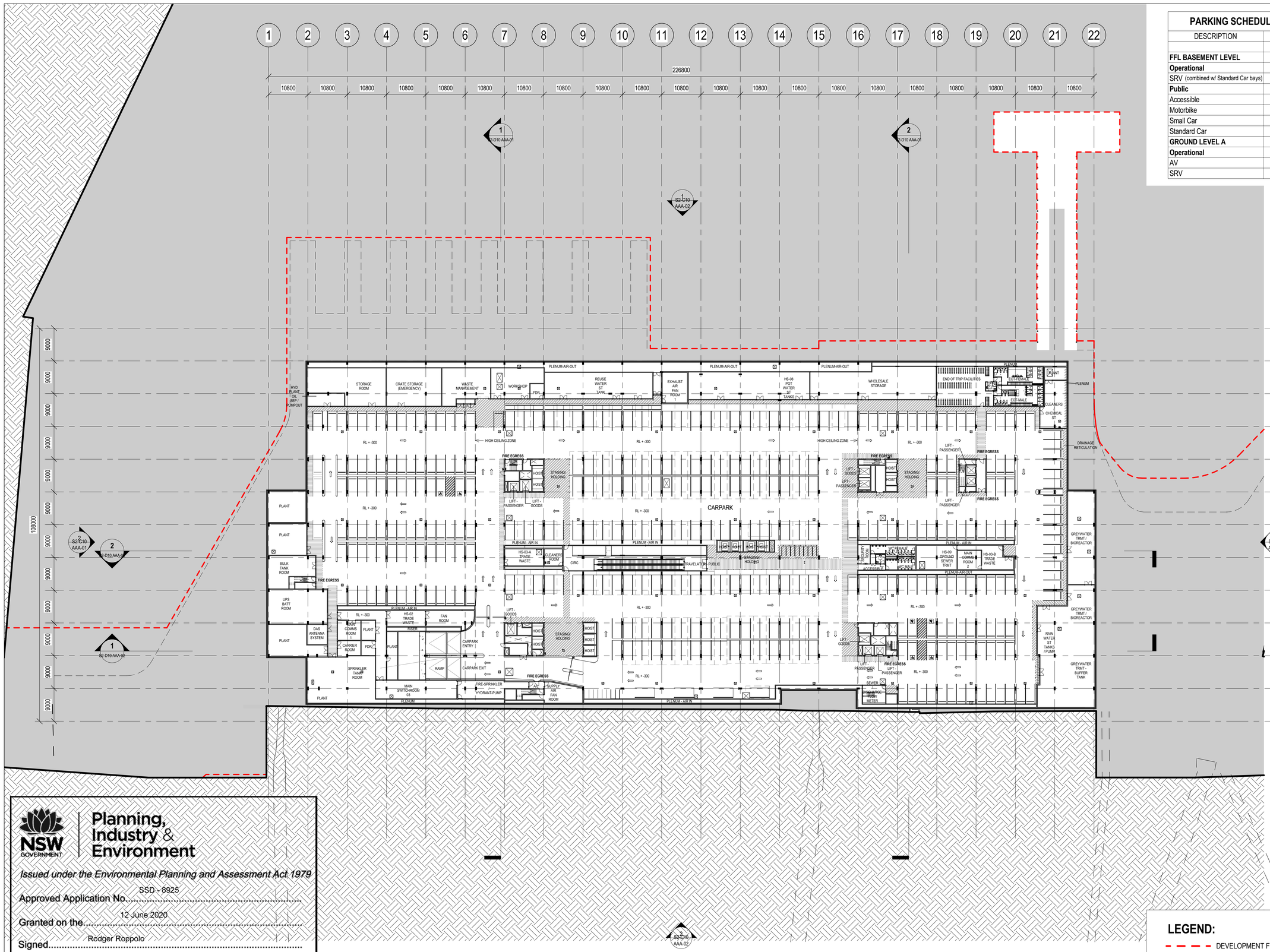
STATUS

DRAWING

ROOF PLAN

AR-S2-B10 L10-01 | ISSUE H

BIM 360://NEW SYDNEY FISH MARKET/NSFM_RVT_AR001_Building.rvt 19/09/2019 12:42:05 AM



PARKING SCHEDULE_DA

DESCRIPTION	COUNT
FFL BASEMENT LEVEL	
Operational	
SRV (combined w/ Standard Car bays)	138
Public	
Accessible	6
Motorbike	32
Small Car	9
Standard Car	383
GROUND LEVEL A	
Operational	
AV	5
SRV	16

Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed. Rodger Roppolo

Sheet No. 12 of 44

LEGEND:

- DEVELOPMENT FOOTPRINT
- CADASTRAL BOUNDARY
- EXTENT OF BRIDGE ROAD WORK

BIM 360://NEW SYDNEY FISH MARKET/NSFM_RVT_AR001_Building.rvt 19/09/2019 12:43:45 AM

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	16/04/19	ISSUE FOR 50% DD
F	18/04/19	ISSUE FOR 50% DD
G	27/08/19	ISSUED FOR REVIEW
H	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

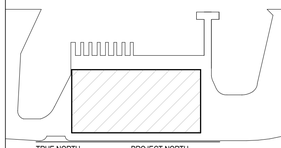
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



TRUE NORTH PROJECT NORTH

GRAPHIC SCALE

0 10000 25000

SCALE

As indicated@A1

STATUS

DRAWING

FLOOR PLAN BASEMENT

AR-S2-B10 LB1-01 | ISSUE H

NSW GOVERNMENT | Planning, Industry & Environment

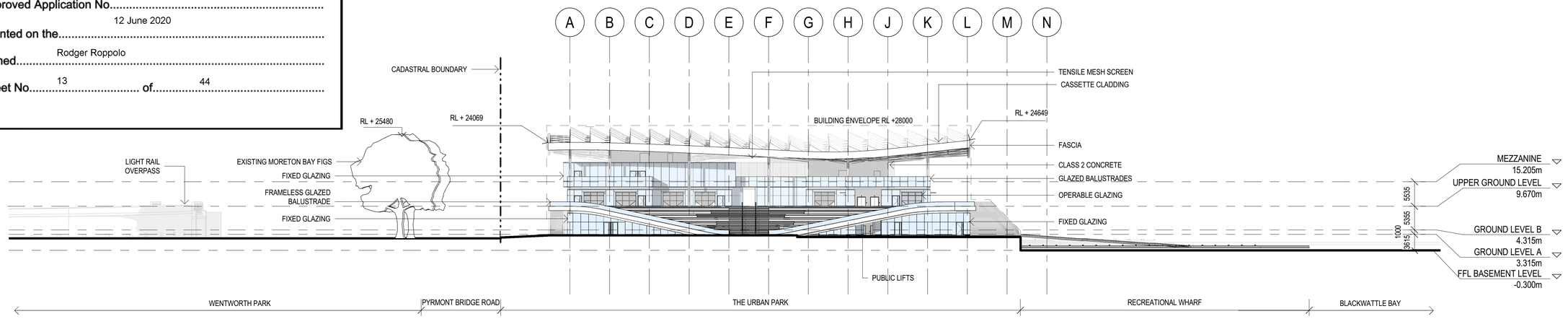
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

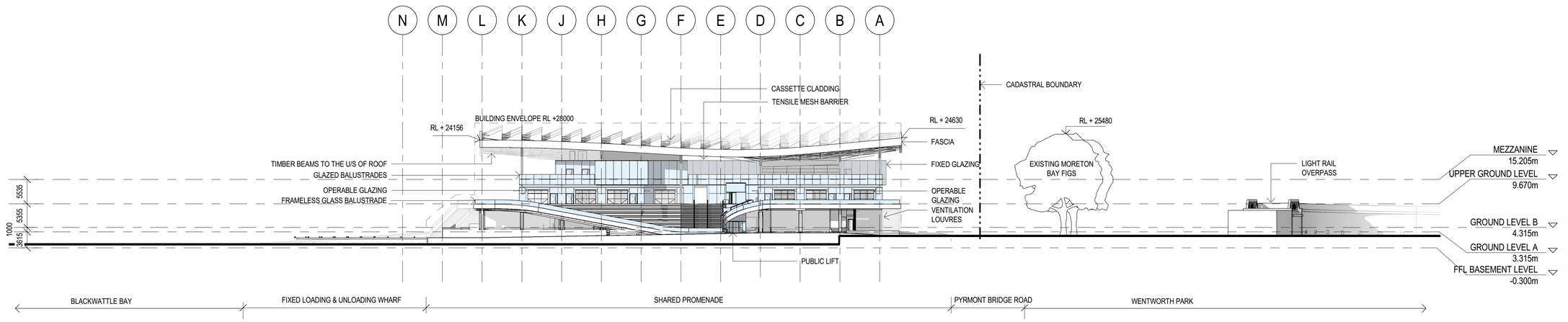
Granted on the. 12 June 2020

Signed. Rodger Roppolo

Sheet No. 13 of 44



1 S2 - EAST ELEVATION



2 S2 - WEST ELEVATION

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	16/04/19	ISSUE FOR 50% DD
F	18/04/19	ISSUE FOR 50% DD
G	27/08/19	ISSUED FOR REVIEW
H	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

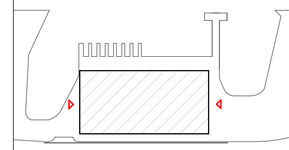
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



GRAPHIC SCALE

0 10000 25000

SCALE

1 : 500@A1

STATUS

DRAWING

EAST AND WEST ELEVATION

ISSUE

AR-S2-C10 AAA-01 H

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

SSD - 8925

Approved Application No......

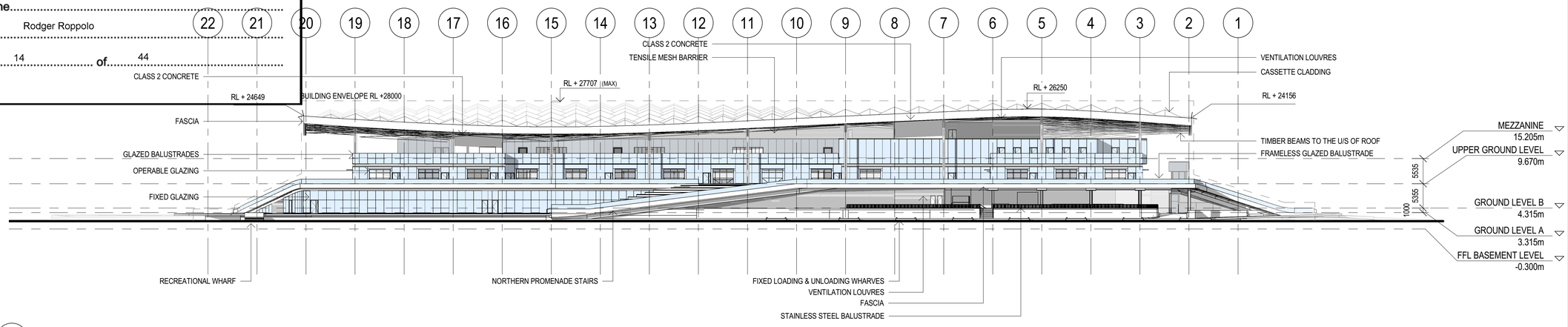
12 June 2020

Granted on the.....

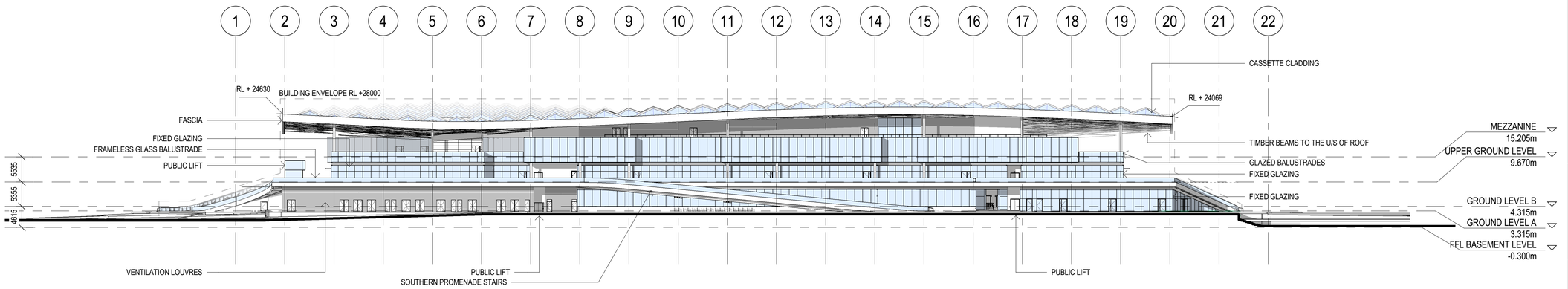
Rodger Roppolo

Signed.....

Sheet No......14..... **of**.....44.....



1 S2 - NORTH ELEVATION



2 S2 - SOUTH ELEVATION

3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	16/04/19	ISSUE FOR 50% DD
F	18/04/19	ISSUE FOR 50% DD
G	27/08/19	ISSUED FOR REVIEW
H	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

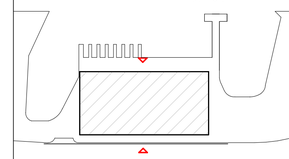
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



GRAPHIC SCALE

0 10000 25000

SCALE

1 : 500@A1

STATUS

DRAWING

NORTH AND SOUTH ELEVATION

ISSUE

AR-S2-C10 AAA-02 | H

BIM 360:/NEW SYDNEY FISH MARKET/NSFM_RVT_AR001_Building.rvt 19/09/2019 12:46:25 AM

NSW GOVERNMENT | Planning, Industry & Environment

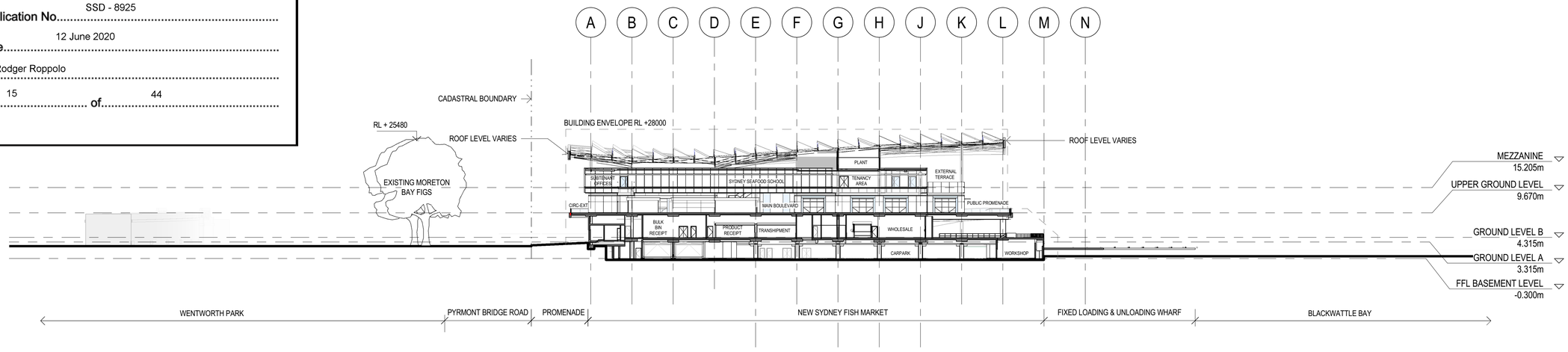
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 15 of 44



1 S2_SECTION BB



2 S2_SECTION DD

BIM 360:/NEW SYDNEY FISH MARKET/NSFM_RVT_AR001_Building.rvt 19/09/2019 12:47:10 AM

3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	16/04/19	ISSUE FOR 50% DD
F	18/04/19	ISSUE FOR 50% DD
G	27/08/19	ISSUED FOR REVIEW
H	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

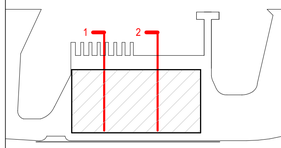
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



GRAPHIC SCALE

0 10000 25000

SCALE

1 : 500@A1

STATUS

DRAWING

CROSS SECTIONS

	ISSUE
AR-S2-D10 AAA-01	H

NSW GOVERNMENT | Planning, Industry & Environment

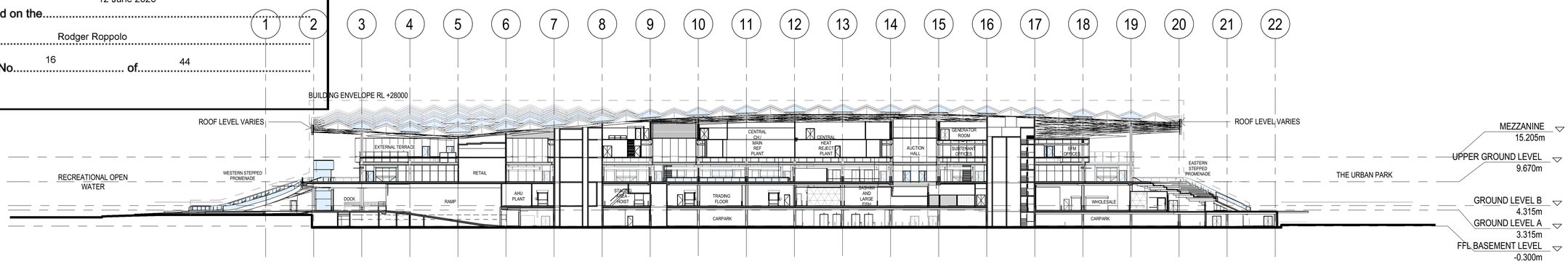
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

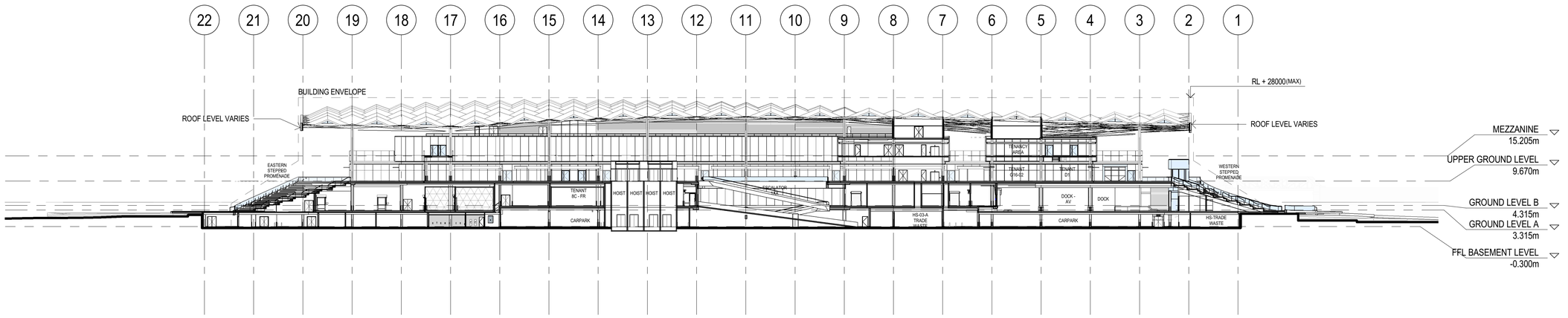
Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 16 of 44



1 S2_SECTION AA



2 S2_SECTION CC

BIM 360://NEW SYDNEY FISH MARKET/NSFM_RVT_AR001_Building.rvt 19/09/2019 12:48:01 AM

3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	16/04/19	ISSUE FOR 50% DD
F	18/04/19	ISSUE FOR 50% DD
G	27/08/19	ISSUED FOR REVIEW
H	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

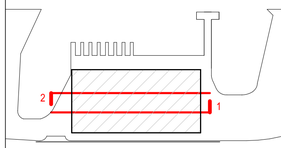
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



GRAPHIC SCALE

0 10000 25000

SCALE

1 : 500@A1

STATUS

DRAWING

LONG SECTIONS

ISSUE

AR-S2-D10 AAA-02 H

A B C

GLAZING
MEMBRANE LINED CASSETTE CANOPY
FASCIA
TIMBER BEAMS
MAINTENACE ACCESSWAY
METAL ROOF
RL + 19590
FIXED GLAZING
OFFICE
INTERNAL GLAZED FACADE
MEZZANINE 15.205m
STEEL CRUCIFORM COLUMN
FIXED GLAZING/WIND SCREEN
PUBLIC PROMENADE
RL + 10670
FRAMELESS GLASS BALUSTRADE WITH STANCHIONS AND HANDRAILS
UPPER GROUND LEVEL 9.670m
FASCIA
METAL PANELS TO EXTERNAL SOFFIT
LOUVRES
FIXED GLAZING
BUYERS' ROOM
TRIPLE HEIGHT VOLUME
5535
6355
SHARED PEDESTRIAN WALKWAY
SOUTHERN PROMENADE STAIRS
GROUND LEVEL B 4.315m
PRECAST CONCRETE PLINTH
PUBLIC DOMAIN LEVEL VARIES (REFER TO LANDSCAPE ARCHITECT DRAWING)
GROUND LEVEL A 3.315m
EXISTING SITE LEVEL (VARIES)
APPROXIMATE LOCATION OF SEA WALL
SUPPLY INTAKE PLENUM
BASEMENT PARKING
WATER LEVEL VARIES
FFL BASEMENT LEVEL -0.300m

NSW GOVERNMENT
Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

SSD - 8925

Approved Application No.....

12 June 2020

Granted on the.....

Signed.....Rodger Roppolo

Sheet No.....17..... of.....44.....

3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	16/04/19	ISSUE FOR 50% DD
F	18/04/19	ISSUE FOR 50% DD
G	27/08/19	ISSUED FOR REVIEW
H	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

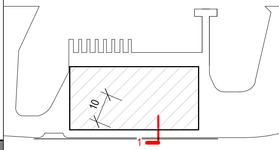
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



GRAPHIC SCALE

0 1000 2500

SCALE

1 : 50@A1

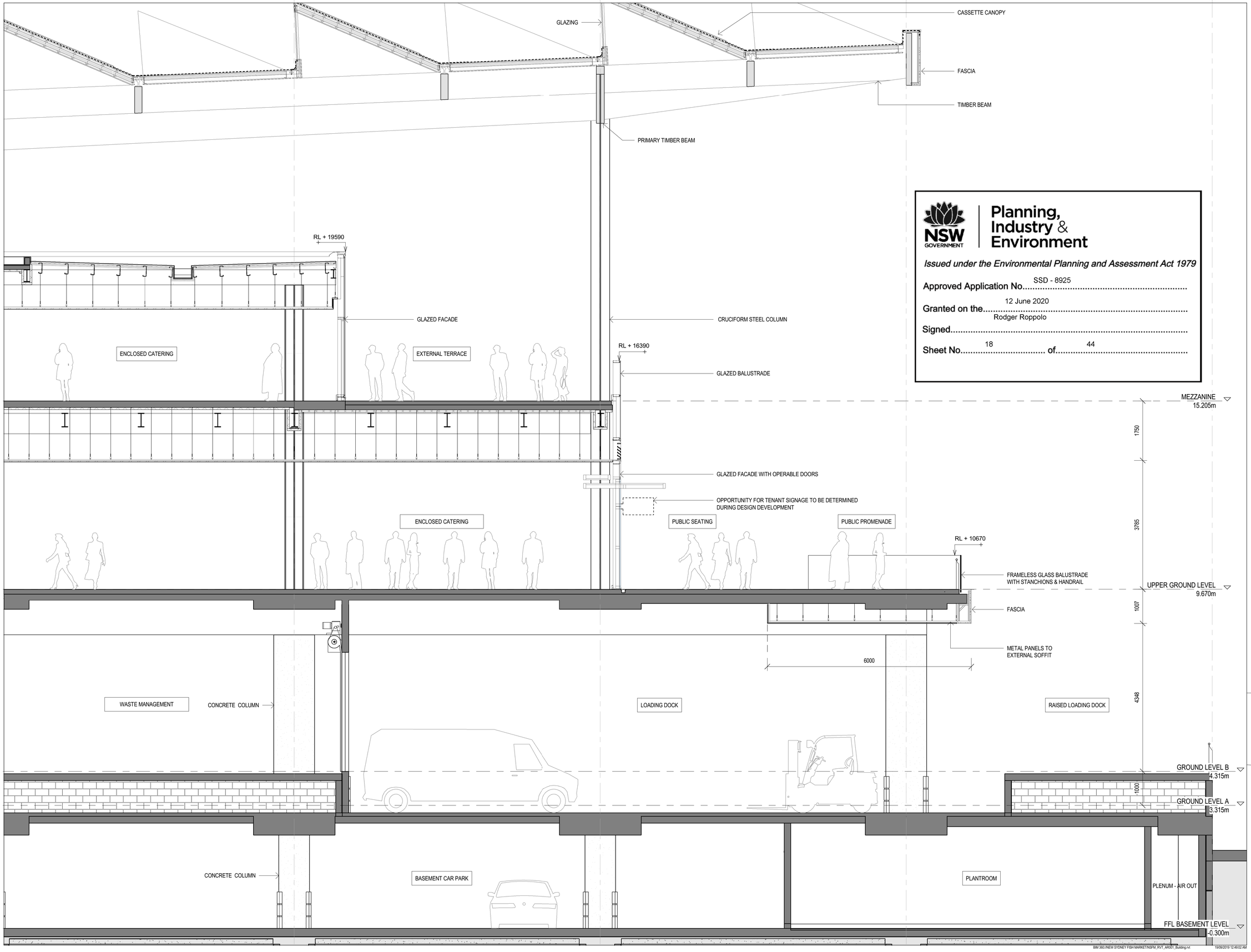
STATUS

DRAWING

AUCTION & OFFICE SECTION

AR-S2-E43 AAA-01 | ISSUE H

J K L M



BIM 360:\NEW SYDNEY FISH MARKET\NSFM_RVT_AR001_Building.rvt 19/09/2019 12:49:02 AM

NSW GOVERNMENT
Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 18 of 44

3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY

COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S. UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE

CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	16/04/19	ISSUE FOR 50% DD
F	18/04/19	ISSUE FOR 50% DD
G	27/08/19	ISSUED FOR REVIEW
H	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

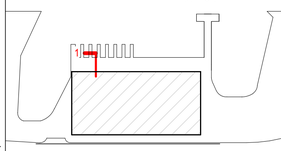
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



GRAPHIC SCALE

0 1000 2500

SCALE

1 : 50@A1

STATUS

DRAWING

FOOD & BEVERAGE SECTION

AR-S2-E43 AAA-02 | ISSUE H

J K L M

GLAZING
MEMBRANE LINED CASSETTE CANOPY
RL VARIES
FASCIA
CLASS 2 CONCRETE CORE
TIMBER BEAM
CRUCIFORM STEEL COLUMN
EXTERNAL TERRACE
EXTERNALTERRACE
RL + 16390
GLAZED BALUSTRADE
MEZZANINE
15.205m
GLAZED FACADE WITH OPERABLE DOORS
OPPORTUNITY FOR TENANT SIGNAGE TO BE DETERMINED
DURING DESIGN DEVELOPMENT
CLASS 2 CONCRETE CORE
ENCLOSED CATERING
PUBLIC SEATING
PUBLIC PROMENADE
FRAMELESS GLASS BALUSTRADE
WITH STANCHIONS & HANDRAILS
FASCIA
RL + 10670
5535
UPPER GROUND LEVEL
9.670m
GRC PANELS EXTERNAL SOFFIT
GLASS LOUVRE FACADE
6355
WHOLESALES
OPERATIONS
WHOLESALE STAGING
CHILLER ROOM
EXHIBITION
NORTHERN PROMENADE STAIR
GROUND LEVEL B
4.315m
GROUND LEVEL A
3.315m
CONCRETE COLUMN
BASEMENT PARKING
PLANT
PLANT
3615
PLENUM
WATER LEVEL
VARIES
FFL BASEMENT LEVEL
-0.300m

BIM 360:\NEW SYDNEY FISH MARKET\NSFM_RVT_AR001_Building.rvt 19/09/2019 12:49:36 AM

NSW GOVERNMENT
Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 19 of 44

3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
TEL +61 2 8297 7200
WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
SYDNEY, NSW 2000

INTELLECTUAL PROPERTY
COPYRIGHT BVN ARCHITECTURE PTY LIMITED & 3XN A/S.
UNLESS OTHERWISE AGREED IN WRITING,ALL RIGHTS TO THIS DOCUMENT ARE SUBJECT TO PAYMENT IN FULL OF ALL BVN & 3XN A/S CHARGES.THIS DOCUMENT MAY ONLY BE USED FOR THE EXPRESS PURPOSE AND PROJECT FOR WHICH IT HAS BEEN CREATED AND DELIVERED, AS NOTIFIED IN WRITING BY BVN & 3XN A/S. AND THIS DOCUMENT MAY NOT BE OTHERWISE USED, OR COPIED. ANY UNAUTHORISED USE OF THIS DOCUMENT IS AT THE USER'S SOLE RISK AND WITHOUT LIMITING BVN'S & 3XN A/S' RIGHTS THE USER RELEASES AND INDEMNIFIES BVN & 3XN A/S FROM AND AGAINST ALL LOSS SO ARISING.

NOTE
CONTRACTOR TO CHECK AND VERIFY ALL DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK OR PREPARATION OF SHOP DRAWINGS. DO NOT SCALE THIS DRAWING

ISSUE	DATE	FOR
A	12/09/18	ISSUE FOR SSD-DA
B	12/11/19	ISSUE FOR SSD-DA
C	22/03/19	ISSUE FOR SSD-DA
D	15/04/19	ISSUE FOR SSD-DA
E	16/04/19	ISSUE FOR 50% DD
F	18/04/19	ISSUE FOR 50% DD
G	27/08/19	ISSUED FOR REVIEW
H	18/09/19	ISSUE FOR SSDA

CONSULTANT

STRUCTURAL - MOTT MACDONALD
TEL +61 (0) 2 9098 6800
CONSULTANT

LANDSCAPE - ASPECT STUDIO
TEL +61 (0) 2 9699 7182
CONSULTANT

BUILDING SERVICES - AECOM
TEL +61 (0) 2 8934 0000
CONSULTANT

BBC PLANNING CONSULTANTS
TEL +61 (0) 2 9211 4099
CONSULTANT

FACADE ENGINEER - APEX
TEL +61 (0) 2 8916 6264
CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

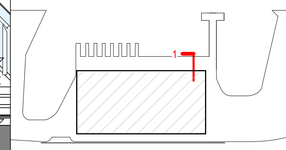
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



GRAPHIC SCALE
0 1000 2500
SCALE
1 : 50@A1
STATUS

DRAWING
WHOLESALE & CATERING SECTION

AR-S2-E43 AAA-04 | ISSUE H

PLAN FORM 2 (A2) WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION Sheet 1 of 2 sheets

NSW GOVERNMENT
Planning, Industry & Environment

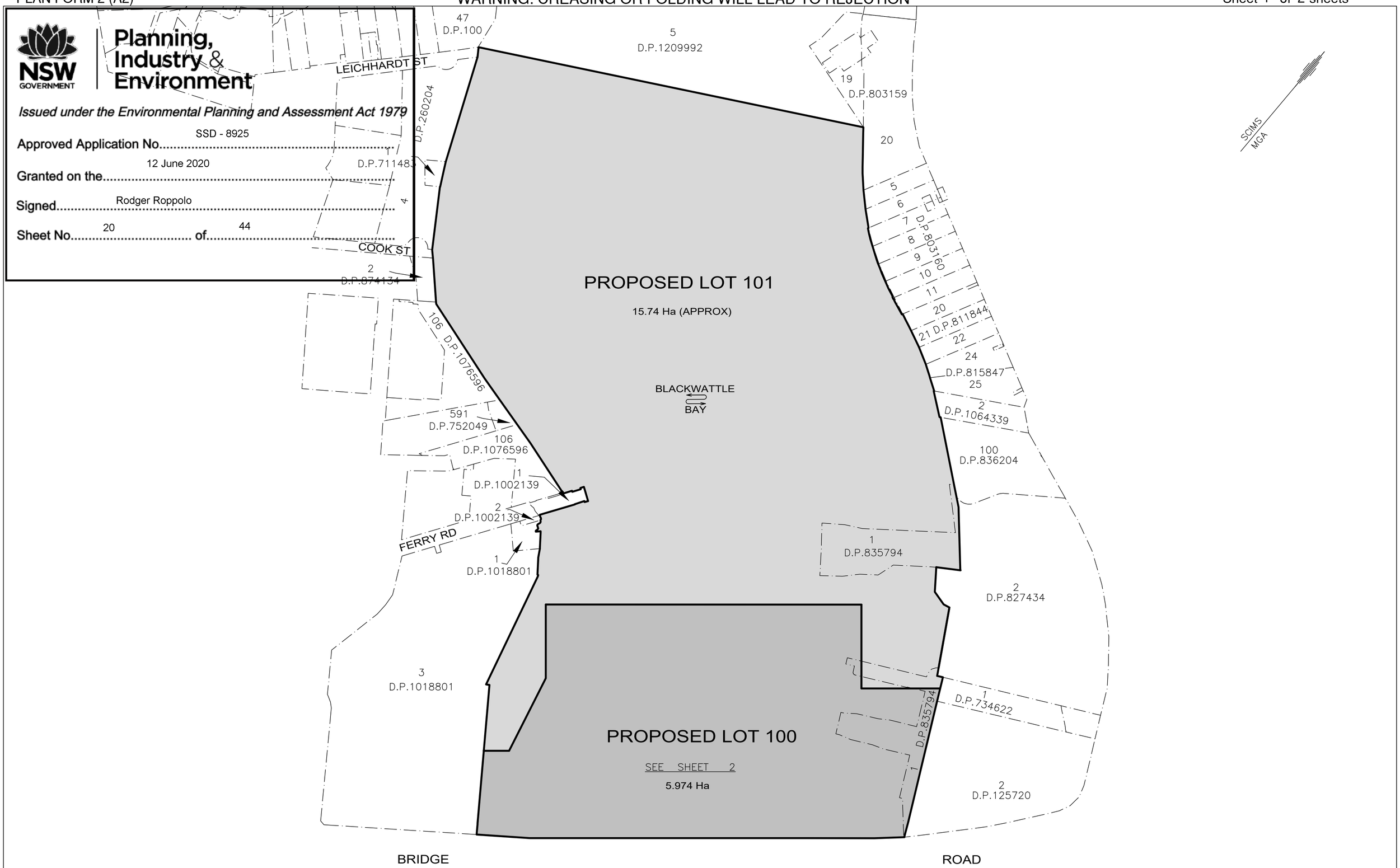
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 20 of 44



THIS PLAN HAS BEEN PREPARED FOR CONCEPT PURPOSES ONLY.
ALL DIMENSIONS AND AREAS ARE APPROXIMATE ONLY AND ARE SUBJECT TO SURVEY.

SURVEYOR	PLAN HEADING		REGISTERED	
Name: ROBERT S DAVIDSON Date: Reference: 78527	PLAN OF ACQUISITION OF LOTS 3, 4 & 5 D.P.1064339, LOT 1 D.P.835794 & LOT 107 D.P.1076596 CROWN PLAN	LGA: SYDNEY & UNINCORPORATED Locality: GLEBE & PYRMONT Reduction Ratio: 1:2000 Lengths are in metres.		DRAFT 26/09/2019

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 21 of 44

106
D.P.1076596

1
D.P.1002139

2
D.P.1002139

1
D.P.1018801

PROPOSED LOT 101

15.74 Ha (APPROX)

SCIMS MGA

100
D.P.836204

1
D.P.835794

2
D.P.827434

BLACKWATTLE BAY

260.1

PROPOSED LOT 100

5.97 Ha

60.75

69.095

52.715

PROPOSED DEVELOPMENT FOOTPRINT

3
D.P.1018801

66.98

20.965

69.275

EXISTING WHARF

EXISTING WHARF

1
D.P.734622

D.P.835794

113.31

2
D.P.125720

1

9.95

2.86

BRIDGE

ROAD

THIS PLAN HAS BEEN PREPARED FOR CONCEPT PURPOSES ONLY.
ALL DIMENSIONS AND AREAS ARE APPROXIMATE ONLY AND ARE SUBJECT TO SURVEY.

SURVEYOR	PLAN HEADING		REGISTERED	
Name: ROBERT S DAVIDSON Date: Reference: 78527	PLAN OF ACQUISITION OF LOTS 3, 4 & 5 D.P.1064339, LOT 1 D.P.835794 & LOT 107 D.P.1076596 CROWN PLAN	LGA: SYDNEY & UNINCORPORATED Locality: GLEBE & PYRMONT Reduction Ratio: 1:1000 Lengths are in metres.		DRAFT 26/09/2019

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 22 of 44

106
D.P.1076596

1
D.P.1002139

2
D.P.1002139

FERRY RD

1
D.P.1018801

3
D.P.1018801

101
D.P.

100
D.P.836204

1
D.P.835794

2
D.P.827434

SCIMS
MGA

BLACKWATTLE
BAY

1001 - PREMISES
1002 - LOADING WHARF
1003 - RECREATIONAL WHARF
1004 - RESIDUE
1005 - PREMISES RESIDUE
1006 - LOADING WHARF RESIDUE
1007 - RECREATIONAL WHARF RESIDUE

1001 - 1007

260.1

60.75

66.98

20.965

69.275

PROPOSED BUILDING
2 STOREY AND 1 BASEMENT LEVEL

69.095

1 D.P.835794

52.715

1
D.P.734622

2
D.P.125720

113.31

16.18

27.815

283.83

24.64

9.95

2.86

BRIDGE

ROAD

THIS PLAN HAS BEEN PREPARED FOR
CONCEPT PURPOSES ONLY.
ALL DIMENSIONS AND AREAS ARE APPROXIMATE
ONLY AND ARE SUBJECT TO SURVEY.

SURVEYOR Name: ROBERT S DAVIDSON Date: Reference: 78527STRATUM	PLAN HEADING PLAN OF SUBDIVISION OF PROPOSED LOT 100	LGA: SYDNEY & UNINCORPORATED Locality: GLEBE & PYRMONT Reduction Ratio: 1:1000 Lengths are in metres.	REGISTERED	DRAFT 30/09/2019

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 23 of 44

106
D.P.1076596

1
D.P.1002139

2
D.P.1002139

FERRY RD

1
D.P.1018801

101
D.P.

BLACKWATTLE BAY

SCIMS MGA

100
D.P.836204

1
D.P.835794

2
D.P.827434

1001 - PREMISES
1002 - LOADING WHARF
1003 - RECREATIONAL WHARF
1004 - RESIDUE
1005 - PREMISES RESIDUE
1006 - LOADING WHARF RESIDUE
1007 - RECREATIONAL WHARF RESIDUE

3
D.P.1018801

PT 1004

PT 1007

PT 1006

PT 1005

1 D.P.835794

1
D.P.734622

2
D.P.125720

LOT 1004 IS LIMITED IN HEIGHT TO THE SLAB OF THE FLOOR ABOVE & IS UNLIMITED IN DEPTH

LOT 1005 IS LIMITED IN HEIGHT TO THE SLAB OF THE FLOOR ABOVE & IS UNLIMITED IN DEPTH

LOT 1006 IS LIMITED IN HEIGHT TO THE SLAB OF THE FLOOR ABOVE & IS UNLIMITED IN DEPTH

LOT 1007 IS LIMITED IN HEIGHT TO THE SLAB OF THE FLOOR ABOVE & IS UNLIMITED IN DEPTH

BRIDGE

ROAD

THIS PLAN HAS BEEN PREPARED FOR CONCEPT PURPOSES ONLY.
ALL DIMENSIONS AND AREAS ARE APPROXIMATE ONLY AND ARE SUBJECT TO SURVEY.

SURVEYOR Name: ROBERT S DAVIDSON Date: Reference: 78527STRATUM	PLAN HEADING PLAN OF SUBDIVISION OF PROPOSED LOT 100	LGA: SYDNEY & UNINCORPORATED Locality: GLEBE & PYRMONT Reduction Ratio: 1:1000 Lengths are in metres.	REGISTERED	DRAFT 30/09/2019

NSW GOVERNMENT | Planning, Industry & Environment

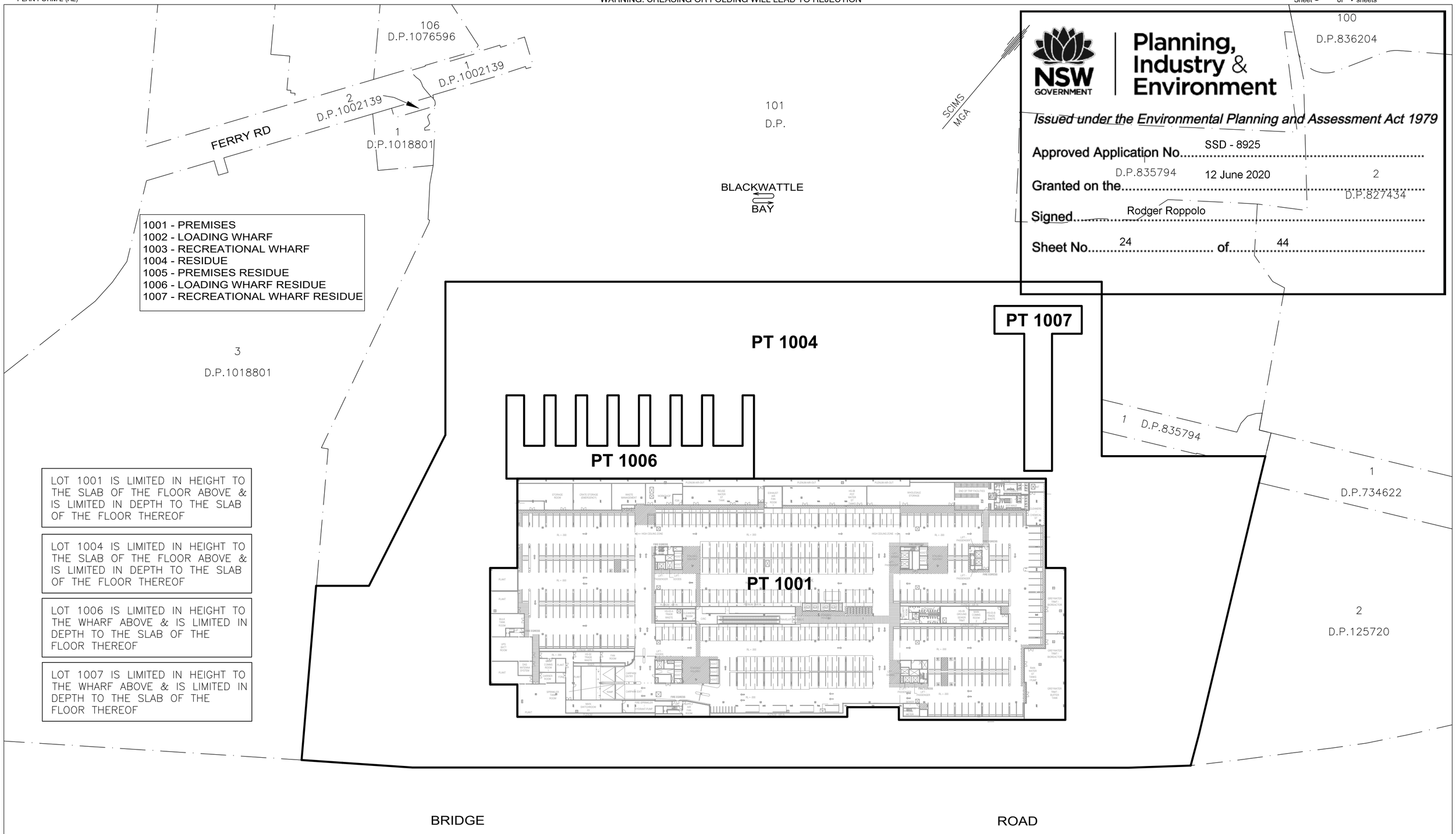
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 24 of 44



BASEMENT FLOOR

THIS PLAN HAS BEEN PREPARED FOR CONCEPT PURPOSES ONLY.
ALL DIMENSIONS AND AREAS ARE APPROXIMATE ONLY AND ARE SUBJECT TO SURVEY.

SURVEYOR	PLAN HEADING	LGA: SYDNEY & UNINCORPORATED	REGISTERED	
Name: ROBERT S DAVIDSON Date: Reference: 78527STRATUM	PLAN OF SUBDIVISION OF PROPOSED LOT 100	Locality: GLEBE & PYRMONT Reduction Ratio: 1:1000 Lengths are in metres.		DRAFT 30/09/2019

106
D.P.1076596

1
D.P.1002139

2
D.P.1002139

FERRY RD

1
D.P.1018801

101
D.P.

BLACKWATTLE BAY

SCIMS MGA

100
D.P.836204

D.P.835794

2
D.P.827434

1001 - PREMISES
1002 - LOADING WHARF
1003 - RECREATIONAL WHARF
1004 - RESIDUE
1005 - PREMISES RESIDUE
1006 - LOADING WHARF RESIDUE
1007 - RECREATIONAL WHARF RESIDUE

3
D.P.1018801

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 25 of 44

PT 1004

PT 1003

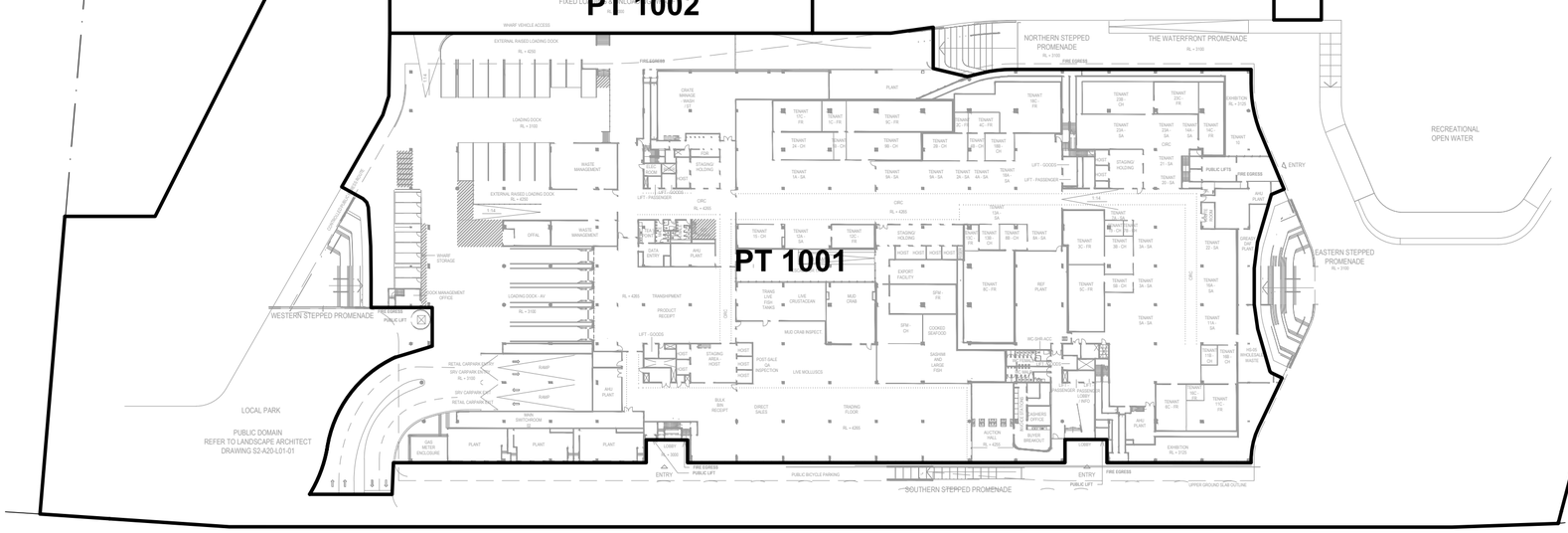
PT 1002

PT 1001

1
D.P.835794

1
D.P.734622

2
D.P.125720



BRIDGE

ROAD

GROUND FLOOR

LOT 1001 IS LIMITED IN HEIGHT TO THE SLAB OF THE FLOOR ABOVE & IS LIMITED IN DEPTH TO THE SLAB OF THE FLOOR THEREOF

LOT 1002 IS LIMITED IN HEIGHT TO THE SLAB OF THE FLOOR ABOVE & IS LIMITED IN DEPTH TO THE WHARF THEREOF

LOT 1003 IS LIMITED IN HEIGHT TO THE SLAB OF THE FLOOR ABOVE & IS LIMITED IN DEPTH TO THE WHARF THEREOF

LOT 1004 IS LIMITED IN HEIGHT TO THE SLAB OF THE FLOOR ABOVE & IS LIMITED IN DEPTH TO THE SLAB OF THE FLOOR THEREOF

THIS PLAN HAS BEEN PREPARED FOR CONCEPT PURPOSES ONLY.
ALL DIMENSIONS AND AREAS ARE APPROXIMATE ONLY AND ARE SUBJECT TO SURVEY.

SURVEYOR	PLAN HEADING	LGA: SYDNEY & UNINCORPORATED	REGISTERED	
Name: ROBERT S DAVIDSON Date: Reference: 78527STRATUM	PLAN OF SUBDIVISION OF PROPOSED LOT 100	Locality: GLEBE & PYRMONT Reduction Ratio: 1:1000 Lengths are in metres.		DRAFT 30/09/2019

106
D.P.1076596

1
D.P.1002139

2
D.P.1002139

FERRY RD

1
D.P.1018801

3
D.P.1018801

101
D.P.

BLACKWATTLE
BAY

SCIMS
MGA

100
D.P.836204

D.P.835794

2
D.P.827434

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 26 of 44

1001 - PREMISES
1002 - LOADING WHARF
1003 - RECREATIONAL WHARF
1004 - RESIDUE
1005 - PREMISES RESIDUE
1006 - LOADING WHARF RESIDUE
1007 - RECREATIONAL WHARF RESIDUE

LOT 1001 IS LIMITED IN HEIGHT TO THE SLAB OF THE FLOOR ABOVE & IS LIMITED IN DEPTH TO THE SLAB OF THE FLOOR THEREOF

LOT 1004 IS LIMITED IN HEIGHT TO THE SLAB OF THE FLOOR ABOVE & IS LIMITED IN DEPTH TO THE SLAB OF THE FLOOR THEREOF

LOT 1006 IS LIMITED IN HEIGHT TO THE SLAB OF THE FLOOR ABOVE & IS LIMITED IN DEPTH TO THE SLAB OF THE FLOOR THEREOF

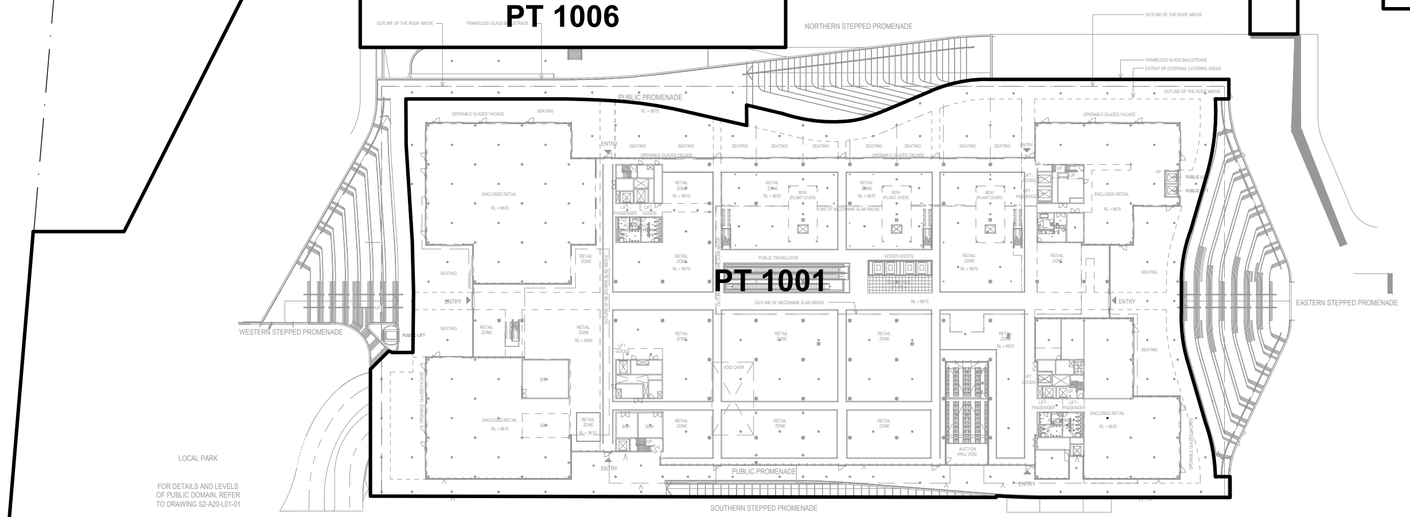
LOT 1007 IS LIMITED IN HEIGHT TO THE SLAB OF THE FLOOR ABOVE & IS LIMITED IN DEPTH TO THE SLAB OF THE FLOOR THEREOF

PT 1004

PT 1007

PT 1006

PT 1001



1
D.P.734622

2
D.P.125720

BRIDGE

ROAD

UPPER GROUND FLOOR

THIS PLAN HAS BEEN PREPARED FOR CONCEPT PURPOSES ONLY.
ALL DIMENSIONS AND AREAS ARE APPROXIMATE ONLY AND ARE SUBJECT TO SURVEY.

SURVEYOR Name: ROBERT S DAVIDSON Date: Reference: 78527STRATUM	PLAN HEADING PLAN OF SUBDIVISION OF PROPOSED LOT 100	LGA: SYDNEY & UNINCORPORATED Locality: GLEBE & PYRMONT Reduction Ratio: 1:1000 Lengths are in metres.	REGISTERED	DRAFT 30/09/2019

106
D.P.1076596

1
D.P.1002139

2
D.P.1002139

FERRY RD

1
D.P.1018801

1001 - PREMISES
1002 - LOADING WHARF
1003 - RECREATIONAL WHARF
1004 - RESIDUE
1005 - PREMISES RESIDUE
1006 - LOADING WHARF RESIDUE
1007 - RECREATIONAL WHARF RESIDUE

3
D.P.1018801

101
D.P.

BLACKWATTLE
BAY

SCIMS
MGA

100
D.P.836204

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

D.P.835794 — 12 June 2020 — 2 D.P.827434

Granted on the

Signed. Rodger Roppolo

Sheet No. 27 of 44

PT 1004

PT 1007

PT 1006

PT 1001

1
D.P.835794

1
D.P.734622

2
D.P.125720

LOT 1004 IS UNLIMITED IN HEIGHT & IS LIMITED IN DEPTH TO THE SLAB OF THE FLOOR THEREOF

LOT 1001 IS LIMITED IN HEIGHT TO THE CEILING ABOVE & IS LIMITED IN DEPTH TO THE SLAB OF THE FLOOR THEREOF

LOT 1006 IS UNLIMITED IN HEIGHT & IS LIMITED IN DEPTH TO THE SLAB OF THE FLOOR THEREOF

LOT 1007 IS UNLIMITED IN HEIGHT & IS LIMITED IN DEPTH TO THE SLAB OF THE FLOOR THEREOF

SSD - 8925

BRIDGE

ROAD

MEZZANINE FLOOR

THIS PLAN HAS BEEN PREPARED FOR CONCEPT PURPOSES ONLY.
ALL DIMENSIONS AND AREAS ARE APPROXIMATE ONLY AND ARE SUBJECT TO SURVEY.

SURVEYOR	PLAN HEADING	LGA: SYDNEY & UNINCORPORATED	REGISTERED	
Name: ROBERT S DAVIDSON Date: Reference: 78527STRATUM	PLAN OF SUBDIVISION OF PROPOSED LOT 100	Locality: GLEBE & PYRMONT Reduction Ratio: 1:1000 Lengths are in metres.		DRAFT 30/09/2019

106
D.P.1076596

1
D.P.1002139

2
D.P.1002139

FERRY RD

1
D.P.1018801

3
D.P.1018801

101
D.P.

BLACKWATTLE BAY

SCIMS MGA

100
D.P.836204

2
D.P.827434

1
D.P.835794

1
D.P.734622

2
D.P.125720

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 28 of 44

1001 - PREMISES
1002 - LOADING WHARF
1003 - RECREATIONAL WHARF
1004 - RESIDUE
1005 - PREMISES RESIDUE
1006 - LOADING WHARF RESIDUE
1007 - RECREATIONAL WHARF RESIDUE

PT 1004

PT 1007

PT 1006

PT 1005

LOT 1004 IS UNLIMITED IN HEIGHT & IS LIMITED IN DEPTH TO THE CEILING OF THE FLOOR BELOW

LOT 1005 IS UNLIMITED IN HEIGHT & IS LIMITED IN DEPTH TO THE CEILING OF THE FLOOR BELOW

LOT 1006 IS UNLIMITED IN HEIGHT & IS LIMITED IN DEPTH TO THE CEILING OF THE FLOOR BELOW

LOT 1007 IS UNLIMITED IN HEIGHT & IS LIMITED IN DEPTH TO THE CEILING OF THE FLOOR BELOW

BRIDGE

ROAD

ROOF LEVEL

THIS PLAN HAS BEEN PREPARED FOR CONCEPT PURPOSES ONLY.
ALL DIMENSIONS AND AREAS ARE APPROXIMATE ONLY AND ARE SUBJECT TO SURVEY.

SURVEYOR Name: ROBERT S DAVIDSON Date: Reference: 78527STRATUM	PLAN HEADING PLAN OF SUBDIVISION OF PROPOSED LOT 100	LGA: SYDNEY & UNINCORPORATED Locality: GLEBE & PYRMONT Reduction Ratio: 1:1000 Lengths are in metres.	REGISTERED	DRAFT 30/09/2019

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

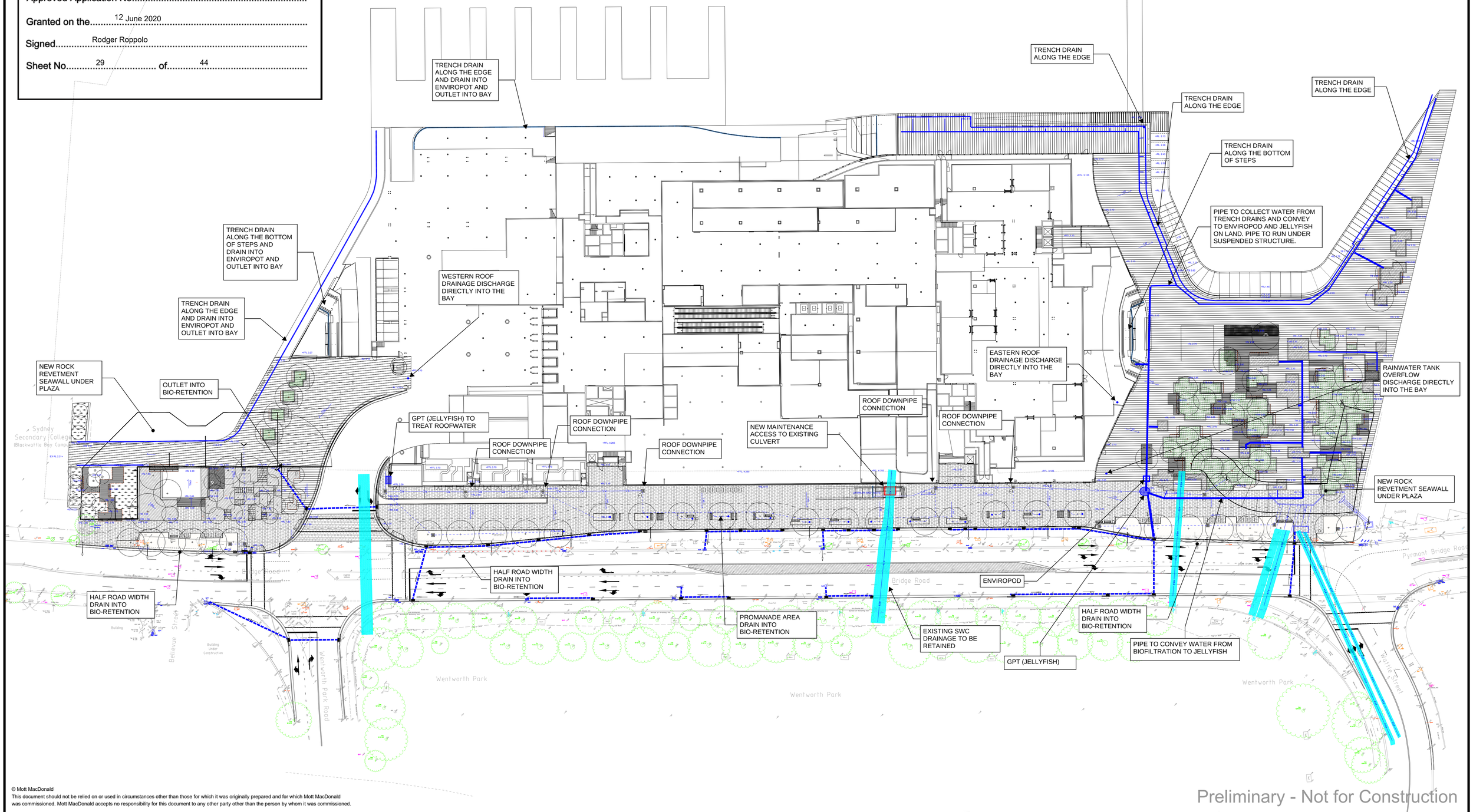
Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 29 of 44

NOTE: PIPE ALIGNMENT IN EASTERN PLAZA TO BE CONFIRMED IN NEXT PHASE



© Mott MacDonald
This document should not be relied on or used in circumstances other than those for which it was originally prepared and for which Mott MacDonald was commissioned. Mott MacDonald accepts no responsibility for this document to any other party other than the person by whom it was commissioned.

Preliminary - Not for Construction

Rev	Date	Drawn	Description	Ch'k'd	App'd
P4	27.09.19	SM	Issued for Information	BS	
P3	26.09.19	SM	Issued for Information	BS	
P2	20.09.19	BS	Issued for Information	BS	
P1	25.03.19	RBD	Issued for Information	BS	

MOTT MACDONALD
Level 10, 383 Kent Street
Sydney, NSW 2000
Australia
PO Box Q1678, QVB Sydney
NSW 1230, Australia
T +61 (0)2 9098 6800
W www.mottmac.com

Client: Urban Growth NSW
Level 12, MLC Centre
19 Martin Place
Sydney NSW 2000

Title: SYDNEY FISH MARKET STORMWATER MANAGMENT PLAN

Designed	R.Deep		Eng check	B.Soo	
Drawn			Coordination	B.Soo	
Dwg check			Approved	B.Soo	

Scale at A1	Status	Rev	Security
1:250	PRE	P4	STD

Drawing Number: MMD-385951-C-SK-CD-3000

P:\Sydney\Projects\38xxxx\385951 Sydney Fish Markets\04 Working\01 Drafting\Civil\Sketches\MMD-385951-C-SK-CD-3000.dwg Sep 27, 2019 - 9:48AM MUS81573

Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 30 of 44

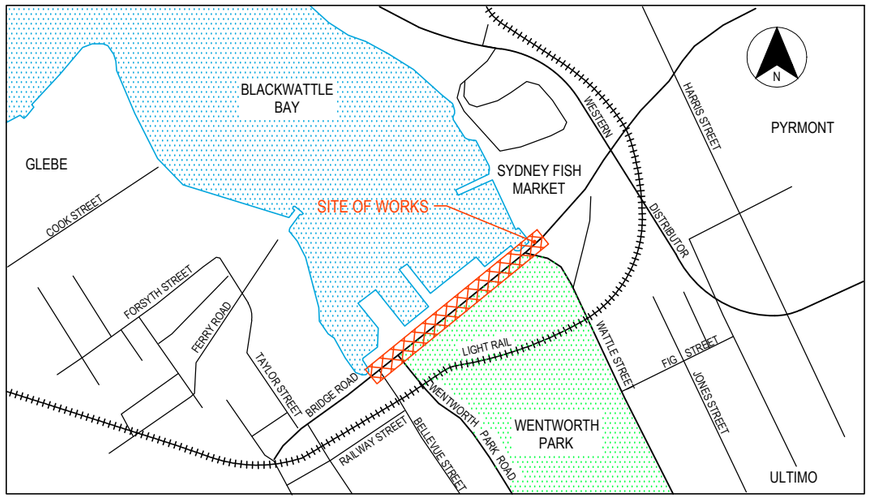
UrbanGrowth NSW Development Corporation

CITY OF SYDNEY

MR 00000 - BRIDGE ROAD

SYDNEY FISH MARKET
BRIDGE ROAD UPGRADE
FROM WATTLE STREET TO WENTWORTH PARK ROAD

CONCEPT DESIGN



LOCALITY SKETCH
NOT TO SCALE

PART INDEX

PART NUMBER	SHEET CODE	NAME
PART 1	GE	GENERAL
	RD	ROAD ALIGNMENT AND DETAIL
	UT	PUBLIC UTILITIES
	PV	PAVEMENT DESIGN

MM DRAWING NUMBER	SHEET NUMBER	SHEET TITLE
GENERAL		
CI-GE0-A00 GE-0001	GE-0001	COVER SHEET AND INDEX SHEET
GENERAL ARRANGEMENT AND ROAD DESIGN (RD)		
CI-RD1-D10 RD-0011	RD-0011	TYPICAL CROSS SECTIONS
CI-RD3-B20 RD-0301	RD-0301	ROADWORKS PLAN SHEET 1 OF 3
CI-RD3-B20 RD-0302	RD-0302	ROADWORKS PLAN SHEET 2 OF 3
CI-RD3-B20 RD-0303	RD-0303	ROADWORKS PLAN SHEET 3 OF 3
CI-RD3-D20 RD-0401	RD-0401	ROADWORKS LONGITUDINAL SECTIONS SHEET 1 OF 3
CI-RD3-D20 RD-0402	RD-0402	ROADWORKS LONGITUDINAL SECTIONS SHEET 2 OF 3
CI-RD3-D20 RD-0403	RD-0403	ROADWORKS LONGITUDINAL SECTIONS SHEET 3 OF 3
UTILITIES (UT)		
CI-UT1-B00 UT-0011	UT-0011	EXISTING UTILITIES LEGEND
CI-UT1-B20 UT-0301	UT-0301	DRAINAGE AND PUBLIC UTILITIES PLAN SHEET 1 OF 3
CI-UT1-B20 UT-0302	UT-0302	DRAINAGE AND PUBLIC UTILITIES PLAN SHEET 2 OF 3
CI-UT1-B20 UT-0303	UT-0303	DRAINAGE AND PUBLIC UTILITIES PLAN SHEET 3 OF 3
PAVEMENT (PV)		
CI-PV1-B20 PV-0301	PV-0301	PAVEMENT PLAN SHEET 1 OF 3
CI-PV1-B20 PV-0302	PV-0302	PAVEMENT PLAN SHEET 2 OF 3
CI-PV1-B20 PV-0303	PV-0303	PAVEMENT PLAN SHEET 3 OF 3

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED
0 5 10 15 20 25 30 35 40 45 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME
\\mottmac\project\Sydney\Projects\38xxxx\385951 Sydney Fish Markets\04 Working\01 Drafting\Civil\Drawings\CI-GE0-A00 GE-0001.dwg

LINEAR REFERENCING
START: END:

PLOT DATE / TIME 9/25/2019 5:22:45 PM
PLOT BY JED64037

CLIENT
UrbanGrowth NSW Development Corporation

ULTIMO - CITY OF SYDNEY
MR 00000 - BRIDGE STREET
SYDNEY FISH MARKET
BRIDGE ROAD UPGRADE
FROM WATTLE STREET TO WENTWORTH PARK ROAD
COVER SHEET
A3

PREPARED BY
MOTT MACDONALD
Level 10, 383 Kent Street
Sydney, NSW 2000
Australia
PO Box Q1678, QVB Sydney
NSW 1230, Australia
T +61 (0)2 9098 6800
W www.mottmac.com

DESIGNED
SIGNED -
NAME MATTHEW JEDNIUK
TITLE PROJECT DESIGNER
DATE 13.02.2018

REVIEWED
SIGNED -
NAME ANDREW LEE
TITLE PRINCIPAL HIGHWAY DESIGNER
DATE 14.02.2018

VERIFIED
SIGNED -
NAME BOON SOO
TITLE CIVIL DISCIPLINE LEAD
DATE 15.02.2018

RMS PROJECT MANAGER
NAME -
TITLE -

VALIDATION AND ACCEPTANCE OF THESE DRAWINGS AND THE DESIGN SHOWN THEREON IS TO BE CARRIED OUT UNDER SEPARATE PROCESS

PREPARED FOR
URBAN GROWTH

MM DRAWING NUMBER
CI-GE0-A00 GE-0001

RMS REGISTRATION No. DS2018/XXXXXX
PART 01
ISSUE STATUS CONCEPT DESIGN
EDMS No.
SHEET No. GE-0001
ISSUE 1

© Roads and Maritime Services

NSW GOVERNMENT | Planning, Industry & Environment

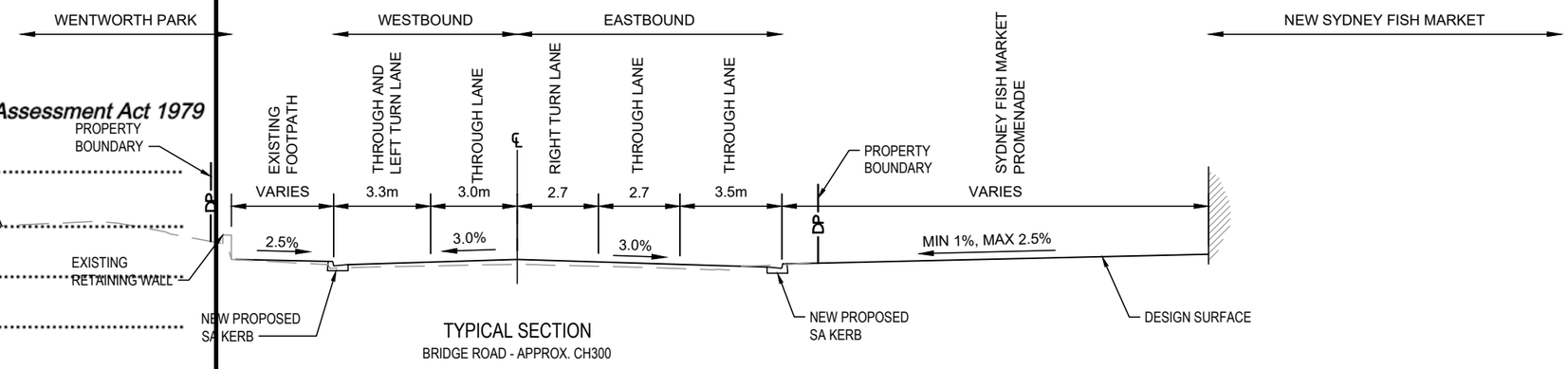
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

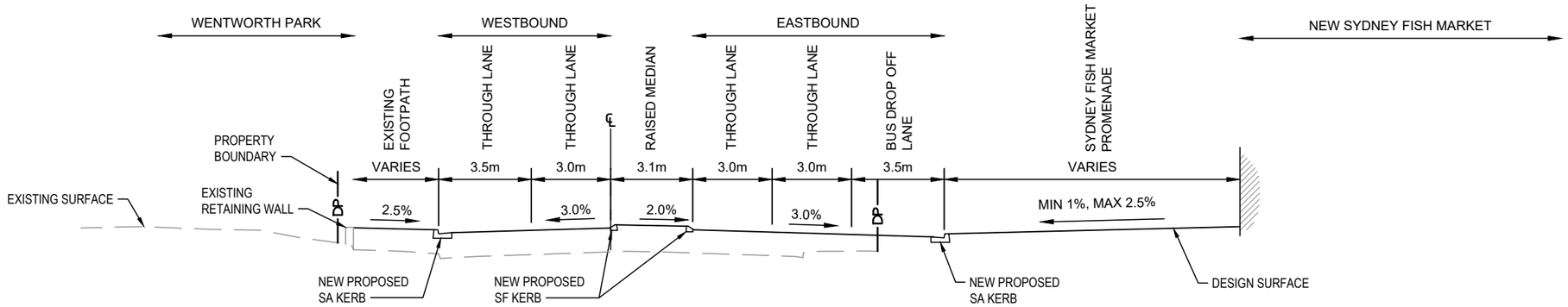
Granted on the 12 June 2020

Signed Rodger Roppolo

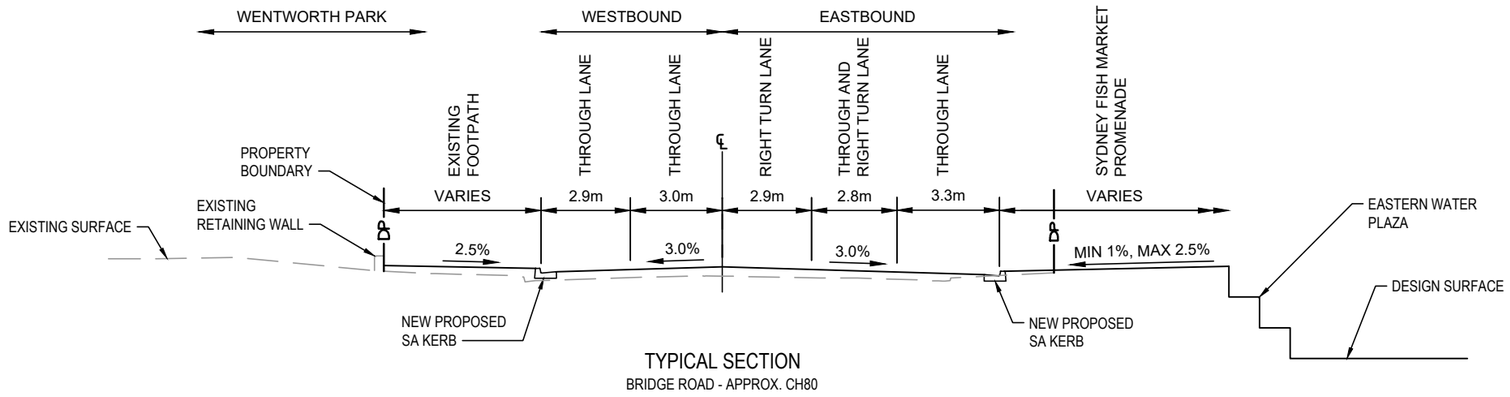
Sheet No. 31 of 44



TYPICAL SECTION
BRIDGE ROAD - APPROX. CH300



TYPICAL SECTION
BRIDGE ROAD - APPROX. CH200



TYPICAL SECTION
BRIDGE ROAD - APPROX. CH80

SSD -

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

DRAWING FILE LOCATION / NAME	DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	PLOT DATE / TIME	PLOT BY	CLIENT	ULTIMO - CITY OF SYDNEY
\\mottmac\project\Sydney\Projects\38xxxx\385951 Sydney Fish Markets\04 Working\01 Drafting\Civil\Drawings\CI-RD1-D10 RD-0011.dwg			25/9/2019 5:30:10 PM	PAC82679	UrbanGrowth NSW Development Corporation	MR 00000 - BRIDGE ROAD

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
	0	9.10.2018	ISSUED FOR CONCEPT DESIGN		B.SOO
	1	25.09.2019	RE-ISSUED FOR CONCEPT DESIGN		B.SOO

SCALES ON A3 SIZE DRAWING: 0 2.5 5 7.5 — PLAN 1:200

CO-ORDINATE SYSTEM: MGA ZONE 56 — HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: MOTT MACDONALD — Level 10, 383 Kent Street, Sydney, NSW 2000, Australia; PO Box Q1678, QVB Sydney, NSW 1230, Australia; T +61 (0)2 9098 6800; W www.mottmac.com

MM DRAWING NUMBER: CI-RD1-D10 RD-0011

TITLE	NAME	DATE
DRAWN	GA.PACIBEN	25.09.19
DRG CHECK	B.SOO	25.09.19
DESIGN	GA.PACIBEN	25.09.19
DESIGN CHECK	V.SOFREVSKI	25.09.19
DESIGN MNGR	B.SOO	25.09.19
PROJECT MNGR	G.BABCOCK	25.09.19

PREPARED FOR: URBAN GROWTH

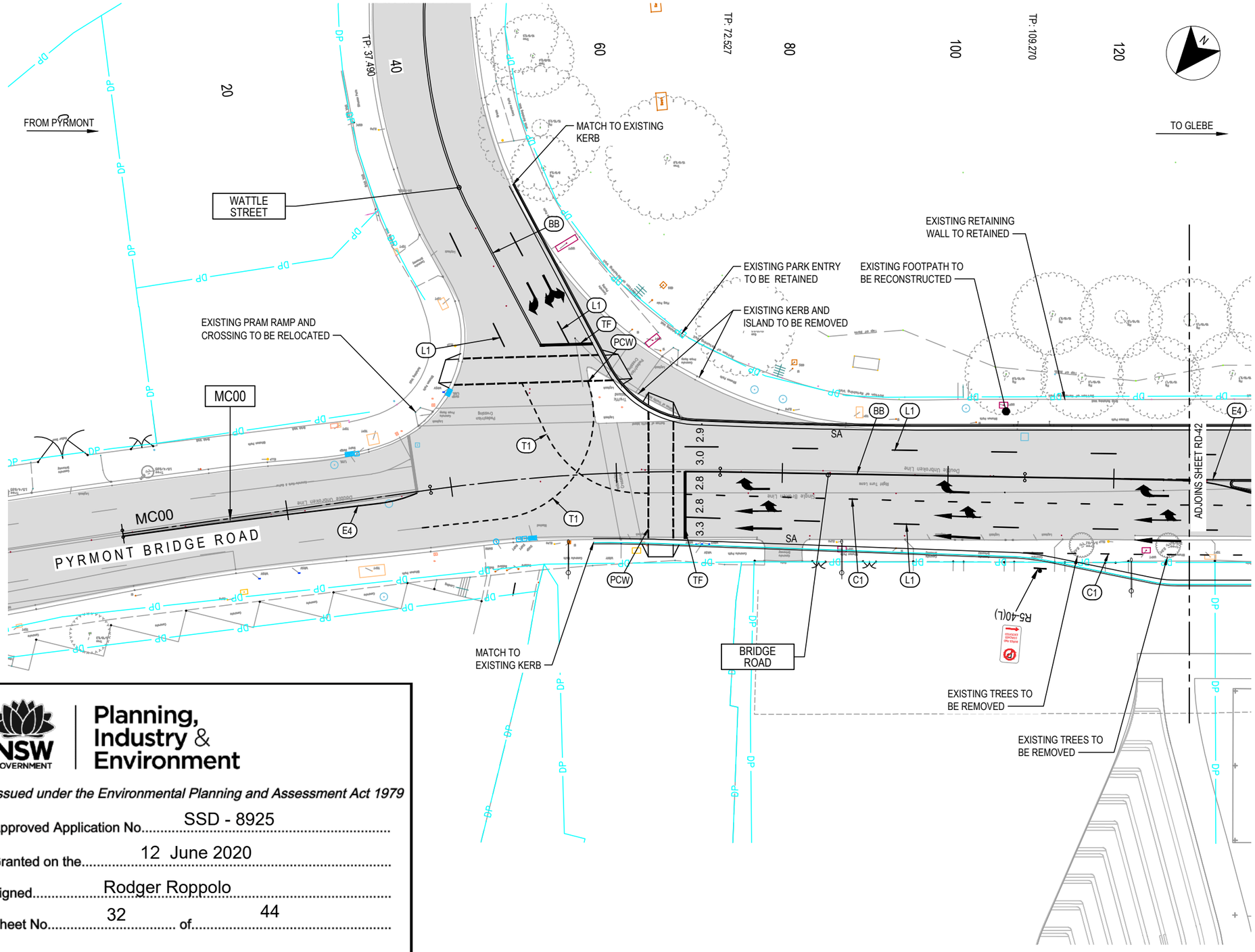
A3

SYDNEY FISH MARKET
BRIDGE ROAD UPGRADE
FROM WATTLE STREET TO WENTWORTH PARK ROAD
TYPICAL CROSS SECTIONS

RMS REGISTRATION No. DS2018/XXXXXX — PART 01

ISSUE STATUS: CONCEPT DESIGN — EDMS No. — SHEET No. RD-0011 — ISSUE 1

© Roads and Maritime Services



GENERAL ARRANGEMENT LEGEND

- EXISTING DP BOUNDARY
- EXISTING TREE
- EXISTING WATER COURSE
- EXISTING EDGE OF GARDEN
- EXISTING FENCE
- EXISTING MANPROOF FENCE
- EXISTING GATE
- EXISTING PAVEMENT
- MC00 — MASTER CONTROL LINE LABEL
- SA — KERB TYPE, FOR DETAILS REFER TO RMS STANDARD DRAWING R0300-01
- NEW STREET LIGHT
- PAVEMENT ARROW AR1
- PAVEMENT ARROW AR2
- PAVEMENT ARROW AR3 (L OR R)
- PAVEMENT ARROW AR4 (L OR R)
- PAVEMENT ARROW ARU5
- PAVEMENT ARROW AR9
- EXISTING PAVEMENT ARROW
- C1 — PAVEMENT MARKING INDICATOR

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 32 of 44

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED
150mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: \\mottmac\project\Sydney\Projects\38xxxx\385951 Sydney Fish Markets\04 Working\01 Drafting\Civil\Drawings\CI-RD3-B20 RD-0301.dwg	DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	PLOT DATE / TIME: 25/9/2019 5:30:20 PM; PLOT BY: PAC82679
EXTERNAL REFERENCE FILES	WVR No.	SCALES ON A3 SIZE DRAWING: 0 5 10 15 20 — PLAN 1:500	DRAWINGS / DESIGN PREPARED BY: MOTT MACDONALD, Level 10, 383 Kent Street, Sydney, NSW 2000, Australia, PO Box Q1678, QVB Sydney NSW 1230, Australia, T +61 (0)2 9098 6800, W www.mottmac.com

REV	DATE	AMENDMENT / REVISION DESCRIPTION	APPROVAL
0	9.10.2018	ISSUED FOR CONCEPT DESIGN	B.SOO
1	25.09.2019	RE-ISSUED FOR CONCEPT DESIGN	B.SOO

CO-ORDINATE SYSTEM	MGA ZONE 56
HEIGHT DATUM	AHD
MM DRAWING NUMBER	CI-RD3-B20 RD-0301

TITLE	NAME	DATE
DRAWN	GA.PACIBEN	25.09.19
DRG CHECK	B.SOO	25.09.19
DESIGN	GA.PACIBEN	25.09.19
DESIGN CHECK	V.SOFREVSKI	25.09.19
DESIGN MNGR	B.SOO	25.09.19
PROJECT MNGR	G.BABCOCK	25.09.19

CLIENT: UrbanGrowth NSW Development Corporation

PREPARED FOR: URBAN GROWTH

ULTIMO - CITY OF SYDNEY
MR 00000 - BRIDGE ROAD
SYDNEY FISH MARKET
BRIDGE ROAD UPGRADE
FROM WATTLE STREET TO WENTWORTH PARK ROAD
ROADWORKS PLAN — SHEET 1 OF 3

A3

RMS REGISTRATION No. DS2018/XXXXXX — PART 01

ISSUE STATUS: CONCEPT DESIGN | EDMS No. | SHEET No. RD-0301 | ISSUE 1

© Roads and Maritime Services

NSW GOVERNMENT | Planning, Industry & Environment

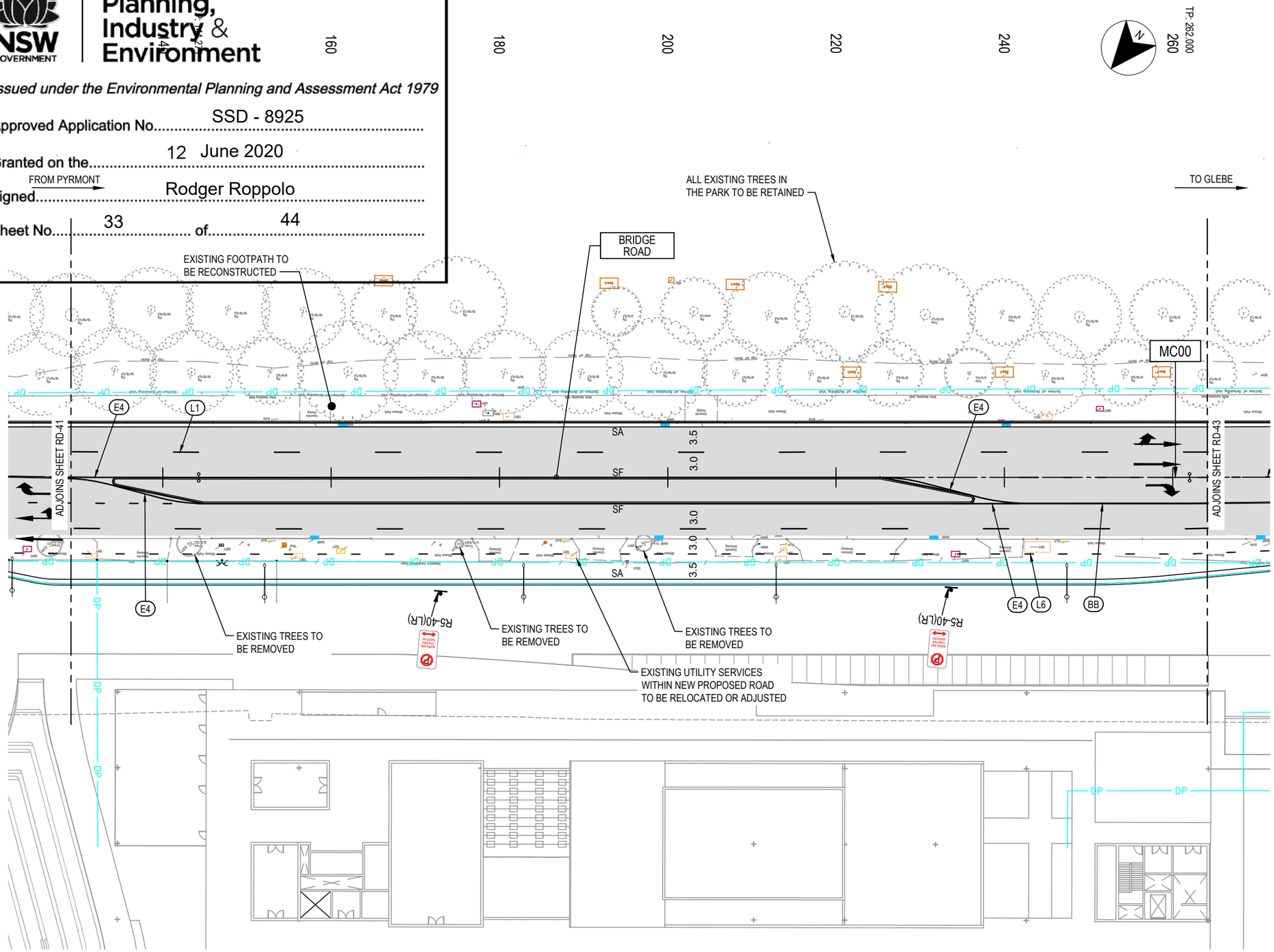
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 33 of 44



GENERAL ARRANGEMENT LEGEND

- EXISTING DP BOUNDARY
- EXISTING TREE
- EXISTING WATER COURSE (eWC)
- EXISTING EDGE OF GARDEN
- EXISTING FENCE
- EXISTING MANPROOF FENCE
- EXISTING GATE
- EXISTING PAVEMENT
- MC00 — MASTER CONTROL LINE LABEL
- SA — KERB TYPE, FOR DETAILS REFER TO RMS STANDARD DRAWING R0300-01
- NEW STREET LIGHT
- PAVEMENT ARROW AR1
- PAVEMENT ARROW AR2
- PAVEMENT ARROW AR3 (L OR R)
- PAVEMENT ARROW AR4 (L OR R)
- PAVEMENT ARROW ARU5
- PAVEMENT ARROW AR9
- EXISTING PAVEMENT ARROW
- C1 — PAVEMENT MARKING INDICATOR

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME	DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	PLOT DATE / TIME	PLOT BY
\\mottmac\project\Sydney\Projects\38xxxx\385951 Sydney Fish Markets\04 Working\01 Drafting\Civil\Drawings\CI-RD3-B20 RD-0302.dwg			25/9/2019 5:30:40 PM	PAC82679

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
	0	9.10.2018	ISSUED FOR CONCEPT DESIGN		B.SOO
	1	25.09.2019	RE-ISSUED FOR CONCEPT DESIGN		B.SOO

SCALES ON A3 SIZE DRAWING: 0 5 10 15 20 — PLAN 1:500

DRAWINGS / DESIGN PREPARED BY

MOTT MACDONALD
Level 10, 383 Kent Street
Sydney, NSW 2000
Australia
PO Box Q1678, QVB Sydney
NSW 1230, Australia
T +61 (0)2 9098 6800
W www.mottmac.com

CO-ORDINATE SYSTEM: MGA ZONE 56 | HEIGHT DATUM: AHD

MM DRAWING NUMBER: CI-RD3-B20 RD-0302

	NAME	DATE
TITLE		
DRAWN	GA.PACIBEN	25.09.19
DRG CHECK	B.SOO	25.09.19
DESIGN	GA.PACIBEN	25.09.19
DESIGN CHECK	V.SOFREVSKI	25.09.19
DESIGN MNGR	B.SOO	25.09.19
PROJECT MNGR	G.BABCOCK	25.09.19

CLIENT: UrbanGrowth NSW Development Corporation

PREPARED FOR: URBAN GROWTH

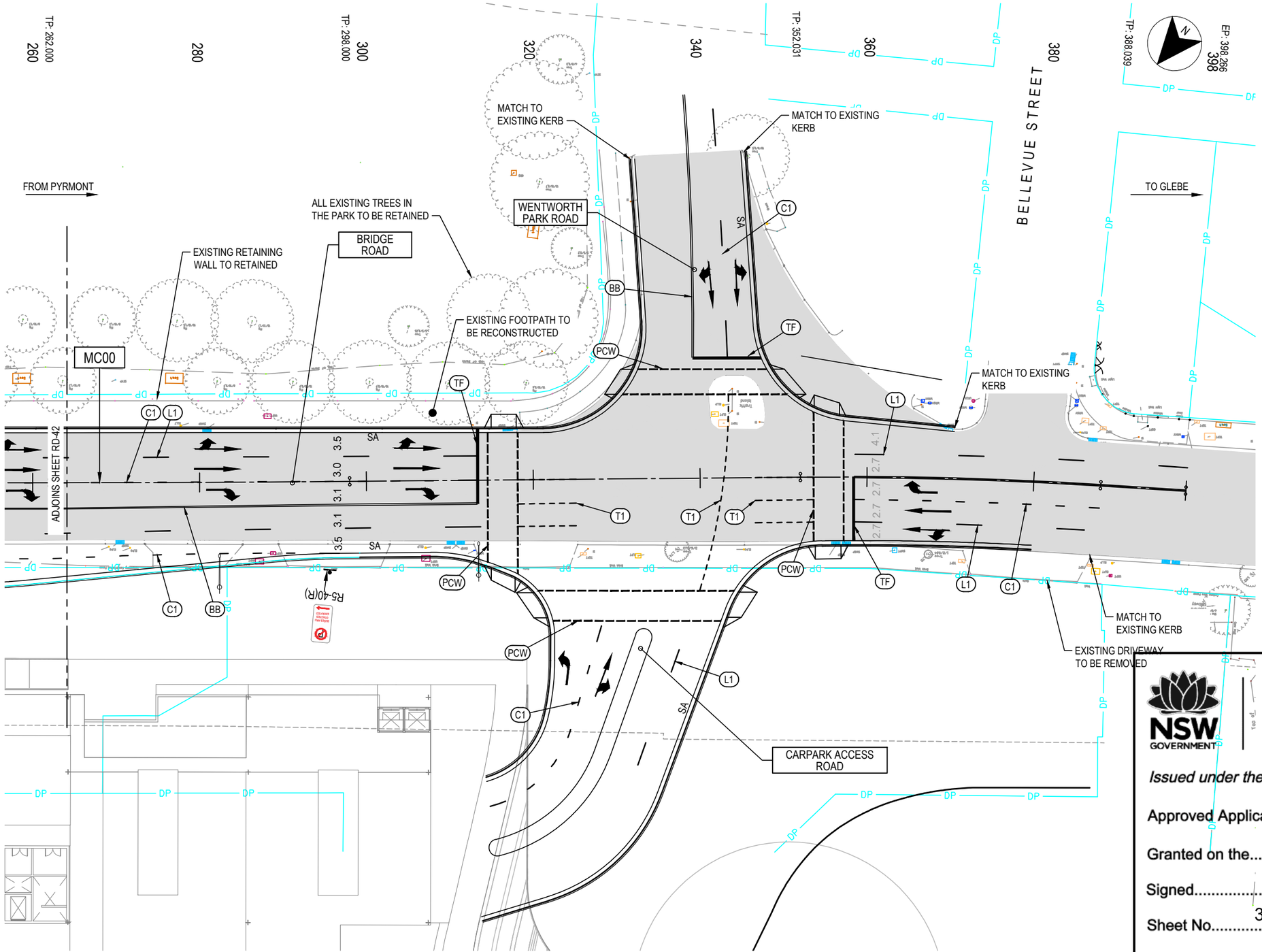
ULTIMO - CITY OF SYDNEY
MR 00000 - BRIDGE ROAD
SYDNEY FISH MARKET
BRIDGE ROAD UPGRADE
FROM WATTLE STREET TO WENTWORTH PARK ROAD
ROADWORKS PLAN — SHEET 2 OF 3

A3

RMS REGISTRATION No. DS2018/XXXXXX | PART 01

ISSUE STATUS: CONCEPT DESIGN | EDMS No. | SHEET No. RD-0302 | ISSUE 1

© Roads and Maritime Services



GENERAL ARRANGEMENT LEGEND

- DP — EXISTING DP BOUNDARY
- EXISTING TREE
- eWC — EXISTING WATER COURSE
- EXISTING EDGE OF GARDEN
- EXISTING FENCE
- EXISTING MANPROOF FENCE
- EXISTING GATE
- EXISTING PAVEMENT
- MC00 — MASTER CONTROL LINE LABEL
- SA — KERB TYPE, FOR DETAILS REFER TO RMS STANDARD DRAWING R0300-01
- NEW STREET LIGHT
- PAVEMENT ARROW AR1
- PAVEMENT ARROW AR2
- PAVEMENT ARROW AR3 (L OR R)
- PAVEMENT ARROW AR4 (L OR R)
- PAVEMENT ARROW ARU5
- PAVEMENT ARROW AR9
- EXISTING PAVEMENT ARROW
- C1 — PAVEMENT MARKING INDICATOR

NSW GOVERNMENT Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 34 of 44

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: \\mottmac\project\Sydney\Projects\38xxxx\385951 Sydney Fish Markets\04 Working\01 Drafting\Civil\Drawings\CI-RD3-B20 RD-0303.dwg				DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING
EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
	0	9.10.2018	ISSUED FOR CONCEPT DESIGN		B.SOO
	1	25.09.2019	RE-ISSUED FOR CONCEPT DESIGN		B.SOO

SCALES ON A3 SIZE DRAWING: 0 5 10 15 20 — PLAN 1:500

CO-ORDINATE SYSTEM: MGA ZONE 56 — HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: MOTT MACDONALD — Level 10, 383 Kent Street, Sydney, NSW 2000, Australia; PO Box Q1678, QVB Sydney NSW 1230, Australia; T +61 (0)2 9098 6800; W www.mottmac.com

MM DRAWING NUMBER: CI-RD3-B20 RD-0303

PLOT DATE / TIME: 25/9/2019 5:31:14 PM — PLOT BY: PAC82679

	NAME	DATE
DRAWN	GA.PACIBEN	25.09.19
DRG CHECK	B.SOO	25.09.19
DESIGN	GA.PACIBEN	25.09.19
DESIGN CHECK	V.SOFREVSKI	25.09.19
DESIGN MNGR	B.SOO	25.09.19
PROJECT MNGR	G.BABCOCK	25.09.19

CLIENT: UrbanGrowth NSW Development Corporation

PREPARED FOR: URBAN GROWTH

ULTIMO - CITY OF SYDNEY
MR 00000 - BRIDGE ROAD
SYDNEY FISH MARKET
BRIDGE ROAD UPGRADE
FROM WATTLE STREET TO WENTWORTH PARK ROAD
ROADWORKS PLAN — SHEET 3 OF 3

A3

RMS REGISTRATION No.: DS2018/XXXXXX — PART: 01

ISSUE STATUS: CONCEPT DESIGN — EDMS No. — SHEET No.: RD-0303 — ISSUE: 1

© Roads and Maritime Services

Planning, Industry & Environment

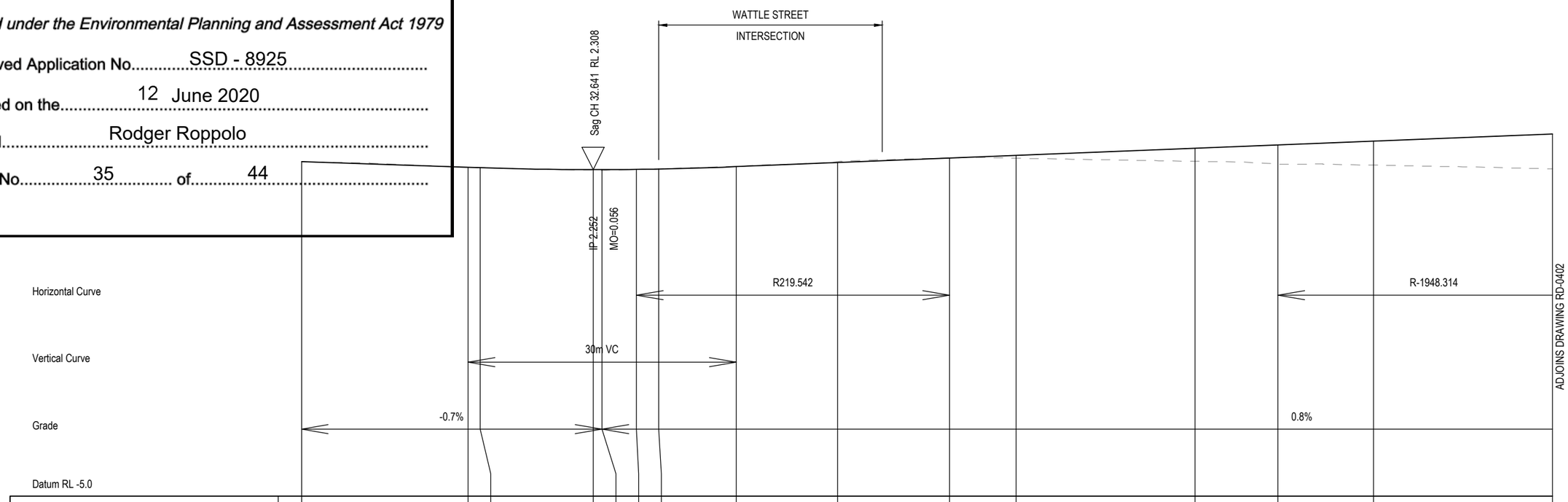
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 35 of 44



Datum RL -5.0																		
Proposed Level	2.49	2.36	2.35	2.31	2.31	2.31	2.32	2.37	2.46	2.56	2.62	2.78	2.86	2.94	3.10			
Existing Level		2.31		2.31	2.31	2.31	2.32	2.37	2.46	2.56	2.62	2.78	2.86	2.94	3.10			
Chainage	0.000	18.641	20.000	32.641	33.641	37.491	40.000	48.641	60.000	72.528	80.000	100.000	109.272	120.000	140.000			

1:500 Hor - 1:100 Ver

Longitudinal Section - MC00

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: \\mottmac\project\Sydney\Projects\38xxxx\385951 Sydney Fish Markets\04 Working\01 Drafting\Civil\Drawings\CI-RD3-D20 RD-0401.dwg

DESIGN LOT CODE:

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING:

PLOT DATE / TIME: 25/9/2019 5:33:02 PM

PLOT BY: PAC82679

CLIENT: UrbanGrowth NSW Development Corporation

ULTIMO - CITY OF SYDNEY
MR 00000 - BRIDGE ROAD
SYDNEY FISH MARKET
BRIDGE ROAD UPGRADE
FROM WATTLE STREET TO WENTWORTH PARK ROAD
ROADWORKS LONGITUDINAL SECTIONS — SHEET 1 OF 3

A3

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
	0	9.10.2018	ISSUED FOR CONCEPT DESIGN		B.SOO
	1	25.09.2019	RE-ISSUED FOR CONCEPT DESIGN		B.SOO

SCALES ON A3 SIZE DRAWING
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:100

CO-ORDINATE SYSTEM: MGA ZONE 56
HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY
Mott MacDonald
Level 10, 383 Kent Street
Sydney, NSW 2000
Australia
PO Box Q1678, QVB Sydney
NSW 1230, Australia
T +61 (0)2 9098 6800
W www.mottmac.com

MM DRAWING NUMBER: CI-RD3-D20 RD-0401

TITLE	NAME	DATE
DRAWN	GA.PACIBEN	25.09.19
DRG CHECK	B.SOO	25.09.19
DESIGN	GA.PACIBEN	25.09.19
DESIGN CHECK	V.SOFREVSKI	25.09.19
DESIGN MNGR	B.SOO	25.09.19
PROJECT MNGR	G.BABCOCK	25.09.19

PREPARED FOR: URBAN GROWTH

RMS REGISTRATION No.: DS2018/XXXXXX — PART 01

ISSUE STATUS: CONCEPT DESIGN | EDMS No. | SHEET No.: RD-0401 | ISSUE: 1

© Roads and Maritime Services

Planning, Industry & Environment

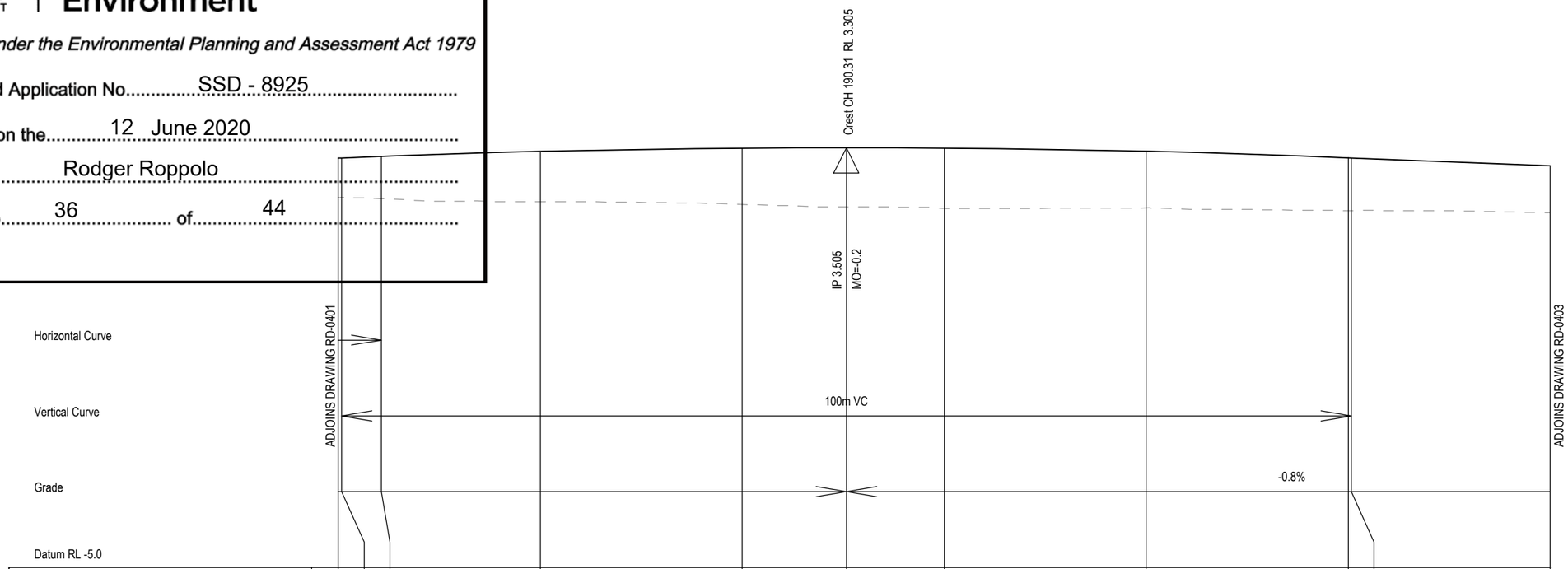
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 36 of 44



Proposed Level	3.10	3.11	3.14	3.23	3.30	3.31	3.30	3.23	3.11	3.11	2.95	
Existing Level	3.10	3.11	3.14	3.23	3.30	3.31	3.30	3.23	3.11	3.11	2.95	
Chainage	140.000	140.310	144.272	160.000	180.000	190.310	200.000	220.000	240.000	240.310	260.000	

1:500 Hor - 1:100 Ver

Longitudinal Section - MC00

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED
50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: \\mottmac\project\Sydney\Projects\38xxxx\385951 Sydney Fish Markets\04 Working\01 Drafting\Civil\Drawings\CI-RD3-D20 RD-0402.dwg

DESIGN LOT CODE:

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING:

PLOT DATE / TIME: 25/9/2019 5:33:18 PM

PLOT BY: PAC82679

CLIENT: UrbanGrowth NSW Development Corporation

ULTIMO - CITY OF SYDNEY
MR 00000 - BRIDGE ROAD
SYDNEY FISH MARKET
BRIDGE ROAD UPGRADE
FROM WATTLE STREET TO WENTWORTH PARK ROAD
ROADWORKS LONGITUDINAL SECTIONS — SHEET 2 OF 3

A3

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
	0	9.10.2018	ISSUED FOR CONCEPT DESIGN		B.SOO
	1	25.09.2019	RE-ISSUED FOR CONCEPT DESIGN		B.SOO

SCALES ON A3 SIZE DRAWING
HORIZONTAL SCALE 1:500 (0 5 10 15 20)
VERTICAL SCALE 1:100 (0 1 2 3 4)

CO-ORDINATE SYSTEM: MGA ZONE 56
HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY:

MOTT MACDONALD
Level 10, 383 Kent Street
Sydney, NSW 2000
Australia
PO Box Q1678, QVB Sydney
NSW 1230, Australia
T +61 (0)2 9098 6800
W www.mottmac.com

MM DRAWING NUMBER: CI-RD3-D20 RD-0402

DRAWN	GA.PACIBEN	25.09.19	
DRG CHECK	B.SOO	25.09.19	
DESIGN	GA.PACIBEN	25.09.19	
DESIGN CHECK	V.SOFREVSKI	25.09.19	
DESIGN MNGR	B.SOO	25.09.19	
PROJECT MNGR	G.BABCOCK	25.09.19	

PREPARED FOR: URBAN GROWTH

RMS REGISTRATION No.: DS2018/XXXXXX — PART 01

ISSUE STATUS: CONCEPT DESIGN | EDMS No. | SHEET No.: RD-0402 | ISSUE: 1

© Roads and Maritime Services

Planning, Industry & Environment

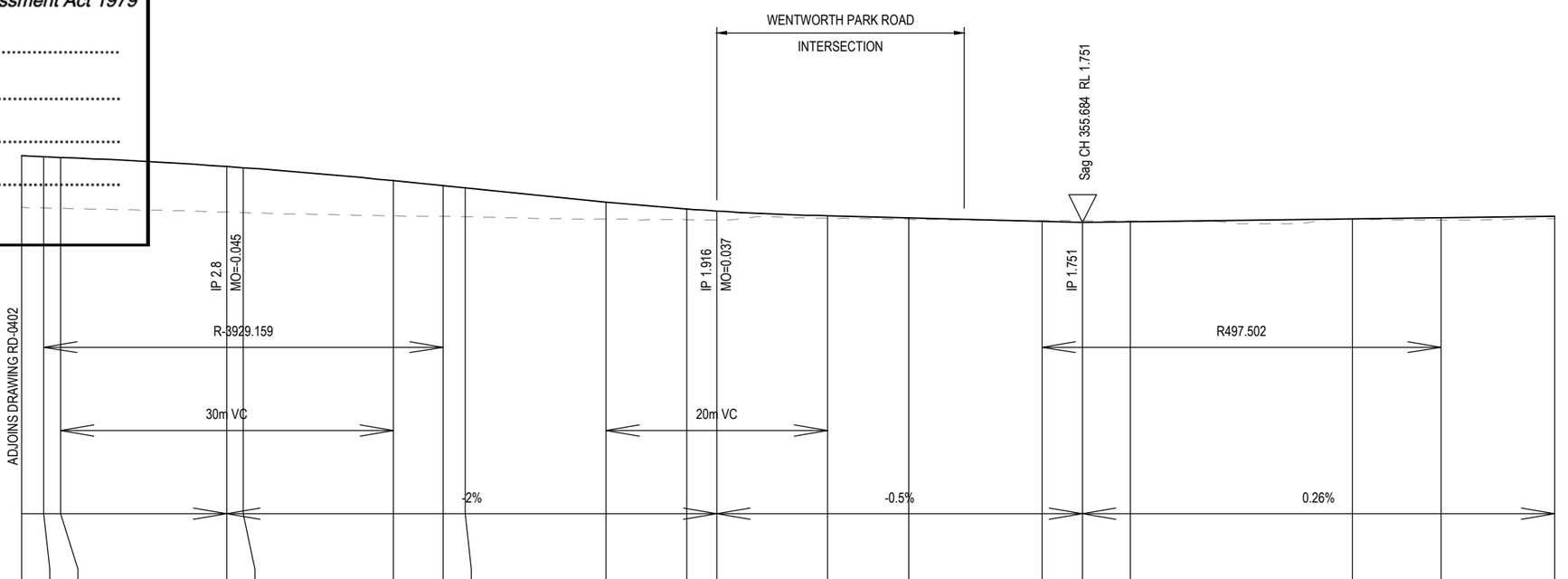
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 37 of 44



Proposed Level	2.95	2.93	2.92	2.75	2.73	2.50	2.41	2.37	2.12	1.99	1.95	1.87	1.83	1.77	1.75	1.76	1.81	1.84	1.86			
Existing Level	2.95	2.93	2.92	2.75	2.73	2.50	2.41	2.37	2.12	1.99	1.96	1.87	1.83	1.77	1.75	1.76	1.81	1.84	1.86			
Chainage	260.000	262.010	263.511	278.511	280.000	293.511	298.011	300.000	312.703	320.000	322.703	332.703	340.000	352.030	355.684	360.000	380.000	388.036	398.267			

1:500 Hor - 1:100 Ver

Longitudinal Section - MC00

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED
50mm ON A3 SIZE ORIGINAL

NOT FOR CONSTRUCTION

DRAWING FILE LOCATION / NAME: \\mottmac\project\Sydney\Projects\38xxxx\385951 Sydney Fish Markets\04 Working\01 Drafting\Civil\Drawings\CI-RD3-D20 RD-0403.dwg

DESIGN LOT CODE:

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING:

PLOT DATE / TIME: 25/9/2019 5:33:33 PM

PLOT BY: PAC82679

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
	0	9.10.2018	ISSUED FOR CONCEPT DESIGN		B.SOO
	1	25.09.2019	RE-ISSUED FOR CONCEPT DESIGN		B.SOO

SCALES ON A3 SIZE DRAWING: HORIZONTAL SCALE 1:500; VERTICAL SCALE 1:100

CO-ORDINATE SYSTEM: MGA ZONE 56

HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY:

MOTT MACDONALD
Level 10, 383 Kent Street
Sydney, NSW 2000
Australia
PO Box Q1678, QVB Sydney
NSW 1230, Australia
T +61 (0)2 9098 6800
W www.mottmac.com

MM DRAWING NUMBER: CI-RD3-D20 RD-0403

	TITLE	NAME	DATE
DRAWN		GA.PACIBEN	25.09.19
DRG CHECK		B.SOO	25.09.19
DESIGN		GA.PACIBEN	25.09.19
DESIGN CHECK		V.SOFREVSKI	25.09.19
DESIGN MNGR		B.SOO	25.09.19
PROJECT MNGR		G.BABCOCK	25.09.19

CLIENT: UrbanGrowth NSW Development Corporation

PREPARED FOR: URBAN GROWTH

ULTIMO - CITY OF SYDNEY
MR 00000 - BRIDGE ROAD
SYDNEY FISH MARKET
BRIDGE ROAD UPGRADE
FROM WATTLE STREET TO WENTWORTH PARK ROAD
ROADWORKS LONGITUDINAL SECTIONS — SHEET 3 OF 3

A3

RMS REGISTRATION No.: DS2018/XXXXXX — PART 01

ISSUE STATUS: CONCEPT DESIGN — EDMS No. — SHEET No.: RD-0403 — ISSUE 1

© Roads and Maritime Services

Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 38 of 44

EXISTING PUBLIC UTILITIES LEGEND

POLE - LIGHT	☼
STAY POLE	⊘
ELEC. CABLE JUNCTION BOX	□EJB
DISTRIBUTION FUSE POINT	□EFP
STAY ANCHOR POLE	⌒
POLE - POWER	○EP
POLE - POWER AND LIGHT	☼
POLE - POWER AND TRANSFORMER	☼
DISTRIBUTION FUSE POINT	□EFP
ELEC. CABLE MARKER	EC
GARDEN LIGHT	○EGL
HIGH TENSION PYLON	⊠
ELEC UNDERGROUND LINE	——eeu——
ELEC UG LINE - DIGITISED	——eez——
ELEC - HOUSE CONNECTION	——eeh——
ELECTRICITY CONDUIT	——eec——
MAJOR TRANSMISSION LINE	——ee——
MINOR TRANSMISSION LINE	———

TELECOMMUNICATIONS SUMP	◪
TELECOMMUNICATIONS SINGLE CONCRETE PIT	◪
TELECOMMUNICATIONS TWIN CONCRETE PIT	◪◪
OPTICAL FIBRE CABLE MARKER	OFC
TELECOMMUNICATIONS DISTRIBUTION PILLAR	⊘
TELECOMMUNICATIONS POLE	○TPL
TELECOMMUNICATIONS LINE	——et——
TELECOMMUNICATIONS - DIGITISED	——etz——

WATER MAIN MARKER	WM
WATER HYDRANT	□WH
STOP VALVE	⧋
WATER METER	◪
WATER TAP	⬡
AIR VALVE	△
WATER - HOUSE CONNECTION	——ewh——
WATER MAIN	——ew——
WATER MAIN - DIGITISED	——ewz——

SEWER VENT PIPE	○SVP
SEWER LAMPHOLE	○SLH
SEWER MANHOLE COVER	⬡
SEWER MAIN	——es——
EXISTING STORMWATER LINE	——esw——
GAS MAIN	——elg——
RMS TRAFFIC SIGNAL CONDUIT	——rms——
EXISTING UTILITY LINE TO BE DECOMMISSIONED	——x——x——x——x——

UTILITY DISCLAIMER

UTILITY INFORMATION SHOWN ON THE PLANS DOES NOT DEPICT ANY MORE THAN THE PRESENCE OF A SERVICE, BASED ON AVAILABLE DOCUMENTARY EVIDENCE. THE PRESENCE OF A UTILITY SERVICE, ITS SIZE AND LOCATION SHOULD BE CONFIRMED BY FIELD INSPECTION, PRIOR TO THE COMMENCEMENT OF ROADWORKS AND THE RELEVANT UTILITY PLANS OBTAINED BY DIALLING PH 1100 OR FAX 1300 652 077 (DIAL BEFORE YOU DIG). CAUTION SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF ALL UTILITY SERVICES.

DIAL BEFORE YOU DIG www.1100.com.au

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: \\mottmac\project\Sydney\Projects\38xxxx\385951 Sydney Fish Markets\04 Working\01 Drafting\Civil\Drawings\CI-UT1-B00 UT-0011.dwg

DESIGN LOT CODE:

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING:

PLOT DATE / TIME: 25/9/2019 5:33:49 PM

PLOT BY: PAC82679

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
	0	9.10.2018	ISSUED FOR CONCEPT DESIGN		B.SOO
	1	25.09.2019	RE-ISSUED FOR CONCEPT DESIGN		B.SOO

SCALES ON A3 SIZE DRAWING:

DRAWINGS / DESIGN PREPARED BY:

MOTT MACDONALD
Level 10, 383 Kent Street
Sydney, NSW 2000
Australia
PO Box Q1678, QVB Sydney
NSW 1230, Australia
T +61 (0)2 9098 6800
W www.mottmac.com

CO-ORDINATE SYSTEM: MGA ZONE 56

HEIGHT DATUM: AHD

MM DRAWING NUMBER: CI-UT1-B00 UT-0011

	TITLE	NAME	DATE
DRAWN		GA.PACIBEN	25.09.19
DRG CHECK		B.SOO	25.09.19
DESIGN		GA.PACIBEN	25.09.19
DESIGN CHECK		V.SOFREVSKI	25.09.19
DESIGN MNGR		B.SOO	25.09.19
PROJECT MNGR		G.BABCOCK	25.09.19

CLIENT: UrbanGrowth NSW Development Corporation

PREPARED FOR: URBAN GROWTH

ULTIMO - CITY OF SYDNEY
MR 00000 - BRIDGE ROAD
SYDNEY FISH MARKET
BRIDGE ROAD UPGRADE
FROM WATTLE STREET TO WENTWORTH PARK ROAD
EXISTING UTILITIES LEGEND

A3

RMS REGISTRATION No.: DS2018/XXXXXX

PART: 01

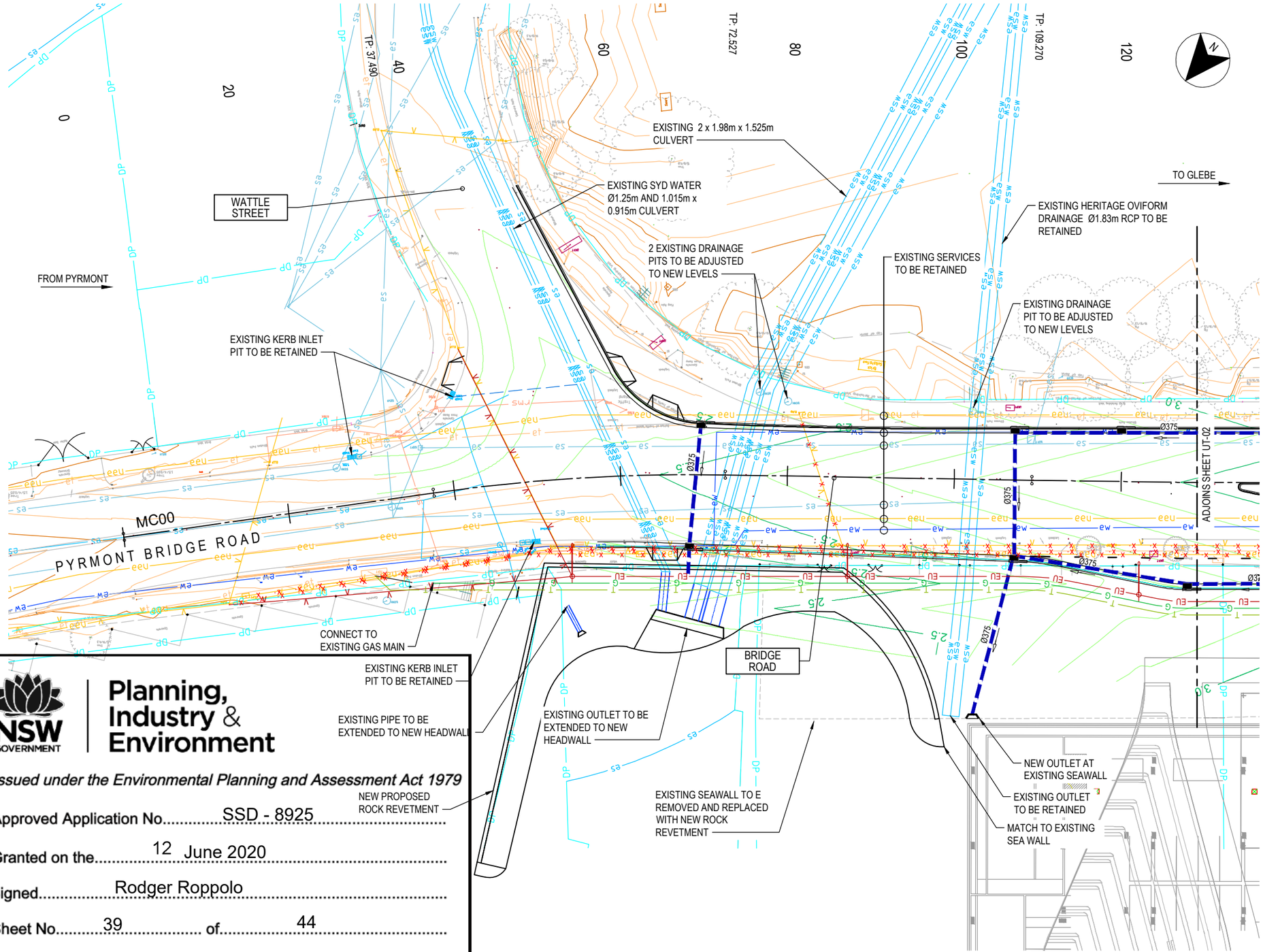
ISSUE STATUS: CONCEPT DESIGN

EDMS No.:

SHEET No.: UT-0011

ISSUE: 1

© Roads and Maritime Services



UTILITIES LEGEND

- EU — NEW UNDERGROUND DISTRIBUTION (11kV)
- V — NEW OVERHEAD POWER LINE
- T — NEW TELSTRA COMMUNICATIONS TRENCH WITH PIT
- G — NEW GAS MAIN
- PROPOSED NEW STORMWATER DRAINAGE PIT AND PIPE
- EXISTING SERVICE TO BE REMOVED
- eWC — EXISTING WATER COURSE
- EXISTING STORMWATER PIPE (DBYD)
- 85.0 — EXISTING SURFACE CONTOURS MAJOR
- EXISITNG SURFACE CONTOURS MINOR
- 85.0 — DESIGN SURFACE CONTOURS MAJOR
- DESIGN SURFACE CONTOURS MINOR
- NEW LIGHT POLE

NOTES

1. ATTENTION IS DIRECTED TO THE POSSIBLE EXISTENCE OF UNDERGROUND UTILITIES NOT SHOWN ON THE DRAWINGS, OR AT LOCATIONS OR ELEVATIONS DIFFERENT FROM THOSE SHOWN ON THE DRAWINGS. THE EXACT LOCATION OF EACH UNDERGROUND UTILITY SHALL BE VERIFIED ON SITE PRIOR TO DOING ANY WORK THAT MAY DAMAGE SUCH UTILITY.
2. FOR EXISTING SERVICES LEGEND REFER TO SHEET UT-1000.
3. ASBESTOS CONDUITS HAVE BEEN IDENTIFIED. THE APPROPRIATE WMS PROCEDURES MUST BE USED WHERE ASBESTOS IS PRESENT.
4. EXISTING OVERHEAD ELECTRICAL ASSETS ARE TO BE RELOCATED. REFER TO ENDEAVOUR ENERGY DESIGN (ARP3473, ARP3474 AND ARP3476) FOR DETAILS.
5. EXISTING UNDERGROUND TELECOMMUNICATIONS ASSETS ARE TO BE RELOCATED. REFER TO TELSTRA DESIGN DRAWING FILE (S.I 185765/01) FOR DETAILS.

UTILITY DISCLAIMER

UTILITY INFORMATION SHOWN ON THE PLANS DOES NOT DEPICT ANY MORE THAN THE PRESENCE OF A SERVICE, BASED ON AVAILABLE DOCUMENTARY EVIDENCE. THE PRESENCE OF A UTILITY SERVICE, ITS SIZE AND LOCATION SHOULD BE CONFIRMED BY FIELD INSPECTION, PRIOR TO THE COMMENCEMENT OF ROADWORKS AND THE RELEVANT UTILITY PLANS OBTAINED BY DIALLING PH 1100 OR FAX 1300 652 077 (DIAL BEFORE YOU DIG). CAUTION SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF ALL UTILITY SERVICES.

DIAL BEFORE YOU DIG www.1100.com.au

NOT FOR CONSTRUCTION

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No..... SSD - 8925

Granted on the..... 12 June 2020

Signed..... Rodger Roppolo

Sheet No..... 39 of..... 44

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: \\mottmac\project\Sydney\Projects\38xxxx\385951 Sydney Fish Markets\04 Working\01 Drafting\Civil\Drawings\CI-UT1-B20 UT-0301.dwg

DESIGN LOT CODE:

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING:

PLOT DATE / TIME: 25/9/2019 5:34:12 PM

PLOT BY: PAC82679

EXTERNAL REFERENCE FILES:

REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
0	9.10.2018	ISSUED FOR CONCEPT DESIGN		B.SOO
1	25.09.2019	RE-ISSUED FOR CONCEPT DESIGN		B.SOO

SCALES ON A3 SIZE DRAWING: 0 5 10 15 20 — PLAN 1:500

DRAWINGS / DESIGN PREPARED BY: MOTT MACDONALD — Level 10, 383 Kent Street, Sydney, NSW 2000, Australia; PO Box Q1678, QVB Sydney NSW 1230, Australia; T +61 (0)2 9098 6800; W www.mottmac.com

CO-ORDINATE SYSTEM: MGA ZONE 56 — HEIGHT DATUM: AHD

MM DRAWING NUMBER: CI-UT1-B20 UT-0301

	NAME	DATE
DRAWN	GA.PACIBEN	25.09.19
DRG CHECK	B.SOO	25.09.19
DESIGN	GA.PACIBEN	25.09.19
DESIGN CHECK	V.SOFREVSKI	25.09.19
DESIGN MNGR	B.SOO	25.09.19
PROJECT MNGR	G.BABCOCK	25.09.19

CLIENT: UrbanGrowth NSW Development Corporation

PREPARED FOR: URBAN GROWTH

ULTIMO - CITY OF SYDNEY
MR 00000 - BRIDGE ROAD
SYDNEY FISH MARKET
BRIDGE ROAD UPGRADE
FROM WATTLE STREET TO WENTWORTH PARK ROAD
DRAINAGE AND PUBLIC UTILITIES PLAN — SHEET 1 OF 3

A3

RMS REGISTRATION No.: DS2018/XXXXXX — PART 01

ISSUE STATUS: CONCEPT DESIGN — EDMS No. — SHEET No.: UT-0301 — ISSUE: 1

© Roads and Maritime Services

NSW GOVERNMENT | Planning, Industry & Environment

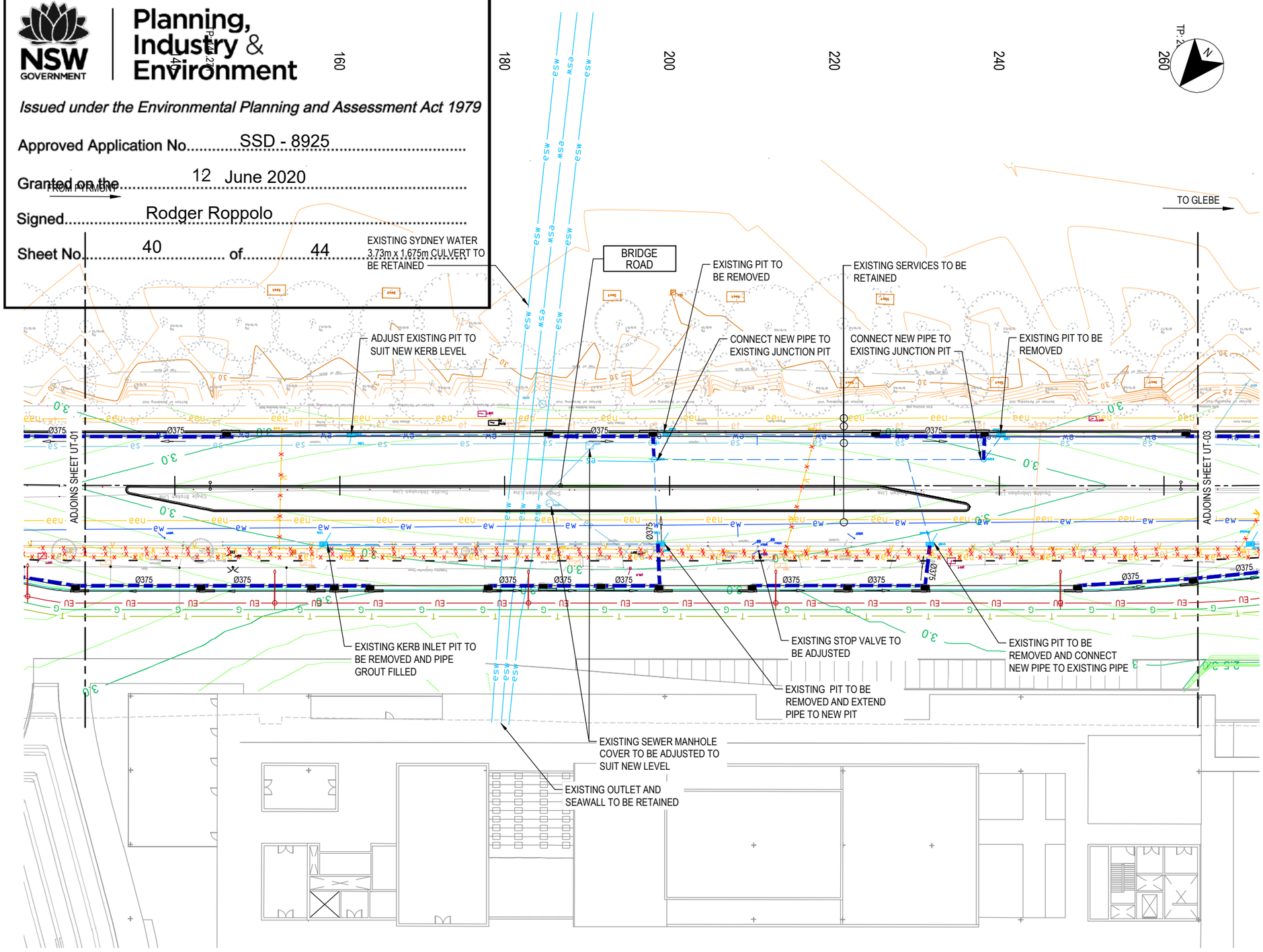
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 40 of 44



UTILITIES LEGEND

- EU — NEW UNDERGROUND DISTRIBUTION (11kV)
- V — NEW OVERHEAD POWER LINE
- T — NEW TELSTRA COMMUNICATIONS TRENCH WITH PIT
- G — NEW GAS MAIN
- PROPOSED NEW STORMWATER DRAINAGE PIT AND PIPE
- EXISTING SERVICE TO BE REMOVED
- eW — EXISTING WATER COURSE
- EXISTING STORMWATER PIPE (DBYD)
- 85.0 — EXISTING SURFACE CONTOURS MAJOR
- EXISITNG SURFACE CONTOURS MINOR
- 85.0 — DESIGN SURFACE CONTOURS MAJOR
- DESIGN SURFACE CONTOURS MINOR
- NEW LIGHT POLE

NOTES

1. ATTENTION IS DIRECTED TO THE POSSIBLE EXISTENCE OF UNDERGROUND UTILITIES NOT SHOWN ON THE DRAWINGS, OR AT LOCATIONS OR ELEVATIONS DIFFERENT FROM THOSE SHOWN ON THE DRAWINGS. THE EXACT LOCATION OF EACH UNDERGROUND UTILITY SHALL BE VERIFIED ON SITE PRIOR TO DOING ANY WORK THAT MAY DAMAGE SUCH UTILITY.
2. FOR EXISTING SERVICES LEGEND REFER TO SHEET UT-1000.
3. ASBESTOS CONDUITS HAVE BEEN IDENTIFIED. THE APPROPRIATE WMS PROCEDURES MUST BE USED WHERE ASBESTOS IS PRESENT.
4. EXISTING OVERHEAD ELECTRICAL ASSETS ARE TO BE RELOCATED. REFER TO ENDEAVOUR ENERGY DESIGN (ARP3473, ARP3474 AND ARP3476) FOR DETAILS.
5. EXISTING UNDERGROUND TELECOMMUNICATIONS ASSETS ARE TO BE RELOCATED. REFER TO TELSTRA DESIGN DRAWING FILE (S.I 185765/01) FOR DETAILS.

UTILITY DISCLAIMER

UTILITY INFORMATION SHOWN ON THE PLANS DOES NOT DEPICT ANY MORE THAN THE PRESENCE OF A SERVICE, BASED ON AVAILABLE DOCUMENTARY EVIDENCE. THE PRESENCE OF A UTILITY SERVICE, ITS SIZE AND LOCATION SHOULD BE CONFIRMED BY FIELD INSPECTION, PRIOR TO THE COMMENCEMENT OF ROADWORKS AND THE RELEVANT UTILITY PLANS OBTAINED BY DIALLING PH 1100 OR FAX 1300 652 077 (DIAL BEFORE YOU DIG). CAUTION SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF ALL UTILITY SERVICES.

DIAL BEFORE YOU DIG www.1100.com.au

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED
0 5 10 15 20 25 30 35 40 45 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: \\mottmac\project\Sydney\Projects\38xxxx\385951 Sydney Fish Markets\04 Working\01 Drafting\Civil\Drawings\CI-UT1-B20 UT-0302.dwg

DESIGN LOT CODE

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING

PLOT DATE / TIME: 25/9/2019 5:34:29 PM PLOT BY: PAC82679

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
	0	9.10.2018	ISSUED FOR CONCEPT DESIGN		B.SOO
	1	25.09.2019	RE-ISSUED FOR CONCEPT DESIGN		B.SOO

SCALES ON A3 SIZE DRAWING: 0 5 10 15 20 — PLAN 1:500

DRAWINGS / DESIGN PREPARED BY: MOTT MACDONALD — Level 10, 383 Kent Street, Sydney, NSW 2000, Australia; PO Box Q1678, QVB Sydney NSW 1230, Australia; T +61 (0)2 9098 6800; W www.mottmac.com

CO-ORDINATE SYSTEM: MGA ZONE 56 HEIGHT DATUM: AHD

MM DRAWING NUMBER: CI-UT1-B20 UT-0302

	NAME	DATE
DRAWN	GA.PACIBEN	25.09.19
DRG CHECK	B.SOO	25.09.19
DESIGN	GA.PACIBEN	25.09.19
DESIGN CHECK	V.SOFREVSKI	25.09.19
DESIGN MNGR	B.SOO	25.09.19
PROJECT MNGR	G.BABCOCK	25.09.19

CLIENT: UrbanGrowth NSW Development Corporation

PREPARED FOR: URBAN GROWTH

ULTIMO - CITY OF SYDNEY
MR 00000 - BRIDGE ROAD
SYDNEY FISH MARKET
BRIDGE ROAD UPGRADE
FROM WATTLE STREET TO WENTWORTH PARK ROAD
DRAINAGE AND PUBLIC UTILITIES PLAN — SHEET 2 OF 3

A3

RMS REGISTRATION No. DS2018/XXXXXX — PART 01

ISSUE STATUS: CONCEPT DESIGN | EDMS No. | SHEET No. UT-0302 | ISSUE 1

© Roads and Maritime Services

Planning, Industry & Environment

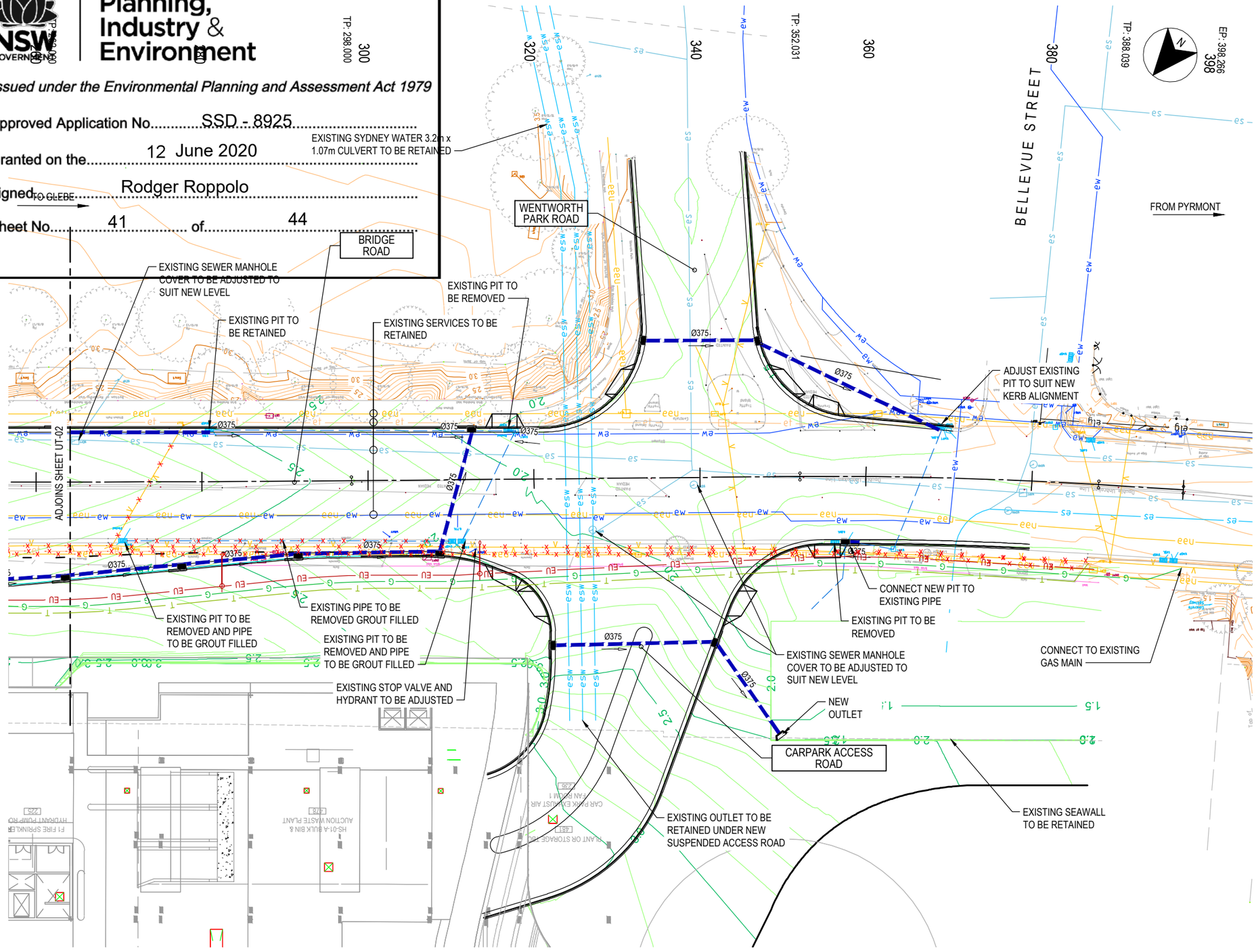
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 41 of 44



UTILITIES LEGEND

- EU — NEW UNDERGROUND DISTRIBUTION (11kV)
- V — NEW OVERHEAD POWER LINE
- T — NEW TELSTRA COMMUNICATIONS TRENCH WITH PIT
- G — NEW GAS MAIN
- PROPOSED NEW STORMWATER DRAINAGE PIT AND PIPE
- EXISTING SERVICE TO BE REMOVED
- EXISTING WATER COURSE
- EXISTING STORMWATER PIPE (DBYD)
- 85.0 — EXISTING SURFACE CONTOURS MAJOR
- EXISITNG SURFACE CONTOURS MINOR
- 85.0 — DESIGN SURFACE CONTOURS MAJOR
- DESIGN SURFACE CONTOURS MINOR
- NEW LIGHT POLE

NOTES

1. ATTENTION IS DIRECTED TO THE POSSIBLE EXISTENCE OF UNDERGROUND UTILITIES NOT SHOWN ON THE DRAWINGS, OR AT LOCATIONS OR ELEVATIONS DIFFERENT FROM THOSE SHOWN ON THE DRAWINGS. THE EXACT LOCATION OF EACH UNDERGROUND UTILITY SHALL BE VERIFIED ON SITE PRIOR TO DOING ANY WORK THAT MAY DAMAGE SUCH UTILITY.
2. FOR EXISTING SERVICES LEGEND REFER TO SHEET UT-1000.
3. ASBESTOS CONDUITS HAVE BEEN IDENTIFIED. THE APPROPRIATE WMS PROCEDURES MUST BE USED WHERE ASBESTOS IS PRESENT.
4. EXISTING OVERHEAD ELECTRICAL ASSETS ARE TO BE RELOCATED. REFER TO ENDEAVOUR ENERGY DESIGN (ARP3473, ARP3474 AND ARP3476) FOR DETAILS.
5. EXISTING UNDERGROUND TELECOMMUNICATIONS ASSETS ARE TO BE RELOCATED. REFER TO TELSTRA DESIGN DRAWING FILE (S.I 185765/01) FOR DETAILS.

UTILITY DISCLAIMER

UTILITY INFORMATION SHOWN ON THE PLANS DOES NOT DEPICT ANY MORE THAN THE PRESENCE OF A SERVICE, BASED ON AVAILABLE DOCUMENTARY EVIDENCE. THE PRESENCE OF A UTILITY SERVICE, ITS SIZE AND LOCATION SHOULD BE CONFIRMED BY FIELD INSPECTION, PRIOR TO THE COMMENCEMENT OF ROADWORKS AND THE RELEVANT UTILITY PLANS OBTAINED BY DIALLING PH 1100 OR FAX 1300 652 077 (DIAL BEFORE YOU DIG). CAUTION SHOULD BE EXERCISED WHEN WORKING IN THE VICINITY OF ALL UTILITY SERVICES.

DIAL BEFORE YOU DIG www.1100.com.au

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED
50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: \\mottmac\project\Sydney\Projects\38xxxx\385951 Sydney Fish Markets\04 Working\01 Drafting\Civil\Drawings\CI-UT1-B20 UT-0303.dwg				DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING
EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
	0	9.10.2018	ISSUED FOR CONCEPT DESIGN		B.SOO
	1	25.09.2019	RE-ISSUED FOR CONCEPT DESIGN		B.SOO

SCALES ON A3 SIZE DRAWING	0 5 10 15 20 — PLAN 1:500
CO-ORDINATE SYSTEM	MGA ZONE 56
HEIGHT DATUM	AHD
DRAWINGS / DESIGN PREPARED BY	MOTT MACDONALD — Level 10, 383 Kent Street, Sydney, NSW 2000, Australia; PO Box Q1678, QVB Sydney NSW 1230, Australia; T +61 (0)2 9098 6800; W www.mottmac.com
MM DRAWING NUMBER	CI-UT1-B20 UT-0303

PLOT DATE / TIME	PLOT BY
25/9/2019 5:35:02 PM	PAC82679

TITLE	NAME	DATE
DRAWN	GA.PACIBEN	25.09.19
DRG CHECK	B.SOO	25.09.19
DESIGN	GA.PACIBEN	25.09.19
DESIGN CHECK	V.SOFREVSKI	25.09.19
DESIGN MNGR	B.SOO	25.09.19
PROJECT MNGR	G.BABCOCK	25.09.19

CLIENT: UrbanGrowth NSW Development Corporation

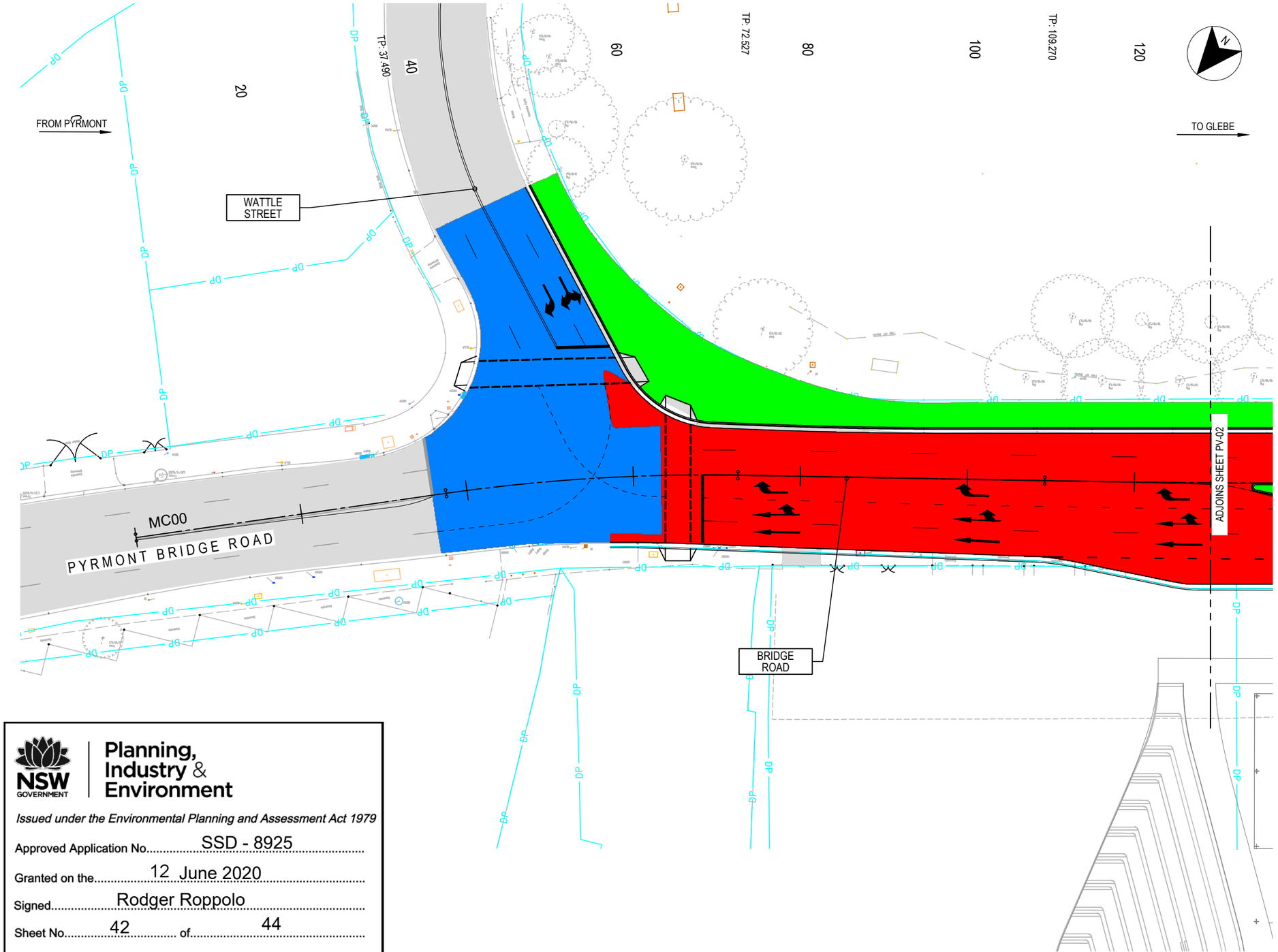
PREPARED FOR: URBAN GROWTH

ULTIMO - CITY OF SYDNEY
MR 00000 - BRIDGE ROAD
SYDNEY FISH MARKET
BRIDGE ROAD UPGRADE
FROM WATTLE STREET TO WENTWORTH PARK ROAD
DRAINAGE AND PUBLIC UTILITIES PLAN — SHEET 3 OF 3

A3

RMS REGISTRATION No.	PART
DS2018/XXXXXX	01
ISSUE STATUS: CONCEPT DESIGN	EDMS No.
SHEET No.: UT-0303	ISSUE: 1

© Roads and Maritime Services



NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 42 of 44

NOTES

1. PAVEMENT PROFILES TO BE DEVELOPED IN CONJUNCTION WITH RMS DURING DETAILED DESIGN PHASE

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME	DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	PLOT DATE / TIME	PLOT BY	CLIENT
\\mottmac\project\Sydney\Projects\38xxxx\385951 Sydney Fish Markets\04 Working\01 Drafting\Civil\Drawings\CI-PV1-B20 PV-0301.dwg			25/9/2019 5:26:17 PM	PAC82679	UrbanGrowth NSW Development Corporation

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
	0	9.10.2018	ISSUED FOR CONCEPT DESIGN		B.SOO
	1	25.09.2019	RE-ISSUED FOR CONCEPT DESIGN		B.SOO

SCALES ON A3 SIZE DRAWING: 0 5 10 15 20 — PLAN 1:500

CO-ORDINATE SYSTEM: MGA ZONE 56 | HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: MOTT MACDONALD — Level 10, 383 Kent Street, Sydney, NSW 2000, Australia; PO Box Q1678, QVB Sydney NSW 1230, Australia; T +61 (0)2 9098 6800; W www.mottmac.com

MM DRAWING NUMBER: CI-PV1-B20 PV-0301

	NAME	DATE
DRAWN	GA.PACIBEN	25.09.19
DRG CHECK	B.SOO	25.09.19
DESIGN	GA.PACIBEN	25.09.19
DESIGN CHECK	V.SOFREVSKI	25.09.19
DESIGN MNGR	B.SOO	25.09.19
PROJECT MNGR	G.BABCOCK	25.09.19

PREPARED FOR: URBAN GROWTH

ULTIMO - CITY OF SYDNEY
MR 00000 - BRIDGE ROAD
SYDNEY FISH MARKET
BRIDGE ROAD UPGRADE
FROM WATTLE STREET TO WENTWORTH PARK ROAD
PAVEMENT PLAN — SHEET 1 OF 3

A3

RMS REGISTRATION No. DS2018/XXXXXX — PART 01

ISSUE STATUS: CONCEPT DESIGN | EDMS No. | SHEET No. PV-0301 | ISSUE 1

© Roads and Maritime Services

Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 43 of 44

TP: 262.000

PAVEMENT LEGEND

- EXISTING DP BOUNDARY
- PAVEMENT TYPE 1 - NEW FULL DEPTH PAVEMENT
- PAVEMENT TYPE 2 - AC CORRECTIVE OVERLAY
- PAVEMENT TYPE 3 - CONCRETE PAVEMENT
- EXISTING PAVEMENT



NOTES

1. PAVEMENT PROFILES TO BE DEVELOPED IN CONJUNCTION WITH RMS DURING DETAILED DESIGN PHASE

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: \\mottmac\project\Sydney\Projects\38xxxx\385951 Sydney Fish Markets\04 Working\01 Drafting\Civil\Drawings\CI-PV1-B20 PV-0302.dwg

DESIGN LOT CODE

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING

PLOT DATE / TIME: 25/9/2019 5:29:51 PM

PLOT BY: PAC82679

CLIENT: UrbanGrowth NSW Development Corporation

ULTIMO - CITY OF SYDNEY
MR 00000 - BRIDGE ROAD
SYDNEY FISH MARKET
BRIDGE ROAD UPGRADE
FROM WATTLE STREET TO WENTWORTH PARK ROAD
PAVEMENT PLAN — SHEET 2 OF 3

A3

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
	0	9.10.2018	ISSUED FOR CONCEPT DESIGN		B.SOO
	1	25.09.2019	RE-ISSUED FOR CONCEPT DESIGN		B.SOO

SCALES ON A3 SIZE DRAWING: 0 5 10 15 20 — PLAN 1:500

CO-ORDINATE SYSTEM: MGA ZONE 56

HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY

MOTT MACDONALD
Level 10, 383 Kent Street
Sydney, NSW 2000
Australia
PO Box Q1678, QVB Sydney
NSW 1230, Australia
T +61 (0)2 9098 6800
W www.mottmac.com

MM DRAWING NUMBER: CI-PV1-B20 PV-0302

	NAME	DATE
DRAWN	GA.PACIBEN	25.09.19
DRG CHECK	B.SOO	25.09.19
DESIGN	GA.PACIBEN	25.09.19
DESIGN CHECK	V.SOFREVSKI	25.09.19
DESIGN MNGR	B.SOO	25.09.19
PROJECT MNGR	G.BABCOCK	25.09.19

PREPARED FOR: URBAN GROWTH

RMS REGISTRATION No.: DS2018/XXXXXX — PART 01

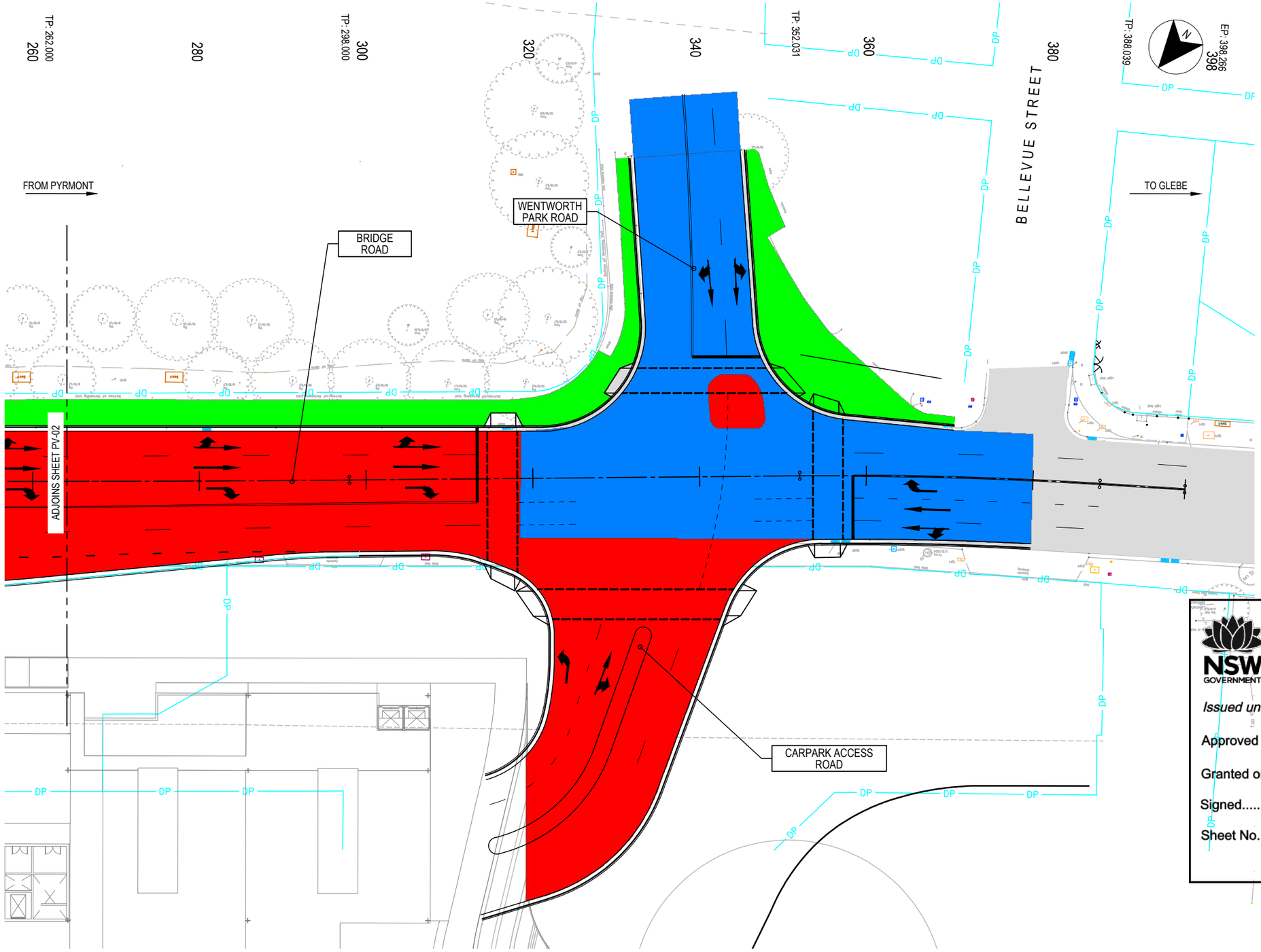
ISSUE STATUS: CONCEPT DESIGN

EDMS No.:

SHEET No.: PV-0302

ISSUE: 1

© Roads and Maritime Services



PAVEMENT LEGEND

- EXISTING DP BOUNDARY
- PAVEMENT TYPE 1 - NEW FULL DEPTH PAVEMENT
- PAVEMENT TYPE 2 - AC CORRECTIVE OVERLAY
- PAVEMENT TYPE 3 - CONCRETE PAVEMENT
- EXISTING PAVEMENT

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 44 of 44

NOTES

1. PAVEMENT PROFILES TO BE DEVELOPED IN CONJUNCTION WITH RMS DURING DETAILED DESIGN PHASE

NOT FOR CONSTRUCTION

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: \\mottmac\project\Sydney\Projects\38xxxx\385951 Sydney Fish Markets\04 Working\01 Drafting\Civil\Drawings\CI-PV1-B20 PV-0303.dwg

DESIGN LOT CODE:

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING:

PLOT DATE / TIME: 25/9/2019 5:30:00 PM

PLOT BY: PAC82679

CLIENT: UrbanGrowth NSW Development Corporation

ULTIMO - CITY OF SYDNEY
MR 00000 - BRIDGE ROAD
SYDNEY FISH MARKET
BRIDGE ROAD UPGRADE
FROM WATTLE STREET TO WENTWORTH PARK ROAD
PAVEMENT PLAN

A3

SHEET 3 OF 3

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
	0	9.10.2018	ISSUED FOR CONCEPT DESIGN		B.SOO
	1	25.09.2019	RE-ISSUED FOR CONCEPT DESIGN		B.SOO

SCALES ON A3 SIZE DRAWING: 0 5 10 15 20 — PLAN 1:500

CO-ORDINATE SYSTEM: MGA ZONE 56

HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: MOTT MACDONALD — Level 10, 383 Kent Street, Sydney, NSW 2000, Australia; PO Box Q1678, QVB Sydney NSW 1230, Australia; T +61 (0)2 9098 6800; W www.mottmac.com

MM DRAWING NUMBER: CI-PV1-B20 PV-0303

	TITLE	NAME	DATE
DRAWN		GA.PACIBEN	25.09.19
DRG CHECK		B.SOO	25.09.19
DESIGN		GA.PACIBEN	25.09.19
DESIGN CHECK		V.SOFREVSKI	25.09.19
DESIGN MNGR		B.SOO	25.09.19
PROJECT MNGR		G.BABCOCK	25.09.19

PREPARED FOR: URBAN GROWTH

RMS REGISTRATION No.: DS2018/XXXXXX — PART 01

ISSUE STATUS: CONCEPT DESIGN

EDMS No.:

SHEET No.: PV-0303

ISSUE: 1

© Roads and Maritime Services

© JBS&G

This document is and shall remain the property of JBS&G. The document may only be used for the purposes for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited

Document Distribution

Rev No.	Copies	Recipient	Date
A	1 x electronic	Nick Bouziotis – UrbanGrowth NSW	01/03/2018
0	1 x electronic	Nick Bouziotis – UrbanGrowth NSW	03/09/2018
1	1 x electronic	Nick Bouziotis – UrbanGrowth NSW	02/11/2018
2	1 x electronic	Jennifer Chang – UrbanGrowth NSW Tom Onus – Ramboll Australia Pty Ltd	29/03/2019
3	1 x electronic	Jennifer Chang – UrbanGrowth NSW Tom Onus – Ramboll Australia Pty Ltd	04/04/2019
4	1 x electronic	Jennifer Chang – UrbanGrowth NSW Tom Onus – Ramboll Australia Pty Ltd	08/07/2020

Document Status

Rev No.	Author	Reviewer	Approved for Issue		
		Name	Name	Signature	Date
A	Chris Bielby	Joanne Rosner	Draft for UrbanGrowth NSW review		01/03/2018
0	Chris Bielby	Joanne Rosner	Joanne Rosner		03/09/2018
1	Chris Bielby	Joanne Rosner	Joanne Rosner		02/11/2018
2	Chris Bielby	Joanne Rosner	Joanne Rosner		29/03/2019
3	Chris Bielby	Joanne Rosner	Joanne Rosner		04/04/2019
4	Chris Bielby	Joanne Rosner	Joanne Rosner		08/07/2020



Appendix 13: Waste Management Plan

MULTIPLEX

WASTE MANAGEMENT PLAN

New Sydney Fish Market

Multiplex Constructions Pty Limited

L22, 135 King St
Sydney, NSW 2000
Australia
T: +61 2 9322 2000
F: +61 2 9322 2001

multiplex.global

Contents

Contents **2**

1. Introduction **1**

1.1 Purpose 1
1.2 Scope of this Plan 1
1.3 Abbreviations 1
1.4 Precedence 1
1.5 Interface with other Operational Procedures and Project Plans 1
1.6 Project Description 2
1.7 Project Scope 3
1.8 Legal and Other Requirements 3
1.9 Document Control 4
1.10 Management System Framework 4

2. Waste Management System Framework **5**

2.1 Roles and Responsibilities 5
2.2 Potential Impacts 6
2.3 Management Strategies 6
2.4 Subcontractor management 6
2.5 Waste Control Methodology 7
2.6 Induction and Training 7
2.7 Emergency Management 7
2.8 Hazardous Substances 7
2.9 Waste Audits 7

3. Waste Minimisation and Management Sub Plan **8**

3.1 Objectives and Targets 8
3.2 Management Strategies 8
3.3 Monitoring and Reporting 10
3.4 Demolition and Excavation Phase Waste Management 10
3.5 Construction Phase Waste Management 11

4. Hazardous Materials **12**

5. Waste Disposal onsite **15**

5.1 Storage Areas 15
5.2 Internal Bin System. 15
5.3 Waste Transport 15

6. Appendices **16**

6.1 Appendix 1: Waste Control Methodology 16

1. Introduction

1.1 Purpose

This Waste Management Plan (WMP) has been prepared by Multiplex Constructions (MPX) to provide a coordinated high level plan that details, at a project level, the waste management strategies and procedures that will be adopted on the new Sydney Fish Market (nSFM). This WMP outlines the procedures to be employed in the recycling, removal, disposal and monitoring of waste that may be generated from nSFM works packages.

This plan forms part of Multiplex Constructions Management System which is certified to AS/NZS IS0 9001:2008 – Quality Management, AS/NZS ISO 14001:2004 – Environmental Management System, AS/NZS 4801:2001 – Occupational Health and Safety Management System, and the NSW Government Environmental Management system Guidelines Edition 4

1.2 Scope of this Plan

This plan applies to the works associated with the project and consists of measures to effectively manage waste, with emphasis on minimisation during construction works.

This plan has been developed to satisfy DA Condition B80 – Waste Management Plan, including at a minimum:

- Demonstrate appropriate areas onsite for storage of waste and recycling bins.
- Detailed list of all waste and recyclable material which will be generated by works package.
- Details of compliant methodology for the removal of asbestos and other hazardous waste.
- Containment and control of emissions of fibres to the air during hazardous waste removal.
- Classification and management of generated waste in accordance to EPA's "Waste Classification Guidelines Part 1: Classifying Waste".
- Waste vehicle transport covers
- Details of how materials likely to fall from wheels and underside of any vehicles, trailers or motorised plant will be removed prior to this plant leaving site.

1.3 Abbreviations

The abbreviations used in this Plan are outlined below.

Abbreviation	Definition
AS/NZS	Australian and/or New Zealand Standard
WMP	Waste Management Plan
MPX	Multiplex Constructions Pty Ltd
MSOP	Management System Operational Procedures

Table 1 *Abbreviations*

1.4 Precedence

Where ambiguity is detected between the procedures and requirements in this plan and the MSOPs located on Multiplex Operating System, then the procedures nominated in this Plan will take precedence.

1.5 Interface with other Operational Procedures and Project Plans

This Plan should be read in conjunction with the MSOP and Management Plans detailed in Section 1.10 of this Plan.

The MSOP referenced in this Plan are confidential documents, and as such, will not be issued outside of Multiplex. However, they will be made available, for the purpose of surveillance and audit.

1.6 Project Description

The existing Sydney Fish Market is the largest market of its kind in the Southern Hemisphere and the third largest seafood market, in terms of variety, in the world. The existing Sydney Fish Market sources product both nationally and internationally and trades over 13,500 tonnes of seafood annually.

The proposal is to design and construct a new fish market with a contemporary urban design that will provide unique experiences for visitors as well as 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 market in a new setting designed to achieve design excellence, functional performance, and environmental sustainability.

The nSFM will include retail and food and beverage premises, wholesale facilities and auction rooms, offices and commercial space, the Sydney Seafood School, and back-of-house facilities including 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 state of the art back-of-house plant and recycling and waste management facilities.

The existing Sydney Fish Market must continue to operate and trade without disruption while works relating to the nSFM are undertaken.

1.6.1 Project Location

The new Sydney Fish Market is located at the head of Blackwattle Bay between Pyrmont Peninsula and Glebe Peninsula, on Bridge Road. The site is adjacent to the existing fish market, located south east of Anzac Bridge at the intersection of Pyrmont Bridge Road and the Western Distributer.

Site Address	New Sydney Fish Market Precint Site, comprising: 1A, 1B, & 1C Bridge Road, Glebe
Site Identification	Part of Lot 107 in DP 1076596 Lot 3, 4 & 5 DP 1064339
Development Area	Development Footprint (approx.) 3.2 Hectares, Building Footprint (approx.) 2 Hectares
Adjoining Site Uses	North: Blackwattle Bay and Foreshore East: Existing Sydney Fish Market, Pyrmont, Strata Developments and terrace houses South: Wentworth Park West: Glebe Hillside Housing & Sydney Secondary College Blackwattle Bay
Ownership	Transport for NSW (TfNSW)
LGA	The Site is partly within the City of Sydney council area and partly within Sydney Harbour and adjoining the City of Sydney council area.

Table 2 *Project Location*

1.7 Project Scope

The New Sydney Fish Market is a proposed design, construct and relocation of the existing Sydney Fish Market to Blackwattle Bay, while ensuring that the existing Sydney Fish Market remains operating and trading without disruption. The development aims to expand and improve the functions of the Sydney Fish Market allowing visitors to experience world class facilities, and will consists of the following elements:

- Undertaking Early Works as per scope.
- A new Public Domain providing linkages to the existing waterfront promenade around Blackwattle Bay as well as Wentworth Park and adjoining public transport networks. Additional features include a water play area, integrated soft landscaping and irrigation systems, water access and water edge treatment.
- New wharves suitable for ferry and commercial fishing fleet operations, charter fishing boat and public recreational marine craft berthing and mooring.
- Design and construction works to raise Bridge Road to suit the levels of the nSFM.
- Selected retail fit out for tenant operations.
- Retail and food and beverage premises, wholesale facilities and auction rooms, offices, commercial space and the Sydney Seafood School.
- Back-of-house facilities including car, truck and coach parking spaces as well as plant and recycling and waste management facilities.
- A long span glulam timber structure and canopy roof including cassettes, roof soffit and fascia.
- Achieving a 5-Star Green Star rating for sustainability.

1.8 Legal and Other Requirements

1.8.1 Legislative References

The pertinent Acts, Regulations and Guidelines that apply to the project are outlined below:

ENVIRONMENTAL LEGISLATION REGULATIONS AND GUIDELINES	
Acts	
» *Waste Avoidance and Resource Recovery Act 2011* » *Protection of the Environment Operations Act 1997*	» *Environmental Planning and Assessment Act 1979* » *Work Health and Safety Act 2011*
Regulations	
» NSW EPA Resource Recovery Orders and Resource Recovery Exemptions » Protection of the Environment Operations (Waste) Regulation 2014	» NSW Waste Avoidance and Resource Recovery Strategy 2014-21Health (Asbestos) Regulations 1994 » Work Health and Safety Regulation 2011
Guidelines/Codes of Practice	
» City of Sydney – Guidelines for Waste Management in New Developments » Landfill Waste Classifications and Waste Definitions' – classified as a Special Waste (Type 1) » Code of Practice How to Safely Remove Asbestos – August 2019 (NSW)	» Guidelines for Health Surveillance [NOSHC: 7039 (1995)] » Waste Classifcation Guidelines Part 1: Classifying Waste

Table 3 *Legislative References*

1.8.2 Development Conditions

The relevant development conditions relating to construction waste management for the project are outlined below:

Condition No.	Requirement
» B80.	» Prior to the commencement of any construction (including demolition), a Waste Management Plan must be prepared. The Waste Management Plan must: a) Demonstrate that an appropriate area will be provided for the storage of garbage bins and recycling containers and all waste and recyclable material generated by the works; b) Provide details demonstrating complaince with the relevant legislation, particularly with regard to the removal of asbestos and hazardous waste, the method of containment and control of emission of fibres to the air; c) Require that all waste generated during the project is assessed, classified and managed in accorance with the EPA's "Waste Classification Guidelines Part 1: Classifying Waste"; d) Require that the body of any vehicle or trailer used to transport waste or excavation spoil from the Subject Site, is covered before leaving the Subject Site to prevent any spill, or escape of any dust, waste, or spoil from thr vehicle or trailer; e) Require that mud, splatter, dust and other material likely to fall from or be cast off the wheels, underside or body of any vehicle, trailer or motorised plant leaving the Subject Site, is removed before the vehicle, trailer or motorised plant leaves the Subject Site. Prior to the commencement of works, details demonstrating complaince with the above requirements and a copy of the Waste Management Plan must be submitted to the Certifier.

Table 4 *Development Conditions*

1.9 Document Control

Revisions to this Management Plan shall be made as required to reflect the current system requirements. Amendments to this Management Plan are approved by the Project Manager or Construction Manager.

All changes will be identified as below, and communicated to all relevant personnel.

Revision	Date	Description	Page	Reviewed By	Approved By
1	09/02/2021	Initial issue	All	Darcy Lambert	Paul Couani
2	16/02/2021	Revised by SLR	All	Andrew Quinn/Darcy Lambert	Paul Couani

Table 5 *Document Revisions Control*

1.10 Management System Framework

Multiplex has a management framework which is applied throughout the business and on all projects it undertakes. The EMS documentation forms part of this System Framework and maintained in electronic format on Multiplex Operating System.

The structure of the overall Management System is explained below.

Element	Content	
Internal Control Framework	» Operating Environment	» Information and Communication

Element	Content	
	» Risk Assessment » Control Activities	» Monitoring Activities
Polices	» Work Health and Safety » Environmental » Quality » Risk	» Drugs and Alcohol » Injury and Rehabilitation » Indigenous Engagement » Diversity
Operational Procedures	» Risk Management » Integrated Management » Quality Management » Design Management » Construction Management » Health and Safety Management	» Environmental Management » Project Administration » Bid Management » Human Resources Management » Planning and Programming
Management Plans	» Project » Quality » Design » Work Health and Safety » Environmental » Emergency	» Construction » Stakeholder » Risk » Commissioning and Testing » Construction Waste Management
Sub Plans	» Construction Noise and Vibration » Dust and Air Quality » Water Quality » Erosion and Sediment » Chemicals » Land Contamination	» Waste » Heritage » Flora and Fauna » Site Office
Risk Management	» Project Risks	» Aspects and Impacts
Forms and Guides	» As per Document and Forms Library	

Table 6 *Management System Structure*

2. Waste Management System Framework

2.1 Roles and Responsibilities

Multiplex has identified levels of individual responsibility and accountability for managing waste across all roles within the Project Team. The general responsibilities of key project personnel in relation to waste are as follows:

Construction Manager – David Maher: The Construction Manager is responsible for establishing and resourcing the project team to meet the requirements for waste management on the project. The Construction Manager reports directly to the Regional Director on all matters relating to the project.

Project Manager – Paul Couani: The Project Manager is responsible for ensuring that the Waste Management Plan and procedures are implemented on the project and has line control of Multiplex project personnel.

Contracts Manager - Daniel Jessop: The Contracts Manager must ensure contract provisions are made for procurement that includes waste management, take-back policies. Subcontractors are expected to extend all avenues to ensure recycling and reuse occurs.

Site Manager – Ben De Bono: The Site Manager is responsible for the day-to-day implementation of waste management and coordination of disposal and overlooking site supervisors to ensure that are managing waste appropriately within their areas of responsibility.

WHS&E Coordinator – Darcy Lambert: The WHS&E Coordinator provides direct assistance to the Site Manager and Supervisors in the implementation of this Plan, and in particular, is the direct conduit between the WHS Committee/ H&S representatives and the project team. Ensuring a rapid response to risks as they emerge and resolution of grievances between management and workers over WHS matters are fundamental aspects of the role.

2.2 Potential Impacts

Potential waste generated during construction may include domestic, biological and physical materials. Domestic refuse will be collected and removed from the project area on a frequent basis.

Biological waste including vegetation and spoil will be stored and re-used on site where appropriate, confirming it is contaminant- and acid sulphate-free. Otherwise, biological waste will be removed and disposed of at a facility lawfully able to accept it. Biological waste from site toilets is to be pumped and removed by the toilet supplier.

2.3 Management Strategies

Multiplex's commitment to construction waste management aligns with the Bays Precinct West East Waste Management Plan minimisation approach. The approach to be implemented by Multiplex is shown below:



Figure 1: Waste Minimisation Approach

2.4 Subcontractor management

All subcontractors are required to operate with the requirements of the WMP and associated documents.

Any demolition, civil and landscape subcontractors will be required to develop a WMP for their Scope of Work detailing the type of waste generated and waste avoidance, reduction, reuse and recycling strategies.

Details on the principles of waste management and methods for reducing construction waste, waste classification and storage locations are included in the project induction.

2.5 Waste Control Methodology

A Waste Control Methodology has been prepared for the project to include key information including the following where relevant. It is located in **Appendix 1** and details the following:

- The worksite layout and boundary
- Location of worksite waste management facilities and waste collection point
- Construction traffic routes within and adjacent to the worksite
- Location of the nearest sensitive (noise and odour) receivers
- Site Offices.

2.6 Induction and Training

Several levels of training activity are managed within the project. Training will be developed to incorporate the requirements of the contract and will include:

- Site induction (including subcontractors and, where applicable, visitors). The induction will contain content on the waste management and mitigation measures for the project. The induction will include appropriate information on the significant risks for the project.
- Unexpected hazardous waste find (protocol)
- Ongoing training and awareness activities throughout the Project Term
- Competency based training (e.g. waste management, spill response and hazardous substances for construction work).

2.7 Emergency Management

Emergency incidents and emergency situations shall be managed in accordance with the Emergency Management Plan (located within the Project Management Plan) which has been developed for the Project. The plan provides guidance in the event of any environmental (waste) or safety related emergency affecting the project.
Relevant details of the Emergency Management Plan shall be provided to all personnel during the site induction and information posted on notice boards.

2.8 Hazardous Substances

Hazardous substances supplied to the project shall be isolated, registered, correctly stored, decanted, used and disposed in accordance with the material safety data sheets (MSDS) and regulatory requirements. Hazardous waste to be landfilled will be transferred and disposed of at authorised hazardous landfill sites (**by the civil subcontractor**). Employees shall be trained in the safe work method statements based on the MSDS and provided with the appropriate PPE.

For more detailed procedures and processes on the management of hazardous substances, reference shall be made to the civil works Subcontractors' Waste Management Plans, and the sub-plans outlined in the CEMP for the Project.

2.9 Audits of Waste System

An environmental auditing programme shall be established and consist of:

- Internal systems audits which shall focus on those sections of the Waste Management Plan that are relevant to current operations;
- Subcontractor compliance audits based on a risk assessment of the activities being undertaken.

Results of the audits shall be documented and brought to the attention of personnel having responsibility for the area audited and reported to the Project Manager. Any deficiencies or non-compliances identified will result in corrective action initiated using the 'Non-Conformance Report' or detailed as 'Observations' in the audit report.

3. Waste Minimisation and Management Sub Plan

Waste can affect different aspects of the environment and may cause contamination, impacts on visual amenity and health effects. Waste materials that may be produced on the Project include:

- Demolition materials – concrete, spoil etc.
- Building material waste – off cuts, overspill of concrete, packaging, steel, etc.
- Plant maintenance waste – oil, batteries etc.
- Work compound (on-site employee) waste - litter including food and drink packaging etc.
- Packaging waste
- Black and grey water – onsite portable toilets
- Office equipment (portable offices) – paper, cardboards, etc.

3.1 Objectives and Targets

Objective	Target	Key Performance Indicator
» Solid and liquid waste to be disposed of as per Regulatory requirements.	» All waste to be disposed of by a licensed waste contractor.	» Onsite waste disposal facilities confirmed and documented.
» No waste to affect nearby premises.	» No complaints related to construction waste affecting nearby premises during construction.	» Number of complaints relating to waste.
» Minimise waste and recycling generated on site	» Ensure all subcontractors are informed of and implement site waste management procedures.	» Waste reporting by waste contractors
» Segregate waste on site to maximise reuse and recycling	» All waste to be segregated into provided separate waste type storage.	» Waste reporting by waste contractors
» Segregate contaminated or hazardous waste for appropriate treatment and disposal, where applicable	» All hazardous waste to be disposed of in accordance with SafeWork NSW and NSW EPA requirements	» Waste reporting by waste contractors
» Divert construction waste from landfill	» Recycle 90% of demolition and construction waste by weight.	» Waste reporting by waste contractors

Table 7 *Waste Objectives and Targets Indicators*, *in line with the Bays Precinct Transformation Plan 2015*

3.2 Management Strategies

Parameter	Action	Timing	Responsibility
» Induction	» During inductions all personnel shall be made aware of individual responsibilities in regards to waste management, including the understanding that all personal rubbish and construction rubbish generated is to be properly disposed of in designated disposal facilities.	» Establishment	» All subcontractors

Parameter	Action	Timing	Responsibility
» Waste Reduction	» Specify reusable, stackable and returnable packaging. » Design in waste minimisation during the design phases by standard sizing of materials, the use of modular and prefabricated construction techniques. » Stockpile clean fill during the excavation phase for use as backfill on-site » Provide sub-contractors during the construction phase with clear guidance for reducing packaging on their own materials by both their suppliers and subcontractors, by accurate ordering and handling of materials.	» Establishment / Construction	» MPX, Consultants and Subcontractors
» Waste Management Plan	» Demolition and excavation subcontractors will be required to develop a Waste Management Plan for their Scope of Work detailing the type of waste generated, waste avoidance / reduction / reuse / recycling strategies.	» Establishment	» Demolition and Excavation Subcontractors
» Waste disposal storage area	» Appropriate waste disposal facilities (e.g. bins) shall be provided in strategic locations onsite (refer **Appendix A**). » Waste bins shall be located such that they do not affect the community and not close to surrounding premises. » Separation of waste for recycling will be enforced and monitored. » Small bins will be placed around the site as required to collect construction waste. These small bins will then be emptied into the large Construction Waste bins, which will be craned onto trucks within the perimiter of the construction zone. These Construction Bins will be strategically placed around the site depending on the progression of works.	» Establishment/ Construciton	» MPX / subcontractor
	» Waste disposal facilities shall be regularly collected or emptied by a licensed waste collector in accordance with local council health laws.	» Construction	» Subcontractor
	» Where possible a storage area allocated for the separation, collection and recycling of wastes will be established.	» Construction	» Subcontractor
» Recycling / waste reduction	» Recycling initiatives will be investigated and where practicable implemented onsite. This may include dedicated bins for different waste streams and use of alternative products.	» Establishment / Construction	» MPX / All subcontractors
» Waste contractors	» Licensed contractors shall be engaged to remove construction waste. A minimum target of 90% landfill waste diversion by weight will be achieved.	» Establishment	» Subcontractor
» Hazardous waste	» Hazardous waste will be managed and disposed of as per MSDS requirements and relevant legislation. Refer Section 4.	» Construction	» MPX / all subcontractors
» Servicing	» Where practicable plant will be serviced offsite to reduce the generation of hydrocarbon waste onsite and potential for spills.	» Construction	» All subcontractors

Parameter	Action	Timing	Responsibility
» Site office	» The site office shall implement the following office waste minimisation techniques: » Organising recycling paper bins in the office for waste paper » Recycle toner cartridges pick-ups » Using electronic storage to reduce use of paper » Purchasing products in bulk to reduce packaging	» Establishment	» MPX
» Package Minimisation	» Subcontractors shall be required to minimise the packaging they bring onto the site and to reuse off-cuts of material where possible	» Construction	» All Subcontractors
» Putrescibles waste (Organic waste)	» All putrescible waste to be placed in a lidded bin and removed separately.	» Establishment	» MPX
» Pallets and Reels	» Pallets and reels shall be separated and stored by subcontractors for return to the suppliers with other reusable packaging	» Construction	» All Subcontractors

Table 8 Waste *Management Strategies*

The strategies outlined in the table above are to be read in conjunction with the Waste Control Methodology outlined in Appendix A.

3.3 Monitoring and Reporting

Monitoring and reporting will be undertaken on a regular basis and as reasonably required by the Principal. Multiplex will check waste status daily, ensuring all waste is disposed of correctly and that bins are emptied at the appropriate frequencies, avoiding any overflow and littering. Reporting will align with the requirements below:

Type of Monitoring / Reporting	Timing	Responsibility	Record
» Percentage of diversion from landfill	» Monthly	» MPX	» Monthly Waste Report - Supported by dockets/receipts of waste removal from waste disposal contractor.
» Segregated waste and appropriate waste placement	» Weekly	» MPX	» Environmental Site Inspection
» Daily visual inspections of waste storage areas	» Daily	» MPX	» Written record of completion

Table 9 *Waste Monitoring and Reporting*

3.4 Demolition and Excavation Phase Waste Management

The new Sydney Fish Market Works package includes demolition and excavation works to facilitate Bridge Road upgrades. Waste materials generated by these works, such as asphaltic surfaces, concrete pavements, light poles and other miscellaneous materials, will fall within the civil Contractor's scope. These materials will be disposed of in accordance with this plan. Recyclable percentages will be provided by the waste disposal contractor.

Excavation will involve cutting and filling works. Any contaminated waste or acid sulphate soil will be disposed of appropriately in accordance with the Remediation Action Plan (RAP) and Acid Sulphate Soils Management Plan. The Table below provides a detailed breakdown of waste management during the demolition and excavation phase.

MATERIALS ONSITE	REUSE AND RECYCLING		DISPOSAL
	ONSITE	OFF - SITE	
Type of Materials	**Specify methods**	**Specify contractor and recycling outlet**	**Disposal**
DEMOLITION			
Masonry, brick & tile	General waste bin	Transfer for reprocess or recycle – Waste Subcontractor	90% Recycling
Concrete	General Waste bin	Transfer for reprocess or recycle – Waste Contractor	
Timber	General waste bin	Transfer for reprocess or recycle – Waste Subcontractor	
Metal	General waste bin / dedicated steel scrap bin	Transfer for reprocess or recycle – Waste Subcontractor	
Mixed waste	General waste bin	Transfer for reprocess or recycle – Waste Subcontractor	
Bitumen	General waste bin	Transfer for reprocess or recycle – Civil Subcontractor	
Asbestos	As per standards	Transfer & disposal at landfill lawfully able to accept it – Civil, Landscape, Marine Subcontractor	Landfill lawfully able to accept it
EXCAVATION			
Clean Fill	Assess, excavate & stockpile	Transport & fill	Nil
Any hazardous waste will be isolated and managed as per the legislation for hazardous waste. A high percentage of the clean excavation material will be diverted from landfill.			
The Civil Subcontractor prior to the commencement of excavation must develop a Waste Management Plan for areas of contamination and acidic soils. Materials are to be disposed at a waste facility lawfully able to accept them.			

Table 10 Demolition and Excavation Phase Waste Management

3.5 Construction Phase Waste Management

Construction phase waste is to be managed in accordance with the below Table:

MATERIALS ONSITE	REUSE AND RECYCLING		DISPOSAL
	ONSITE	OFF-SITE	
Type of Materials	**Specify methods**	**Specify contractor and recycling outlet**	**Disposal**
Concrete	General waste bin.	Transfer for reprocess or recycle - Waste contractor	90% Recycling

Masonry, Brick & Tile	General waste bin	Transfer for reprocess or recycle - Waste contractor	
Timber	General waste bin	Transfer for reprocess or recycle - Waste contractor	
Metal	General waste bin	Transfer for reprocess or recycle - Waste contractor	
Cardboard	Separate in designated bin	Transfer for reprocess or recycle - Contractor to be confirmed	
Mixed waste	General waste bin	Transfer for reprocess or recycle - Waste contractor	
Batteries	Separate in designated bin	-Recycle – Waste contractor	
Glass	General waste bin	-Transfer for reprocess or recycle – Waste contractor	
Packaging	Separate in designated bin	Transfer for reprocess or recycle - Waste contractor	
Paper	Separate in designated bin	Transfer for reprocess or recycle - Waste contractor	Divert from Landfill
Toner Cartridge	Separate in designated bin	-Transfer for reprocess or recycle/Waster contractor	Divert from Landfill
Waste will be minimised through reduction of waste generated, reuse of products and recycling. The waste stream will be separated where possible to maximise landfill diversion. Subcontractors will be responsible for recycling and reuse of their waste material and for removing non-recyclables from the work area to the main bin onsite.			

Table 11 Construction Phase Waste Management

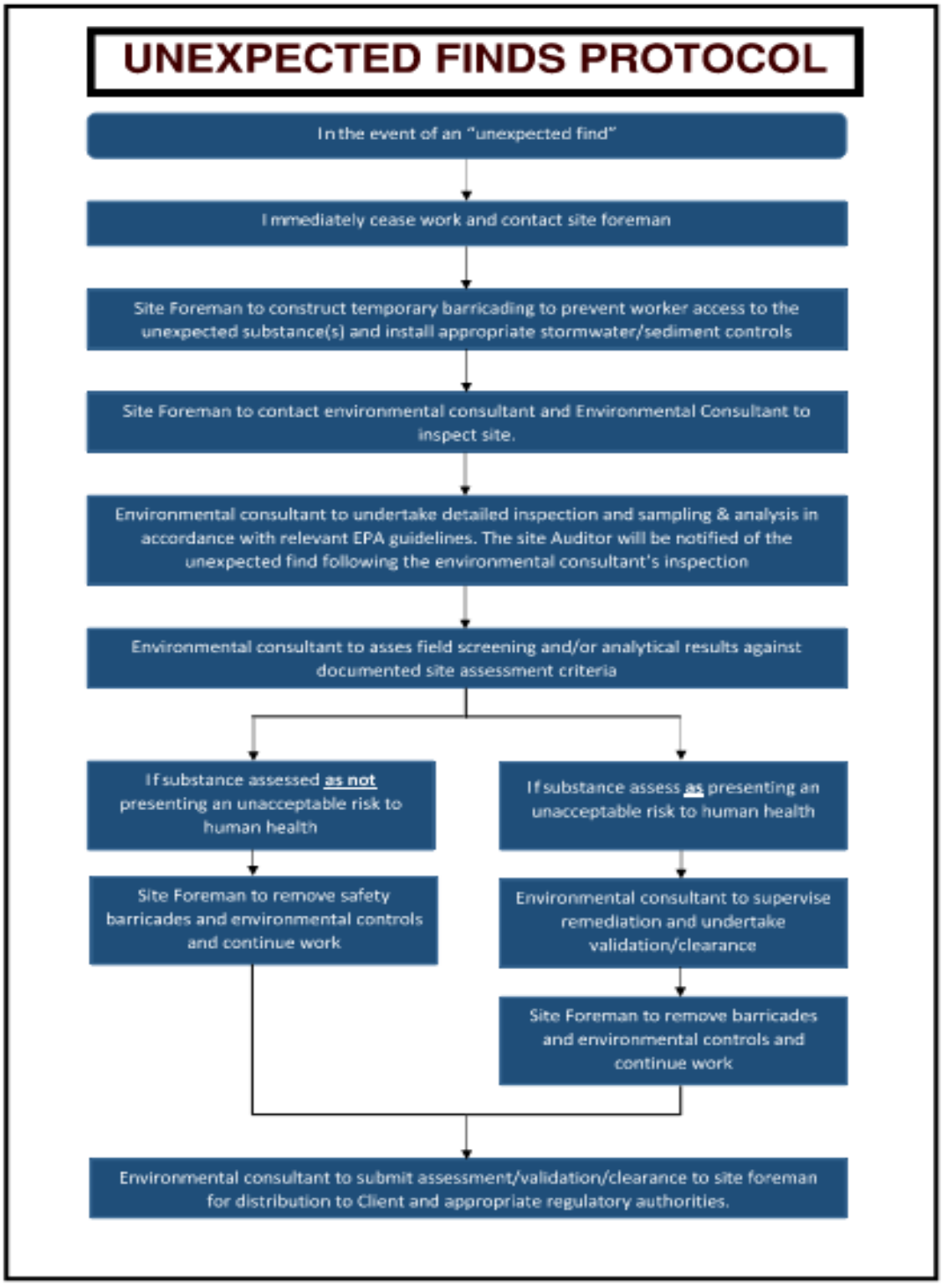
4. Hazardous Materials

4.1 Hazardous Waste Finds

Contaminated and/or hazardous materials and liquids, where identified, are to be removed by an appropriately licensed contractor and transported to facilities licensed to accept such materials for treatment and/or disposal in accordance with NSW EPA regulations.

Where suspected hazardous materials are encountered unexpectedly, the following protocol should be adhered to as a minimum:

- Work near the suspect material is to stop immediately, and access to the area restricted;
- Site manager is to contact a qualified hazardous materials assessor and/or environmental consultant (as necessary) to arrange an assessment of the suspect materials and advise on subsequent management procedures; and
- The building contractor's unexpected finds protocol, shall be implemented.



4.2 Asbestos and Hazardous Waste Removal and Containment.

Prior to excavating, all asbestos-containing material (ACM)-impacted soils must be dampened, but not drenched so as to avoid increase in both material weight and the risk of contaminated leachate run-off.

While excavating materials, the potential release and spread of ACM should be minimised by preventing loads being dropped from heights, controlling speed of on-site mobile plant and reducing the number and surface area of any temporary stockpiles between the excavation and loading point.

Stockpiles of ACM impacted soils must be:

- Managed in accordance with the remediation action plan
- Retained within the exclusion zone away from water bodies, to reduce potential impacts of stockpiles on surface water and sediment quality
- Maintained under moist conditions and provisions made to hydro mulch or otherwise stabilise the stockpile if not disposed of or removed from site within two weeks
- Bunded to contain soil or surface runoff. Material used for bunding is to be incorporated into the stockpile prior to burial or off-site disposal
- Following removal, soil validation sampling must be taken across the stockpile location to validate that contaminated soils have been successfully removed.

Decontamination of Soil

- If there is a risk of soil contamination, the area should be visually inspected by a competent person, and if any ACM is detected the soil must be decontaminated. The methods used for this decontamination should be based on a risk assessment and advice should be sought from a competent person.

- The topsoil should be dampened down, to minimise the generation of dust, and all visible pieces of ACM debris should be picked up individually, so that the risk of ACM fibre inhalation is effectively eliminated. If this is not practicable, the contaminated topsoil should be removed to a depth at which there is no visible ACM contamination or debris.

Remediation Options

- Treated on-site – hand-picking (emu-bob) any visible ACM fragments. Tilling and screening to separate ACM fragments from soil stockpiles. Testing and validation by a competent person via on-site screening through a < 7mm sieve of soil stockpiles and lab analysis prior to prescribing the soil as non-contaminated with ACM.

- Removed off-site - Contaminated soil is excavated to a depth where visible ACM fragments are no longer present. The contaminated soil is placed in a licensed truck and disposed of at a licensed landfill facility. Onsite visual inspection and further lab analysis by a competent person to prescribe the soil as uncontaminated.

Exclusion Zones & PPE

- The boundaries of the ACM work area and ACM removal site should be determined by the Licensed Removalist in consultation with a competent person and MPX. ACM removal boundaries must be defined with barricading and signage.
- Anyone involved in ACM work must wear respirators, coveralls, protective gloves and safety footwear. Where practical, this gear should be disposable. If not disposable this PPE, and any equipment used, must be appropriately decontaminated.

Monitoring and Clearance

- A competent person must assess the requirements for clearance inspections, control monitoring and clearance monitoring prior to starting the works based upon the risk identified by the asbestos removal works.

- A competent person must undertake clearance inspections which may include visual inspection, soil/dust/debris sampling, airborne fibre monitoring or a combination of them all.

Further details for management of removal, containment and control of other hazardous wastes is detailed in the site's Acid Sulphate Soil Management Plan, Remedial Action Plan and Hazardous Materials Management Plan.

5. Waste Disposal onsite

5.1 Storage Areas & Recycling

It is anticipated that on commencement of works, a main skip with dimensions 6.3 x 2.4 x 1.7 m (~25 m^3 or 11 tonne capacity) for the site's general solid (non-putrescible) waste will be established. This skip size will be able to fulfil the building waste disposal requirements of the project. This bin will be emptied at whatever frequency is required to ensure that waste is not placed in the bin beyond its rim, to prevent potential overflowing waste. Lidded bins separate to this skip will be located at site amenities areas for the removal of general solid waste (putrescible).

This skip bin will be positioned within the boundary of the project's main internal loading zone, this will allow unimpeded access by site personnel and waste disposal contractors. The skip will be collected at this designated location, where sufficient space for the collection trucks to manoeuvre and reverse to the bin will be provided. The location described may changed based on construction progression and requirements. The bin zone may be changed to basement areas with adequate height clearance and/or a ground loading zone at later stages. Any changes to the main collection points will be communicated to the site workforce and the waste contractor.

Environmental controls such as drain covers, silt socks and sediment curtains will be established at bin storage areas, and outside the site, to manage any potential waste material or contamination entering the environment.

Wet down methods will be used during all bin emptying to minimise dust emissions which may impact nearby Bridge Road or other external or public areas. Physical screening may also be used to mitigate the potential impact from waste emptying and collection activities.

Where posssilbe, the project will aim to separate ferrous, concrete and other identified waste streams onsite. All other streams of waste will be separated offsite by a licensed contractor. Separate bins for recyclable cans and bottles are planned to be established near site amenites. Any proceeds from the recycling of this waste stream, including collection and refund of deposit containers,will be donated to a charity yet to be determined.

5.2 Internal Bin System.

All waste produced onsite will be delivered to the skip bin as detailed in the previous section. Smaller quantities of waste will be collected in 240 L, 660 L and 1100 L wheelie bins and craneable skips with a capacity of 2 tonnes and will be emptied regularly into the site's main skip bin.

These smaller bins will positioned to accommodate waste expected to be produced during construction. Contractors will also be responsible for supplying bins for their own waste generation activities.

These bins will be transported to the internal collection point and emptied into the skip bin as required. No bins will be left full in the storage area. Multiplex will ensure that this is enforced by each Subcontractor and emphasised in tool box meetings and pre-starts where required. In the unlikely event that the skip bins are full, bins will be stored neatly and placed out of the way of site activities.

Bins for general putrescible (organic waste) and recycling will be established at site amenity areas and will be removed separately to the main skip onsite.

5.3 Waste Transport

All waste collection vehicles will follow routes specified in the Construction Traffic & Pedestrian Management Plan. Trucks will access the site via the entry point (gate 1) located nearest to the intersection of Wentworth Park Road and Bridge Road. If during the material handling process, unpleasant odours are produced, these materials will be relocated to an area away from public interfaces and removed immediately from the site.

All trucks exiting the site will have their loads covered with tarps or other approved coverings prior to leaving the site or construction boundary. Once loaded, each truck's tyres will be inspected to ensure that debris is removed as best as possible prior to leaving the site.

A truck wash facility will be installed at Gate 3 where trucks will be exiting the site. All loading zones will be kept clean at all times to ensure truck and vehicle tyres are in the same condition they were when they entered.

Furthermore, on-going sediment controls will be implemented to prevent waste, debris, saltation or contaminated liquid discharges onto roads and the local environment as well as preventing damage, loss, injury or nuisance caused by sediments and other materials. Controls include but are not limited to:

- Regular housekeeping e.g. road sweeping (remove debris transported onto roadways).
- Physical screening
- Sediment fencing
- Silt socks and silt curtain in Blackwattle Bay.

Trucks will transport materials along the fastest route to their end destination. Trucks heading north will cross the Harbour Bridge on the M1. Trucks heading west will either travel along Parramatta Road onto the M4 or cross the Harbour Bridge onto the M1 and M2 respectively depending on which route has the least amount of traffic. These are shown in Figure 4.

6. Appendices

6.1 Appendix 1: Waste Control Methodology

6.1.1 Worksite layout and boundary

The new Sydney Fish Market development footprint and waste storage and collection areas are shown in the figure below.

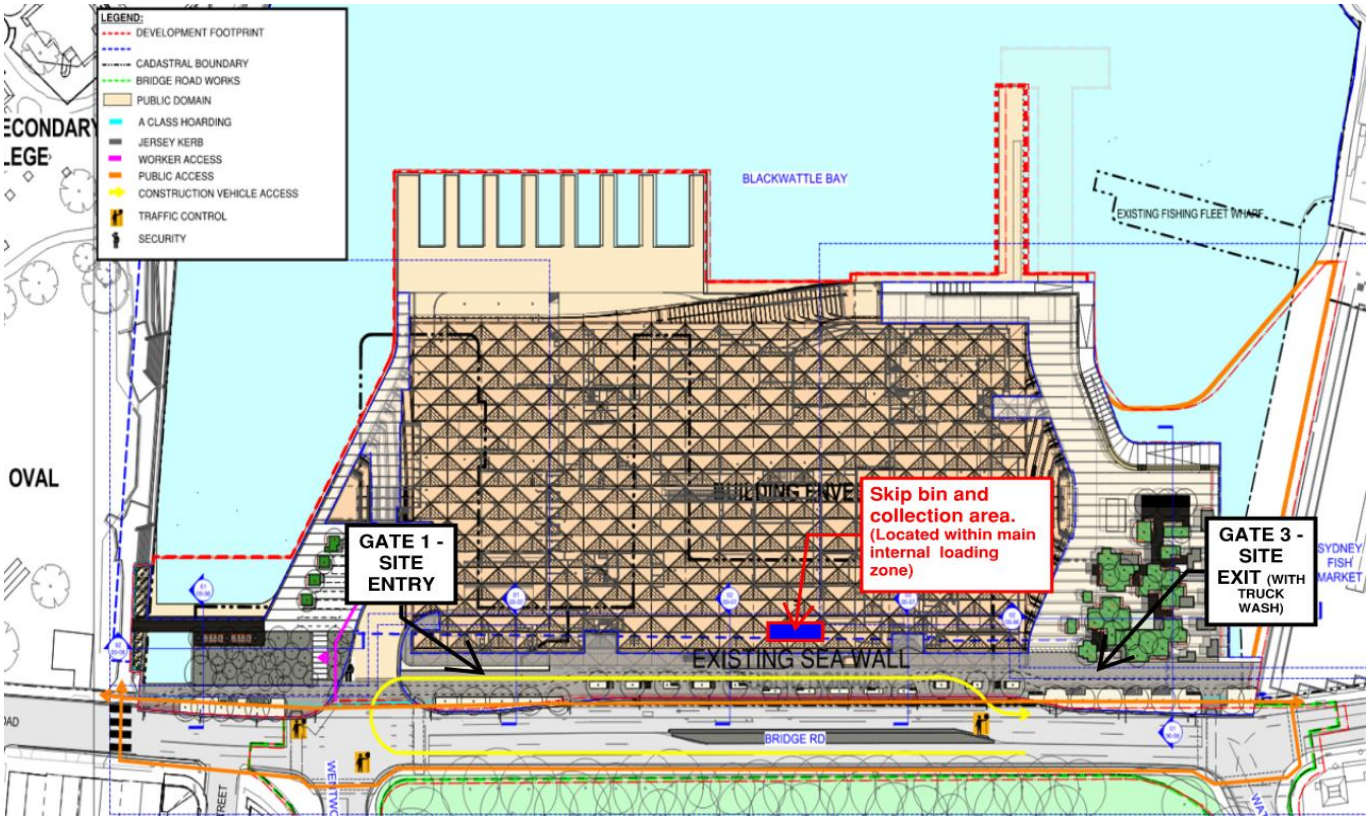


Figure 2 Waste Storage and Collection Point

6.1.2 Construction traffic routes within and adjacent to the worksite

Vehicles will approach the site from various directions. The corresponding access routes are summarised below as shown in *'Transport Impact Assessment: Concept and Stage 1 Works and Stage 2 Main Works'* document. These are shown in Figure 3:

» West – Majority of trips are expected to be from the west via either Victoria Road or the City West Link.

» East – Access from the east via the Cross City Tunnel and Western Distributor.

» North – Access from the north via the Sydney Harbour Bridge and Western Distributor

» South – Access via the Cross City Tunnel and Western Distributor, however both Wattle Street and Harris Street will provide an alternative route.

The primary access point to the site will be via the intersection of Wentworth Park and Bridge Road. The main inbound and outbound construction traffic routes are shown below:

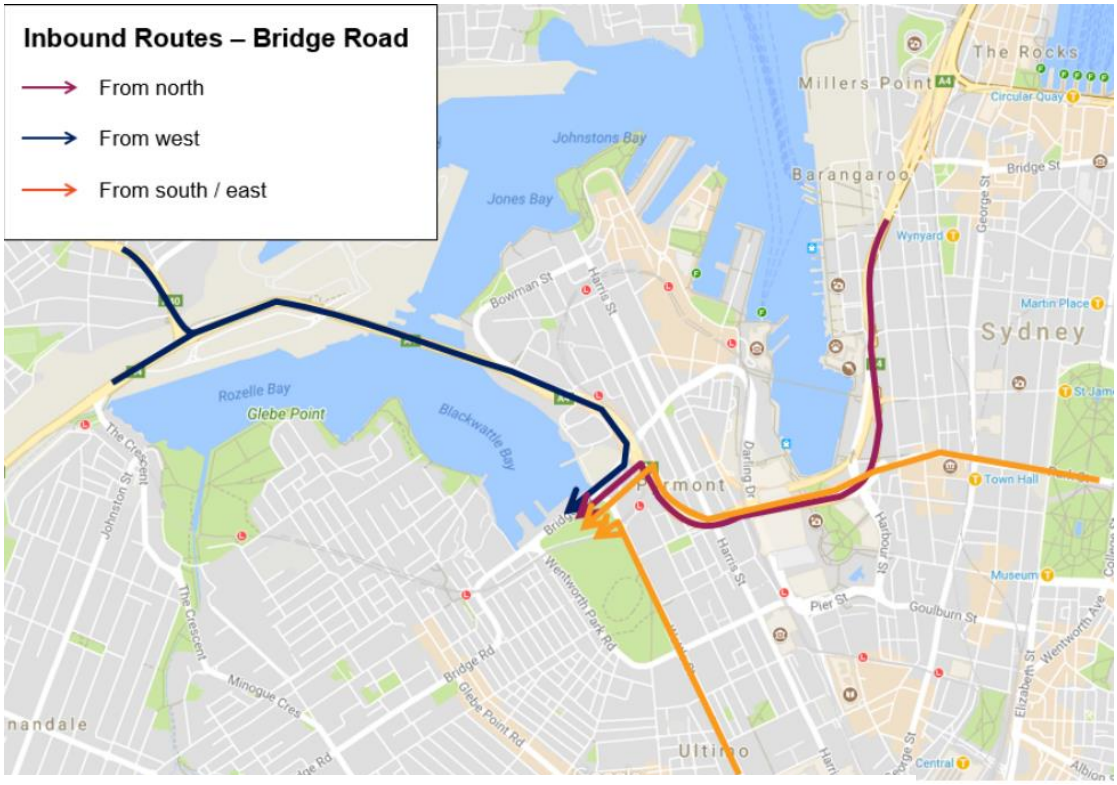


Figure 3 Inbound Construction Traffic Routes – Bridge Road (Reference: 'Transport Impact Assessment: Concept and Stage 1 Works and Stage2 Main Works)

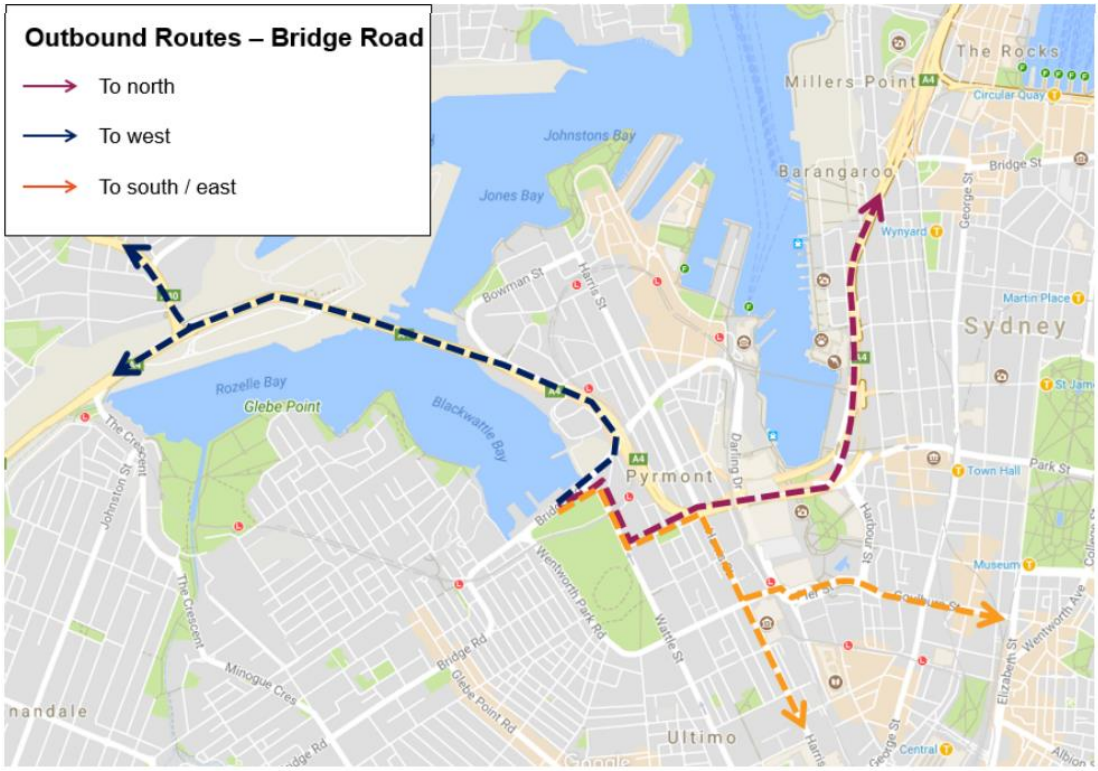


Figure 4 Outbound Construction Traffic Routes – Bridge Road (Reference: 'Transport Impact Assessment: Concept and Stage 1 Works and Stage 2 Main Works')

Appendix 14: Maritime Structures Heritage Impact Statement

COMBER CONSULTANTS

ARCHAEOLOGY – HERITAGE – MEDIATION – ARBITRATION

NEW SYDNEY FISH MARKET

Maritime Heritage Impact Statement

PREPARED BY DAVID NUTLEY

REPORT TO URBANGROWTH NSW DEVELOPMENT CORPORATION
VERSION NO I.2019
DATE MARCH 2019

COMBER CONSULTANTS

ARCHAEOLOGY – HERITAGE – MEDIATION – ARBITRATION

COMBER CONSULTANTS PTY LTD
ABN 96 109 670 573

76 EDWIN STREET NORTH
CROYDON, NSW, 2132
T 02 9799 6000
F 02 9799 6011
www.comber.net.au

DIRECTOR
JILLIAN COMBER

ASSOCIATE DIRECTOR, SYSTEMS
DAVID NUTLEY

ASSOCIATE DIRECTOR, PROJECTS
TORY STENING

DOCUMENT CONTROL

PROJECT NO.: UG322 **STATUS:** Final

REV	DATE	PREPARED	EDITED	APPROVED
A	20-02-2018	David Nutley	Jillian Comber	Jillian Comber
B	23-08-2018	David Nutley	Jillian Comber	Jillian Comber
C	29-08-2018	David Nutley	Jillian Comber	Jillian Comber
D	05-11-2018	David Nutley	Jillian Comber	Jillian Comber
E	06-11-2018	David Nutley	Jillian Comber	Jillian Comber
F	07-11-2018	David Nutley	Jillian Comber	Jillian Comber
H	07-11-2018	David Nutley	Jillian Comber	Jillian Comber
I	27-03-2019	David Nutley	Jillian Comber	Jillian Comber

INTEGRATED MANAGEMENT SYSTEM

Comber Consultants has a certified integrated management system to the requirements of ISO 9001:2008 (quality), ISO 14001:2004 (environmental), OHSAS 18001:2007 (health and safety) and AS/NZS 4801:2001 (health and safety). This is your assurance that Comber Consultants is committed to excellence, quality and best practice and that we are regularly subjected to rigorous, independent assessments to ensure that we comply with stringent Management System Standards.



EXECUTIVE SUMMARY

UrbanGrowth NSW Development Corporation (UrbanGrowth NSW) is currently preparing plans for the redevelopment of the new Sydney Fish Market within Blackwattle Bay. The Corporation has received Draft Secretary's Environmental Assessment. Requirements (SEARS) for the State Significant Development (SSD) Development Approval (DA's) for the Sydney Fish Markets.

Comber Consultants have been engaged by UrbanGrowth NSW to prepare a Maritime Heritage Impact Assessment (HIA) as part of the environmental risk assessment for the proposed DA. The HIA draws upon inter-related studies to contribute to the development of the SSD DA. The report identifies potential environmental risk impacts associated with the development within the marine environment.

The following report addresses SSD 8924. SSD 8925 will be addressed once concept plans are available.

The findings of this maritime Heritage Impact Assessment for SSD 8924 (Sydney Fish Markets – Concept development application and Stage 1 works comprising demolition and early works) and SSD 8925 (Sydney Fish Markets – Stage 2 main works) are:

1. The works under SSD 8924 and SSD 8925 have potential to disturb archaeological deposits of local significance within the sediment in the investigation area. The potential relics include those that may have originated from the use of the wharves as well as those carried into the bay via adjacent stormwater drains. The works under SSD 8924 and SSD 8925 therefore have potential to disturb archaeological deposits and relics submerged within the sediment in the investigation area. The potential relics include those that may have originated from the use of the wharves as well as those carried into the bay via adjacent stormwater drains.

2. Mitigation measures and archaeological test excavation strategy identified in Section 7 of this report should be adopted for the proposed works.

3. Site inductions for all employees, contractors and subcontractors engaged in undertaking works within the marine environment of the study area are to include protocols for responding to chance finds. These instructions should that in the event that a shipwreck or relic is located during construction works:
    I. Work should cease immediately in the vicinity of the shipwreck or relic
    II. A qualified maritime archaeologist should be engaged to:
        a. Assess the significance of the shipwreck or relic
        b. Provide management recommendations which could include recovery and conservation or reburial of the relic.

4. If a significant relic is uncovered during the redevelopment of the Bay, reuse strategies should be considered. Dependent upon the condition, material and significance of the item such opportunities could include:
    - Incorporation as a waterside feature in design and interpretation plans for the reuse of the current site of the Sydney Fish Market
    - Relocated into the public domain as an artwork, similar to the approach adopted at Pyrmont with the tumbling balls retained from the former Cane-ite works.

5. Any earthworks within the vicinity of the nineteenth century seawall and wharf should be monitored by a suitably qualified archaeologist. In the event that evidence of those structures is identified, work should immediately cease in that area to enable the archaeologist to assess the nature and significance of the feature and to provide advice on appropriate management.

CONTENTS

1.0 INTRODUCTION AND OVERVIEW 2
1.1 BACKGROUND 2
1.3 SITE AND CONTEXT 2
1.4 APPROVAL STRATEGY 2
1.5 SUMMARY OF THE DEVELOPMENT 3
1.5.1 CONCEPT DEVELOPMENT APPLICATION 3
1.5.2 MAIN WORKS DEVELOPMENT APPLICATION 3
1.6 PURPOSE OF THIS REPORT 4
1.7 OWNERSHIP 4

2.0 PROPOSED WORKS 7
2.1 PROPOSED WORKS - GENERAL 7
2.2 PROPOSED WORKS - STAGE 1 - DEMOLITION AND EARLY WORKS (SSD 8924) 8
2.3 PROPOSED WORKS - STAGE 2 – MAIN WORKS (SSD 8925) 9

3.0 LITERATURE REVIEW 14
3.1 INTRODUCTION 14
3.2 NEW SOUTH WALES MARITIME HERITAGE DATABASE 14

3.3 ARCHAEOLOGICAL POTENTIAL OF WHARVES ON PARRAMATTA RIVER 15
3.4 EXISTING BAYS MARKET DISTRICT HERITAGE IMPACT ASSESSMENT STUDIES REGARDING THE SYDNEY FISH MARKET AREA 16
3.5 OTHER SOURCES OF MARITIME HERITAGE WITHIN THE BAY 18
3.6 CLEARANCE DIVING WITHIN THE BAY 19
3.7 STRATEGIES AND PLANS 19

4.0 SITE INSPECTION 21
4.1 INTRODUCTION 21
4.2 SOUTHERN SHORELINE – PROPOSED NEW SYDNEY FISH MARKET FRONTAGE 21

5.0 ARCHAEOLOGICAL POTENTIAL 25
5.1 SHIPWRECKS 25
5.2 MARITIME INFRASTRUCTURE 25
5.3 OTHER POTENTIAL RELICS WITHIN THE NEW SYDNEY FISH MARKETS INVESTIGATION AREA 25
5.4 SUMMARY OF ARCHAEOLOGICAL POTENTIAL 25

6.0 SIGNIFICANCE ASSESSMENT 27
6.1 HERITAGE SIGNIFICANCE 27
6.2 CRITERIA 27
6.3 STATEMENT OF SIGNIFICANCE 28

7.0 IMPACT AND MITIGATION 30
7.1 COFFERDAM INSTALLATION 30
7.2 REMOVAL OF EXISTING PILES, INSTALLATION OF NEW PILES AND SILT REDISTRIBUTION 30
7.3 AREAS NOT SUBJECT TO SEDIMENT DISTURBANCE: 32
7.4 EARTHWORKS ALONG THE SOUTHERN SHORE 32
7.5 INTERPRETATION 32

8.0 RECOMMENDATIONS 34

REFERENCES 36

APPENDIX A 38

APPENDIX B 39

1.0 INTRODUCTION

BACKGROUND
LOCATION
APPROVAL STRATEGY
SUMMARY OF THE DEVELOPMENT
CONCEPT DEVELOPMENT APPLICATION
MAIN WORKS DEVELOPMENT APPLICATION
PURPOSE OF THIS REPORT
OWNERSHIP

1.0 INTRODUCTION AND OVERVIEW

1.1 Background

1.2 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 UrbanGrowth NSW Development Corporation (UrbanGrowth NSW) and Sydney Fish Market Pty Ltd (SFM), to develop the design for the new fish market. As announced by the NSW Premier, works are planned to commence in 2019.

1.3 Site and Context

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 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 36,800m2. 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 400m walking distance from the site are the 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.

1.4 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 fish market development is State Significant Development and the Minister for Planning is the consent authority.

To deliver the new 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;

2. A development application for the construction of the new fish market;

3. An application to amend the planning controls applying to the site to enable the proposed development to be a permissible use on all of the site. This is to be achieved by an amendment to *Sydney Regional Environmental Plan No 26—City West ("SREP26").*

These applications will be lodged concurrently.

1.5 Summary of the development

The proposal is to build a new fish market with a contemporary urban design to 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 in a new setting designed to achieve design excellence, functional performance and environmental sustainability.

The new 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.

1.5.1 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 approximately 58,000m^2 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.

1.5.2 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 the fish market including waterfront commercial and tourist facilities and ancillary uses and the distribution of uses;
3. a gross floor area of approximately26,000m^2 as calculated according to the definition of GFA under SREP 26 (approximately 25,600m^2 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 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

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

1.6 Purpose of this report

The purpose of this report is to address the SEARs:

- SSD 8924 Sydney Fish Markets – Concept development application and Stage 1 works comprising demolition and early works, page 5, Section 11 – Heritage and Archaeology:
  - *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.*
- SSD 8925 Sydney Fish Markets – Stage 2 main works page 5, Section 11 – Heritage and Archaeology:
  - *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.*

Comber Consultants have been engaged by UrbanGrowth NSW to prepare this Maritime Heritage Impact Assessment (MHIA) for the proposed DA.

1.7 Ownership

The sea bed of the marine zone of Blackwattle Bay is controlled by Roads and Maritime Services, a New South Wales Government agency. The land associated with the existing Sydney Fish Market is government-owned.

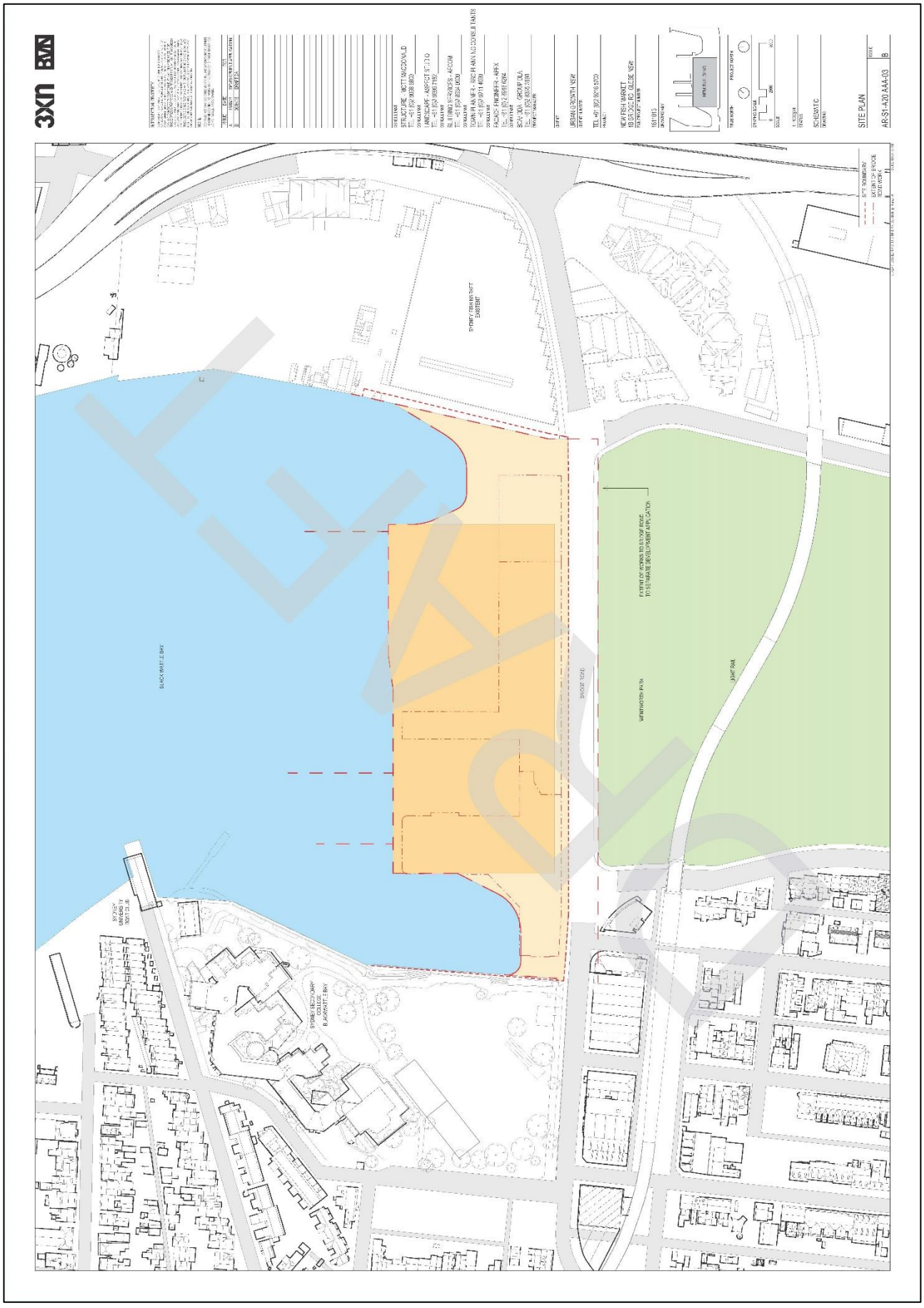


Figure 1: Bays Market Precinct investigation area (UrbanGrowth NSW)

2.0 PROPOSED WORKS

GENERAL
STAGE 1 - DEMOLITION & EARLY WORKS (SSD 8924)
STAGE 2 – MAIN WORKS (SSD 8925)

2.0 PROPOSED WORKS

2.1 Proposed Works - General

The 'New Sydney Fish Market SSD Pack 1 – Concept and Demolition document (November 10th 2017) delineates the investigation area and overlays the proposed footprint of the redevelopment over the existing site plan (Figure 2). It also includes an Early Works Demolition' plan (Figure 3), a long section (Figure 4), a cross section (Figure 5) and a basement plan (Figure 6).

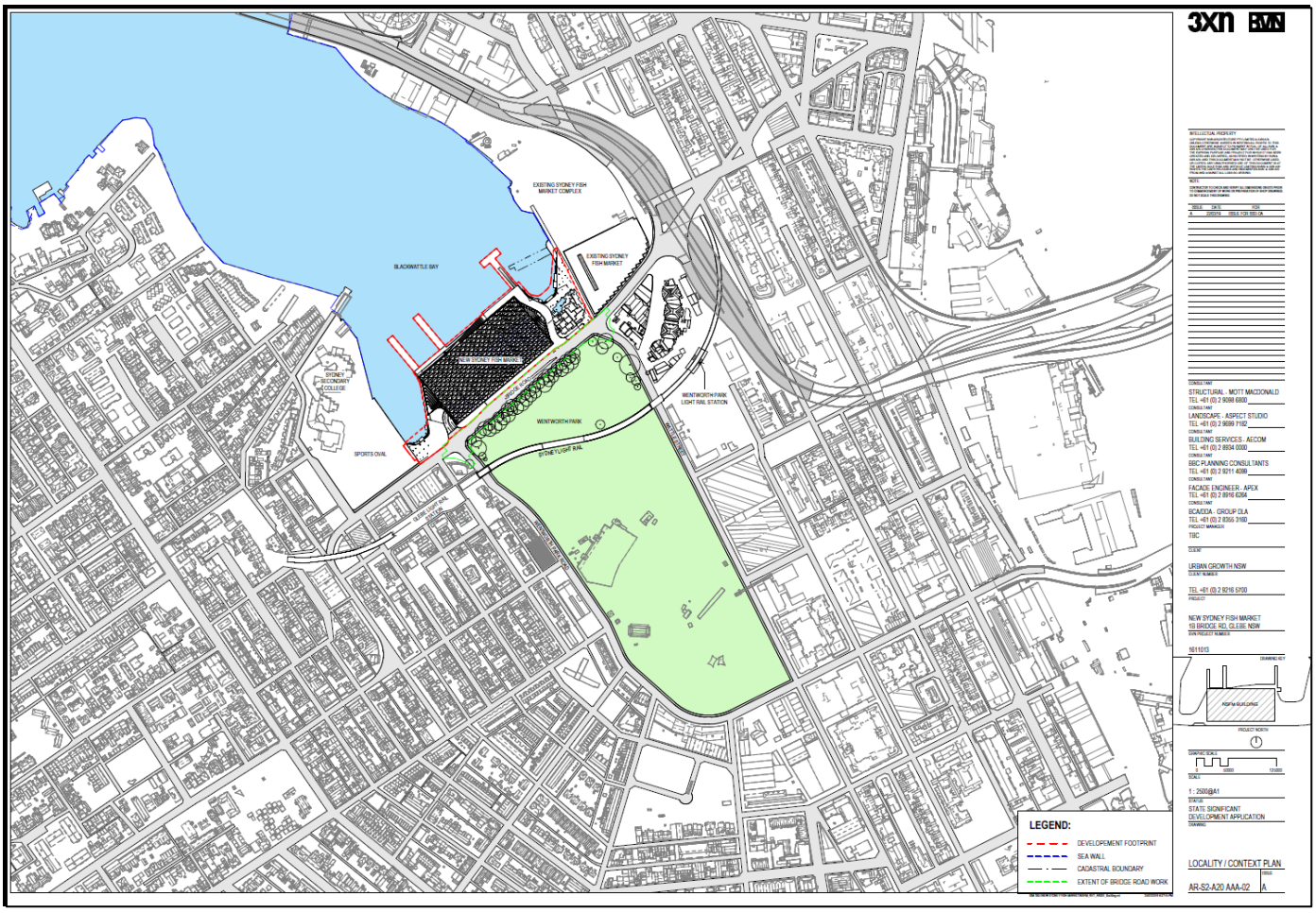


Figure 2: Development footprint for the New Sydney Fish Market. Site Plan -AR-S2-A20 AAA-02, Issue A. Date: 22-03-2019)

The proposed works include demolition of all existing buildings and wharf structures along the southern foreshore (Figure 5). This will include removal of existing platforms and full extraction of support piles. These works will be conducted prior to installation of a cofferdam for the construction phase (Stage 2).

The new structure for the wharf will include a basement that will be excavated to RL -0.3m. The wharf will be supported on piles (Figures 6 & 7). The proposed excavation and construction works will be conducted within the cofferdam.

2.2 Proposed Works - Stage 1 - demolition and early works (SSD 8924)

The proposed Scope for Stage 1 (Figures 3 & 4) comprises of:

- Demolition of existing infrastructure including concrete batch plant, timber wharf and other marine structures
- Removal of marine piles and any resulting repairs to the existing sea wall (Waste Management Plan for the New Fish Market - AECOM Australia Pty Ltd, 16-Feb-2018)
- Site mobilization and establishment (including installing environmental controls)
- Services verification, relocations and installation of temporary services
- Any required localised remediation works
- Early civil works (cofferdam, piling, temporary works, drainage and other inground services)

The structures to be demolished consist of all existing structures along the southern foreshore of Blackwattle Bay (Figure 3). The Scope of works refers to demolition of a timber wharf 'and other marine structures' and including other existing wharves in the investigation area (Figure 4).

Existing piles will be extracted by mechanical means where possible. In the event that piles cannot be extracted by conventional means, or the existing pile does not clash with the new Sydney Fish Market design, they will be cut off at sea bed level.

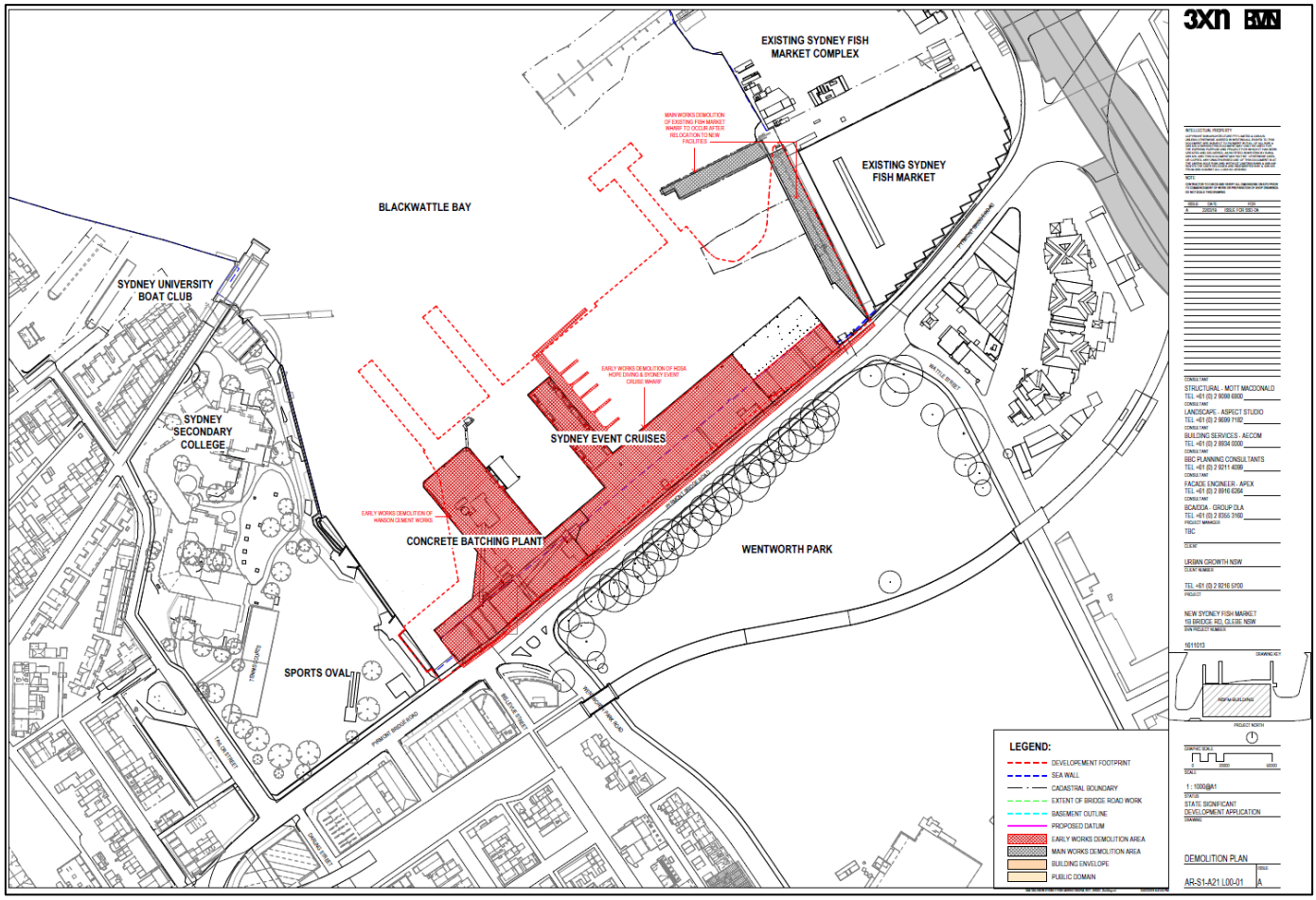


Figure 3: Demolition Plan – Structures to be demolished (AR-S1-A21 L00-01 Issue A. Date: 23-03-2019)

Recommendations for identifying and minimising impacts submerged within sediments in the vicinity of these structures and piles are contained in Section 7 of this report.



Figure 4: Demolition zone of existing Blackwattle Infrastructure
(CEMP – Sydney Fish Markets Stage 1 (draft) (Section 2.1.3, Thelem Consulting, February 2018)

2.3 Proposed Works - Stage 2 – Main Works (SSD 8925)

The Stage 2 works include the construction of the new Sydney Fish Market wharves. These will be supported on piles driven through sediments within the head of the bay and into bedrock. The exact number and diameter of piles is not yet known but, from the GFA Measurement SREP 26 plans, (Figure 6) and Concept Proposal (Figure 7) are estimated to be close to 300. In addition, the draft SSD DA Stage 2 Works document (3XN) indicates the construction of five new mooring jetties extending into the Bay on the northern side of the footprint of the main wharf area.

The proposed Scope for Stage 2 – Main Works includes the following which have direct or potential relevance to the marine environment:

- Site establishment and install environmental controls (by Main Works Contractor)
- Cofferdam construction and dewatering of site (Figure 5)
- Repositioning of the seabed to facilitate a basement area (Figures 5 & 6)
- Foundation works – piling and secant pile wall (Figures 7 & 8)
- Install tower cranes
- Slab and column construction (FRP) of basement, ground level, upper ground level and level 2
- Construct operational and recreational wharfs
- Public area infrastructure works (promenade, controlled water feature, bridge connection, and recreational water features)

These works are to be conducted in the marine precinct and will involve extensive disturbance of sediments in the investigation area.



Figure 5: Site Activities for Stage 2 (Main Works) – substructure works and cofferdam – staging program

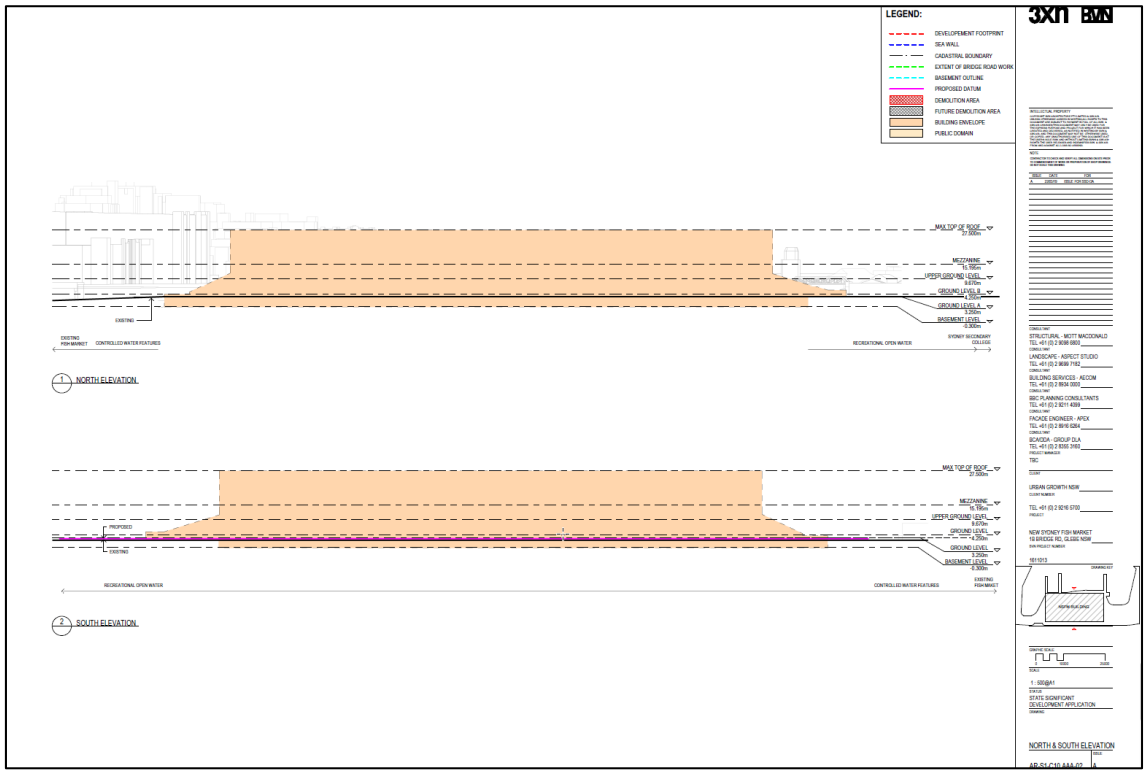


Figure 6: North & South elevations showing extent of basement excavations
(3XN & BVN Plan AR-S1-C10 AAA-02 Version A. Date 22-03-2019)

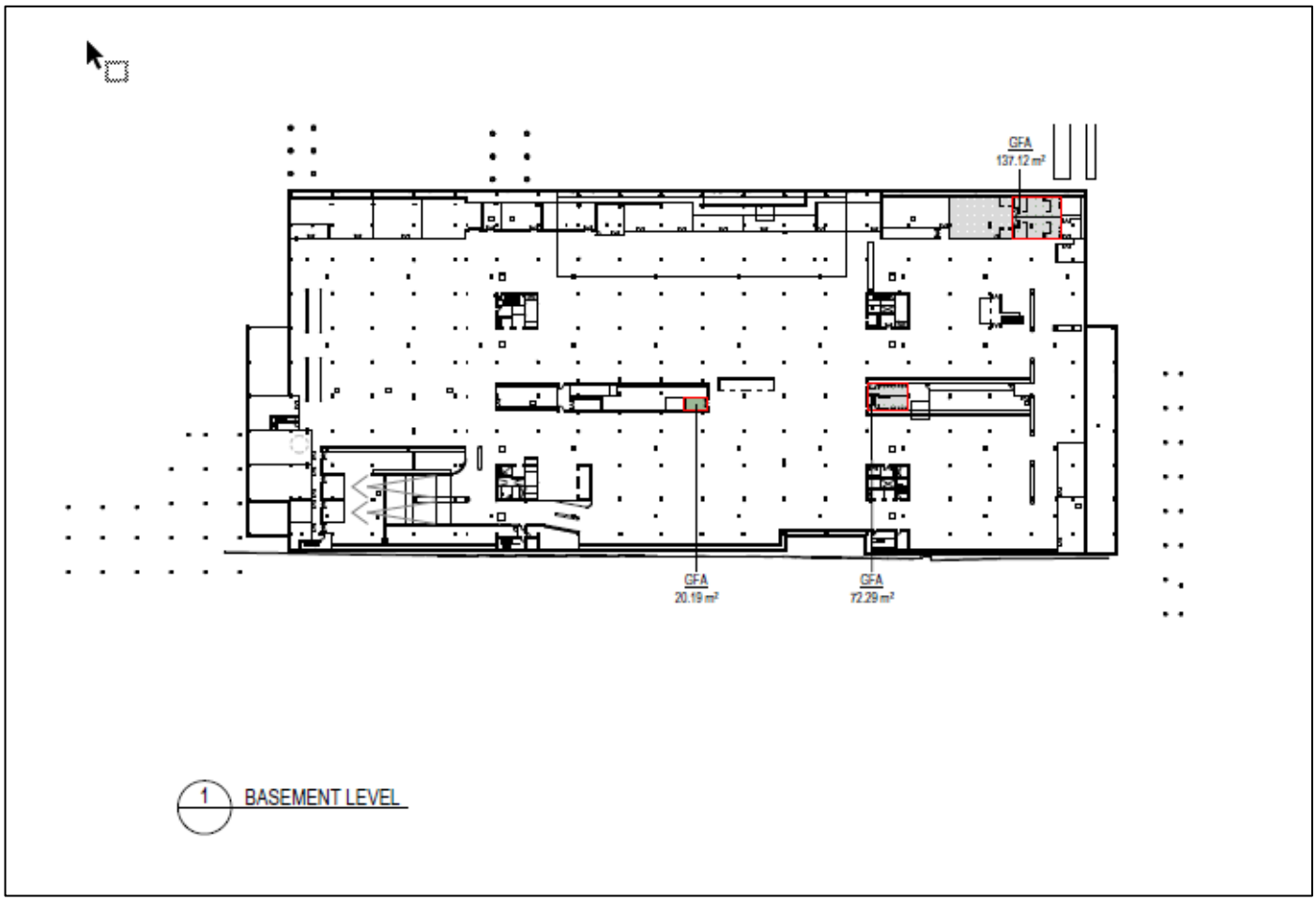


Figure 7: GFA Measurement SREP 26 plans AR-S2-L10 AAA-01 Issue A Date: 23-03-2019)

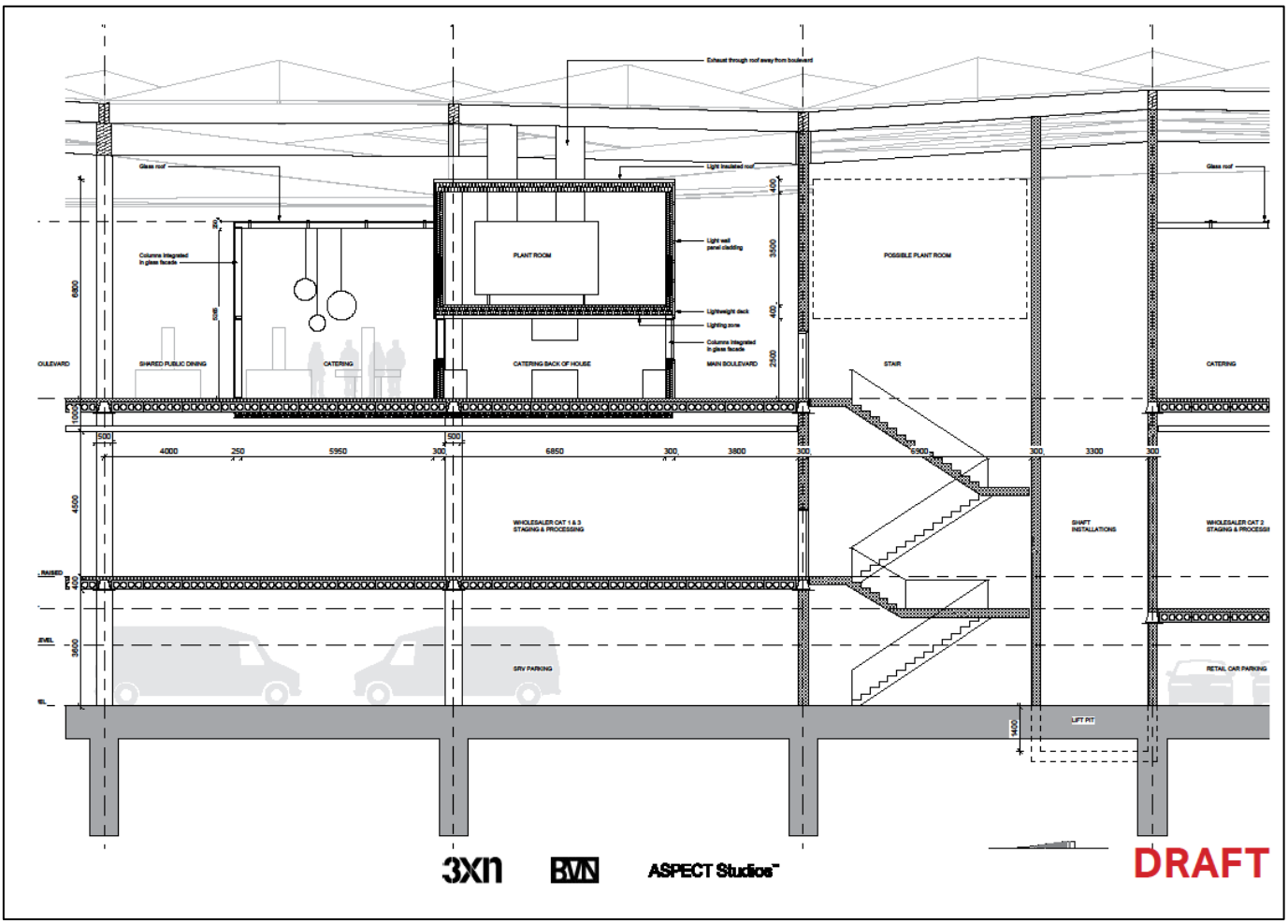


Figure 8: Concept Proposal – Draft cross section showing the proposed new Sydney Fish Market supported on piles (SSD-DA Package: (SSD-DA Package: Stage 2 Main Works Proposal prepared by 3XN BVN & Aspect Studios – 4.0 Built Form & Urban Design - Building Overview - n.d., File 1251_180202_SSD-DA Stage 2 Main Works_3XN Placeholder copy)

3.0 LITERATURE REVIEW

INTRODUCTION
NSW MARITIME HERITAGE DATABASE
ARCHAEOLOGICAL POTENTIAL OF WHARVES ON PARRAMATTA RIVER
EXISTING BMD HERITAGE IMPACT ASSESSMENT STUDIES
ANALYSIS OF OTHER SOURCES OF MARITIME HERITAGE IN THE BAY
CLEARANCE DIVING WITHIN THE BAY
STRATEGIES AND PLANS

3.0 LITERATURE REVIEW

3.1 Introduction

The following literature review is taken from the 2017 Maritime Archaeological Assessment (Nutley 2017).

3.2 New South Wales Maritime Heritage Database

The New South Wales Maritime Heritage Database maintained by the Heritage Division of the Office of Environment and Heritage contains a comprehensive listing of reported instances of shipwrecks and/or reported locations of 'ship graveyards' or other abandoned hulks that have been found to date. Ships were abandoned due to being obsolete, surplus to requirements or no longer seaworthy. These instances of abandoned shipwrecks often went unreported in media or official records. Such vessels could be left in backwaters, deep water (where they would not interfere with shipping movements) or under landfill.

The New South Wales maritime heritage database, (Accessed 11 July 2017), does not record any shipwrecks within Blackwattle Bay. It does reference Strides shipbreaking yard in regard to the dismantling of the tug *Bustler* before that vessel was towed to sea and scuttled. The database refers to Strides of Blackwattle Bay. Strides, established in 1858, was on the western end of what is now Blackwattle Bay Park and faced Rozelle Bay rather than Blackwattle Bay itself (Figure 2). That location is outside of the current investigation area (Figure 9; EDAW 1999:6).

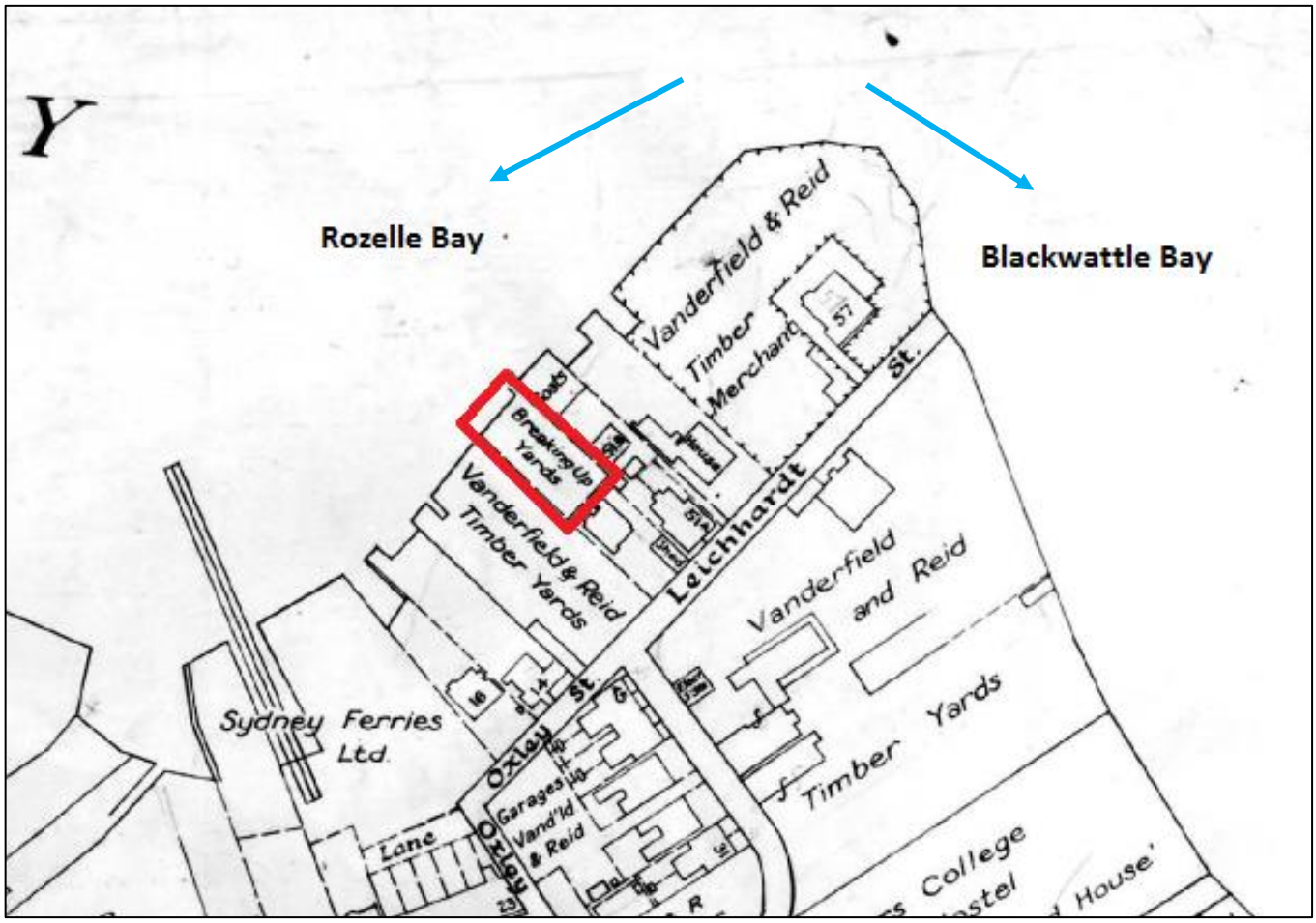


Figure 9: Strides ship breaking works, labelled on the 1939 map above as 'Breaking up Yards' (outlined in red). Glebe Municipality 1939 Drawn by W. T. Evesson – March 1939. (City of Sydney's Historical Atlas of Sydney accessed online 19-19-2017)

3.3 Archaeological potential of wharves on Parramatta River

Archaeological investigations of wharf sites around Australia reveal important information about potential for cultural deposits within riverine sediments adjacent to wharves.

Wharves and jetties are the focal point of the arrivals and departures of shipping services. Depositional material has been shown to include equipment, cargo and personal items. For wharves with high volumes of shipping movements, or those associated with stormwater drains, the quantities of depositional can be considerable.

Archaeological excavation by Bower and Staniforth (1993) of the riverbed adjacent to Queens Wharf on the Parramatta River in New South Wales undertook test excavations that identified over 10,000 artefacts cover a time period from much of the nineteenth and twentieth century (Nutley 2006:94). The collection included cultural items that had fallen from the wharf, from vessels using the wharf and many that had accumulated at the site as a result of adjacent stormwater drainage from elsewhere in Parramatta. The test excavations were conducted using an excavator mounted on a barge and depositing the excavated material onto a steel mesh screen mounted on a second barge. The archaeologists sorted through the deposited load which was periodically washed by water from raised from the river in the excavator bucket. The resulting collection included belt buckles, fob watches, lipsticks, bracelets, a necklace, cutlery, coins (dating from 1827 to 1952), shoe and boot leather, shako badges (from military head-dress), building materials, animal bones, glassware, stoneware and ceramics. The collection was a graphic illustration of the history of that locality and is now included in the Parramatta Heritage Centre as an important component of Parramatta history.



Photograph 1: 1993 testing of sediments at Queens Wharf, Parramatta excavation by Australian National Maritime Museum (Source –D Nutley)

In the 1970s, early archaeological investigations of wharf and jetty sites was conducted in South Australia by the Society for Underwater Historical Research. A project that they conducted at the Holdfast Bay jetty recovered over 5, 00 items (Nutley 2006:94).

3.4 Existing Bays Market District heritage impact assessment studies regarding the Sydney Fish market area

Shipwrecks

This gap analysis included a review of the history of Blackwattle Bay contained in heritage studies previously undertaken for the Bays Market District (City Plan 2013, 2017; Artefact 2017). These histories indicate that Blackwattle Bay began as a swamp. An undated Parish Map of Petersham shows what is now Blackwattle Bay as 'Blackwattle Cove Swamp' (City Plan Heritage 2013:23). The extent of the swamp is even clearer in a circa 1830 map with an overlay of the modern shoreline (City Plan Heritage 2017:13; Artefact 2017:17). The investigation area is still labelled as 'Black Wattle Bay Swamp' (sic) in Woolcott and Clarke's 1854 map of the City of Sydney (City Plan 2013:25) and as 'Black Wattle Swamp' in an 1857 map (Artefact 2017:10).

The swamp area was of little use as a navigable waterway but the freshwater of Black Water Creek that fed into the swamp provided an opportunity to relocate slaughterhouses that had become a bane to the inner-city area. It was assumed that the creek water and tides would flush the waste out of the Bay but this did not occur and the creek and swamp became fouled and a public health risk (City Plan Heritage 2013:24-25). The slaughterhouses were relocated to Homebush Bay by 1860 but raw sewerage and other industrial waste continued to be discharged into the southern end of the Bay (City Plan 2013:25-26). A stone causeway with a timber bridge in the centre (now Pyrmont Bridge Road) was built in 1859 and was accompanied by discussion of reclamation of the swamp, south of the causeway. The reclamation progressed after completion of the causeway in 1875 with silt dredged from the Bay (City Plan Heritage 2017:16) and surplus rubbish from Pyrmont and other quarries (City Plan Heritage 2013:27; Artefact 2017:18).

The origin of the current navigable waters of Blackwattle Bay, precludes the presence of areas of excessive depth within which shipwrecks could be scuttled without impacting on shipping movements. In addition, given the proximity to industrial activities and to numerous workers and residents in the area, any shipwreck events (eg, through explosions, fire, storm events etc) would have been reported as newsworthy items. The absence of any reported shipwreck events makes the presence of shipwrecks from such sources highly unlikely. In addition, any vessel that foundered within the Bay would need to have been removed to maintain the waterway.

As the history of the Bay includes land reclamation, the potential for decommissioned or unseaworthy vessels to have been included in landfill is considered in the Gap analysis in Section 3.3 below. Such occurrences are generally associated with a vessel that has already been abandoned on or near the original shoreline or which has been towed to the area to act as a seawall to shore up the area to be reclaimed. Such inclusions may not be formally recorded and subsequent reclamation can remove any indication of the site. Due to the proximity of Strides shipbreaking yard (Figure 2) north-west of the investigation area and the concentration of shipbuilding activities on the eastern side of Pyrmont Peninsula, the potential for shipwrecks to be present from that source is also considered in Section 3.3.

Conversion of the swamp to an area useful for shipping required considerable transformation of Blackwattle Bay. In addition to dredging to provide a navigable waterway and berthing facilities, (ie wharves and jetties), modification to the shoreline was also needed to provide suitable areas for unloading, stockpiling and transhipment of goods and materials. Prior to reclamation, land along the eastern shore consisted of steep cliffs and small springs with little room for wharfage. Areas where land reclamation have occurred within the Bay since the 1870s include the eastern, southern and western shorelines where the reclaimed land was used for industrial purposes. These include extensive areas for timber merchants and the southern shore which was used variously for the transhipment of coal, blue metal and other materials.

A 2013 study of Berrys Bay (Nutley 2014) refers to the torpedo boat *Avernus* which is reported to have been included in landfill 'at Glebe' in the 1940s. Consideration is therefore given to this vessel due to the southern and western shores of Blackwattle Bay being within the suburb of Glebe. The *Avernus,* along with the *Acheron*, was based at the Berrys Bay Torpedo Depot from 1879 under the control of the New South Wales Torpedo Corp (Nutley 2014:18; Gillett 2003). The Corp was renamed the NSW Torpedo and Signalling Corp in 1879 – the same year that two torpedo launches were completed by the Atlas Engineering Company at Pyrmont. For their time, they were of a design that had only recently been developed for the Royal Navy (Nutley 2013; Gillett:2003). Although no further details are available about the location of the *Avernus,* the 1940s date for its inclusion within reclamation works at Glebe post-dates reclamation works within the investigation area.

Wharves and jetties and seawalls

The earliest indication of wharves extending into Blackwattle Bay are shown on an 1865 Trigonometrical Survey (City Plan Heritage 2017:28). These predate land reclamation on the eastern shoreline and any surviving evidence of those structures would be within reclaimed land. The pre-reclamation portions of these wharves may be present beneath the 1886 western

extent of Miller Street and Gipps Street (Figure 3). The 1886 the parish map of Petersham and Camperdown (Figure 3), shows short and apparently insubstantial wharves extending from those streets in much the same location as those. There are no other details of these items to indicate the industries with which they were associated or whether they were timber or stone structures.

The Blackwattle Bay Maritime Precinct study by City Plan in 2013 provides a detailed history of the development of the wharves and seawalls at the head of the Bay, (with the exception of the Howard Smith Ltd Coal Depot and wharf, now occupied by Hanson Heidelberg Cement concrete batching plant). The 1886 map (Figure 10) shows the initial wharf that was built along the seawall on the northern side of Pyrmont Bridge Road (this section now known as Bridge Road) (Figure 7). The 2013 study notes that the seawall and wharf were constructed in 1885-86 (City Plan Heritage 2013:5) and the wharf consisted of two rows of timber piles extending about 9.14m beyond the seawall. The Sydney Harbour Trust initiated improvements to this wharf in 1904 to allow their use as coal and metal depots. The wharf along Bridge Road was reconstructed in 1910-1911 'when a seawall of close piling and Monier plates was erected 4.71m further out' and 13.7m from the original seawall (City Plan Heritage 2013:29). The area was then backfilled to extend the coal depot area and provide a stable surface for other material including blue metal (City Plan Heritage 2013:29).

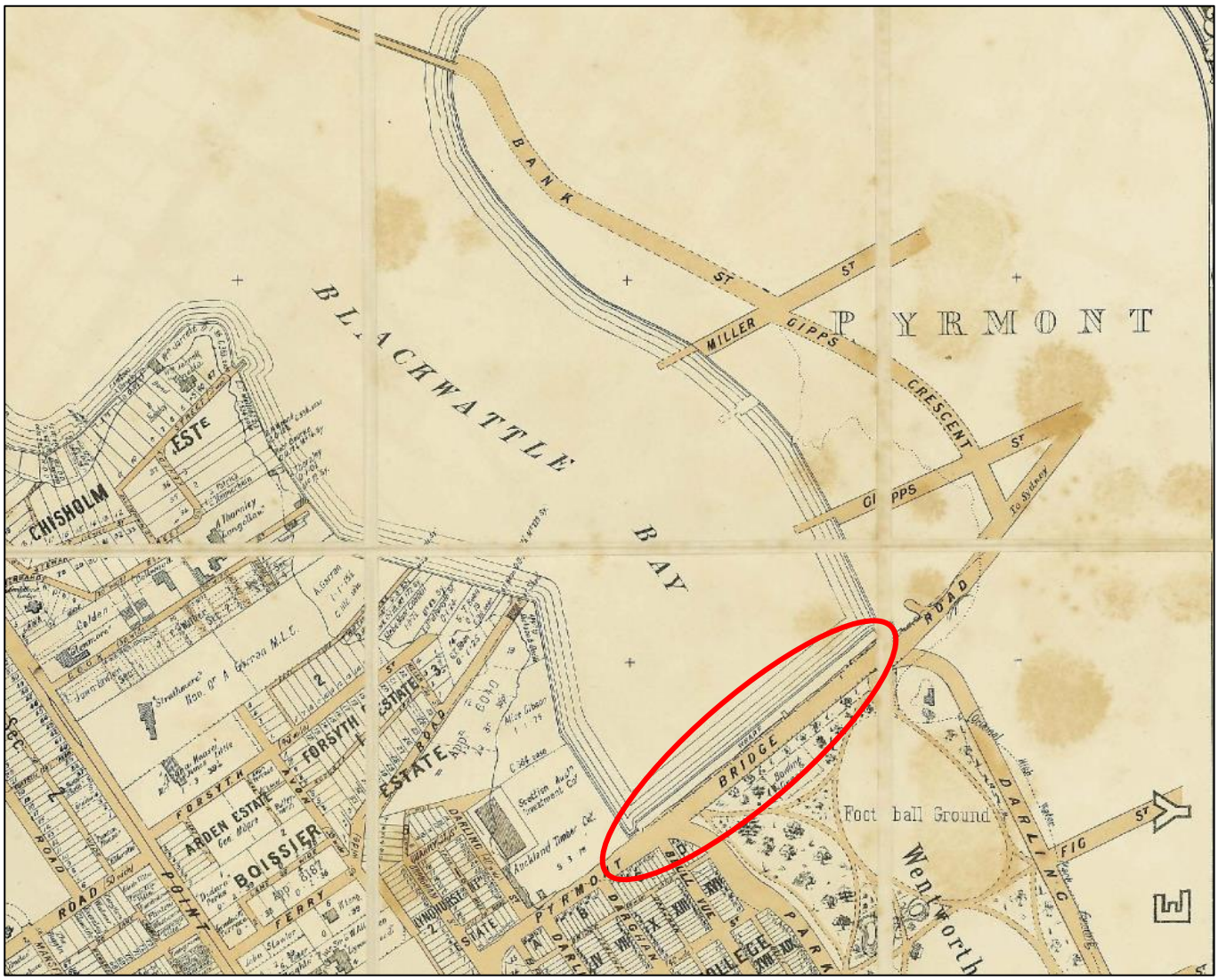


Figure 10: Portion of the 1886 parish map of Petersham and Camperdown showing the post-reclamation wharves on the eastern side of Blackwattle Bay extending from Miller Street and Gipps Street and the 9.4 wide wharf at the head of the Bay on the northern side of Pyrmont Bridge Road (circled).

The Trust also undertook further dredging works in the Bay, 'removing thousands of tons of rock, clay, sewerage and "found objects", (City Plan Heritage 2013:29). This second phase of dredging would have therefore removed a considerable amount of any cultural deposits that had accumulated in the Bay to that point in time.

The reclamation works along the western shore of Blackwattle Bay are shown in the parish map of Petersham (1899). The map also shows an indent on the reclaimed eastern shore which may be a dock for shipping or a slipway. A subsequent parish map of Petersham provides details of the reclamation works on the eastern shore along with a number of jetties extending into the Bay (City Plan Heritage 2017:23). These reclamations appear to have been made by private concerns such as the Harris family and F. Buckle. F. Buckle's reclamation is of particular interest in terms of the section of sandstone seawall that survives along the eastern shore of Blackwattle Bay. His reclamation was limited to a very narrow strip that encompasses the extent of the current sandstone seawall. It would appear that this was specifically related to his family's commercial interests. A 1908 Sydney Harbour Trust map of Port Jackson shows a narrow wharf at the southern end of this structure labelled F. Buckle & Sons. It aligns with the northern side of the original alignment of Gipps Street and what appears to be a slipway for Saxton and Binns Timber Yard (City Plan Heritage 2017: Figure 13:23). The F. Buckle frontage is now adjacent to the existing Fish Market parking lot and Saxton and Binns was on the site of the existing Sydney Fish Market.

The 2017 City Plan Heritage report includes a 1924 Sydney Harbour Trust map showing the Howard Smith wharf – at that time the only structure extending northward into the Bay from those owned by Public Works Department and the State Metal Quarries (City Plan heritage 2017:20). No further information on the construction and subsequent modifications to this structure has been documented for the Bays Market District Investigation area to date.

Redeposited materials from stormwater channels

Stormwater has fed into Blackwattle Bay through a system of stormwater channels that commenced in 1850 (City Plan Heritage 2013:28). The stormwater channels are likely to have carried cultural items into the Bay and deposited these adjacent to the outlets of those channels. In July 1992, archaeological investigations in Parramatta River adjacent to Queens Wharf, Parramatta, have shown the potential for a wide variety of such material to be redeposited adjacent to stormwater drains (Nutley 2005; Bower and Staniforth 1993).

In Blackwattle Bay, dredging works for land reclamation in the latter part of the nineteenth century and continued into the early part of the twentieth century (City Plan Heritage 2013:27). These dredging programs will have removed much of the early deposits of cultural material that had flowed down the stormwater channels. 1901

3.5 Other sources of maritime heritage within the Bay

Shipbuilding yards:

If there had been a presence of shipbuilding yards in the investigation area there would been potential for underwater archaeological remains to be present in the form of slipways, construction tools and other equipment as well as discarded structural components. The New South Wales maritime heritage database – (Accessed 11 July 2017) includes references to a number of shipbuilding yards at Pyrmont on the eastern side of the peninsula. No references have been found to shipbuilding yards in Blackwattle Bay (Table 1), either in the Heritage Office maritime heritage database or the Sands Directory. In addition, a compilation of New South Wales Shipbuilders and Boat Builders from the Register of Australian and New Zealand Vessels, (Flapan 2008 http://www.boatregister.net/NSW_Builders.htm - accessed 29/08/2017), does not include any reference to shipbuilding in Blackwattle Bay. In the absence of any known shipbuilding yards within Blackwattle Bay, it can be assumed that vessels listed as being built at Pyrmont, New South Wales were not built within Blackwattle Bay.

Name	Date range	Location	Source
John Sands	1884	Pyrmont	http://www.environment.nsw.gov.au/maritimeheritageapp/ViewSiteDetail.aspx?siteid=872
Russell, John William & Bourne, W.; also Russell, John William	1831-1853	Pyrmont	Sands Directory
James Bower & Co; also Bower & Drake; Bower & Duke	1873-1875	Pyrmont	http://www.boatregister.net/NSW_Builders.htm)
James Underwood	1798, also 1800-1807	Pyrmont	http://www.australiaonnet.com/economy-business/industries/ship-building.html)
Davey & Co.	1879	Pyrmont	Sands Directory
Fenwick, Andrew & family	1871	Pyrmont	Sands Directory
Holdsworth	1856	Pyrmont	Sands Directory
Jeffery, H.E.	1870	Pyrmont	Sands Directory
Thomas Chowne	1840-1863	Johnstons Bay, Pyrmont	Listing for Former CSR Tablet House Including Interiors

John William Russell	1843	Pyrmont Bay	Listing for Former CSR Tablet House Including Interiors
Drake, David; also Drake, David Ltd.	1879-1934	42 Mill Street Pyrmont	Sands Directory
H. E. Jeffery	1870	Pyrmont	http://www.environment.nsw.gov.au/maritimeheritageapp/ViewSiteDetail.aspx?siteid=1432

Table 1

3.6 Clearance diving within the Bay

In 2012, Manly Hydraulics Laboratory of the former Department of Public Works, undertook a survey of the southern section of Blackwattle Bay covering the area in front of the current and proposed new Sydney Fish Market (pers comm, Colin Browne 11 July 2017). A Waterways Construction Group report contains the results of that survey and subsequent clearance diving undertaken on behalf of Roads and Maritime Services (Waterway Construction Group Seabed:2012). The 2012 report includes a list of sixty-nine objects identified in the initial survey and the results of the subsequent clearance diving. Ten of the surveyed items could not be relocated - either due to being no longer present, (eg, washed away by tides/currents), or buried deeper within the silt. Most of the identified features consisted of miscellaneous items such as shopping trolleys, plastic chairs, wheelie bins, and assorted pieces of metal. Various types of timber were also located. These included a couple of wharf timbers, and a timber pylon.

The survey did not locate any significant structures or objects of archaeological value lying above the seabed.

3.7 Strategies and plans

The following strategies and master plans contain principles for the redevelopment of the Bays Market Precinct. The master plans are deemed as Development Control Plans but will be considered as part of the current SSP Proposal. Those that inform the management of the maritime archaeological potential of the Bay are:

1. Rozelle and Blackwattle Bay Master Plan (Waterways Authority 2000)
   - Principles:
     - *Future development should retain the existing diversity and maritime character of the precinct*
     - *Development is to encourage the conservation of and adaptation for re-use of existing structures of heritage significance*. (This principle applies to any significance maritime infrastructure that may be present within the Bay or under landfill around the Bay.)

   - The 2000 Masterplan identifies Maritime Heritage Precinct Site B1 (former coal loader site) (p39) as an area for provision of on-site parking. The nature of this parking facility is not specified but, if were to be an underground structure, there would be potential for uncovering significant relics or remains of former structures of heritage significance in that location.

2. Bays Market District masterplanning principles 01 August 2017.
   - This document includes the following principles, in relation to landscape and environment
     - *Explore and interpret the history of the site*
     - *Pursue leading edge sustainability outcomes*

   In addition, under Principle 3: Explore and interpret the history of the site, this document notes that:

   > *The site has a distinctive history, geography and mercantile role, which requires a considered response. …. Landscaping, public art and events can be informed by past uses and traditions, and can be used as cultural and educational tools to educate residents, workers and visitors.*

   These principles both help to inform the management of the maritime archaeological potential of the Bay area.

4.0 SITE INSPECTION

INTRODUCTION
SOUTHERN SHORELINE

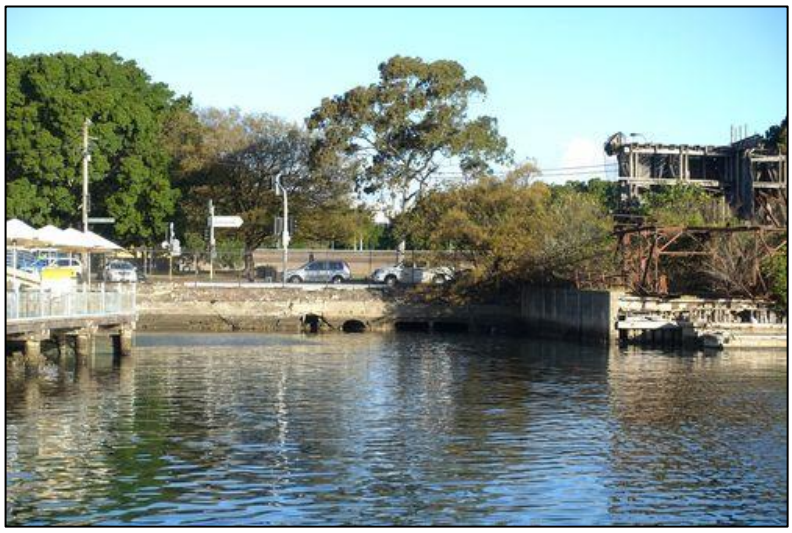
4.0 SITE INSPECTION

4.1 Introduction

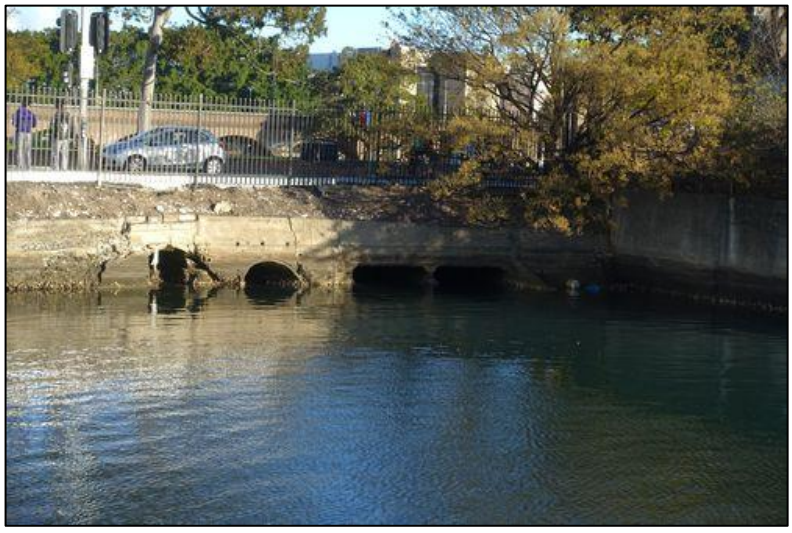
An inspection of the foreshores of the redevelopment area for the new Sydney Fish Market was conducted by the author on Monday 28th August 2017). This inspection extended from the northern boundary of the Fish Market car Park, (the boundary adjacent to the Hymix concrete batching plant), to the western shore of Blackwattle Bay adjacent to the Hanson Heidelberg Cement Group wharf. The inspection included observations of seawalls did not include grounds of the former coal loader or wharf structures along the southern or eastern shores as wharf structures were outside of the scope of this assessment. The following are the results of the site inspection.

4.2 Southern shoreline – proposed new Sydney Fish Market frontage

In the south-east corner of the Bay, north of the former coal loader are four stormwater outlets set in concrete facing along the northern side of Pyrmont Bridge Road (Photographs 2-3).

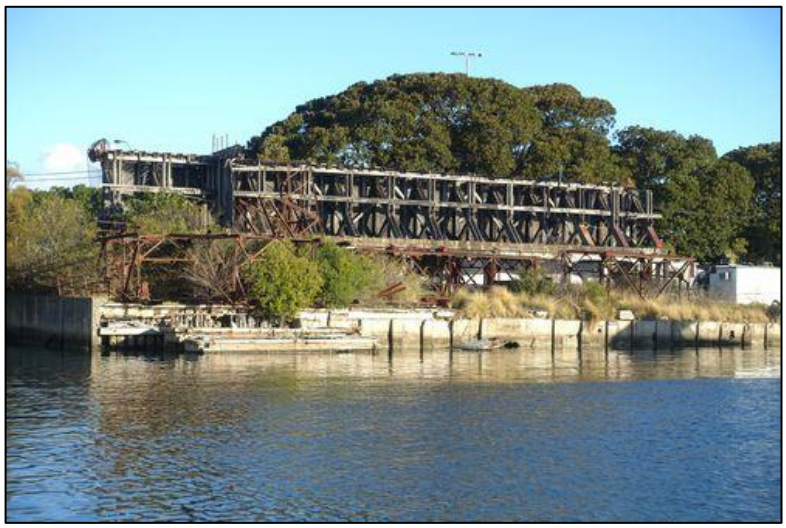


Photograph 2: Stormwater outlets east of the coal loader along Pyrmont Bridge Road

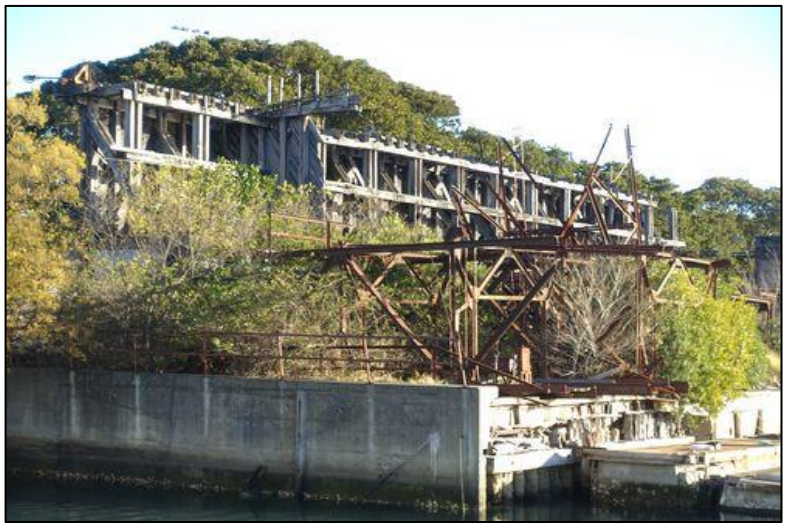


Photograph 3: Stormwater outlets east of the coal loader

The remains of the coal loader stand on 1953 era reinforced concrete beams and concrete columns cast within steel tubes and with seaward walls of concrete plating (Murphy 1997:21). (Photograph 4). Along the north-east frontage are the remains of close-set timber pylons of the former jetty that extended northwards (Photographs 4-5).



Photograph 4: Remains of the coal loader on the northern side of Pyrmont Bridge Road



Photograph 5: Seawall surrounding the coal loader and timber pylons on north-eastern frontage from former wharf

West of the coal loader, concrete Monier plates form a seawall on the southern side of the decking of the concrete wharf extension. The wharf, set over the waters of the Bay, is supported on steel pylons (Photograph 6).



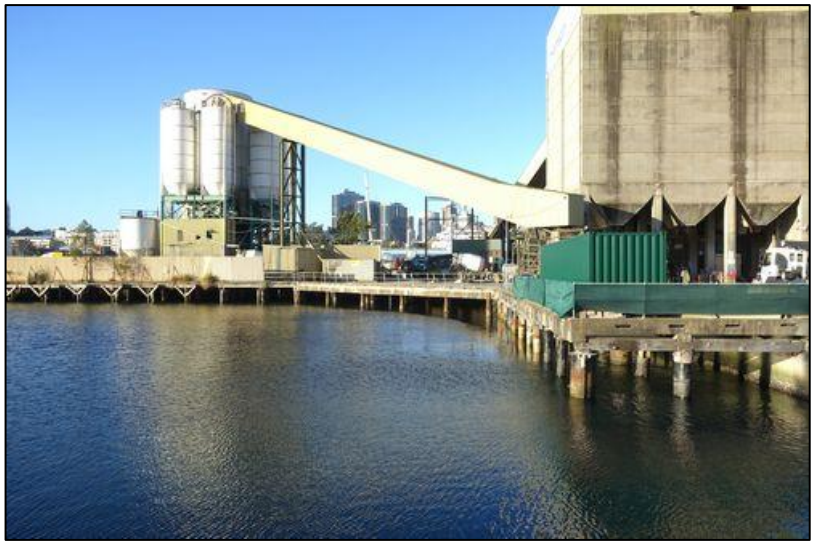
Photograph 6: Underside of the reinforced concrete deck of the wharf east of the coal loader showing seawall that runs the length of the site about 20m from Bridge Road.

The Blackwattle Bay Marina wharf, to the east of the Hanson Heidelberg cement works, is set on pylons in various stages of decay (Photograph 7).



Photograph 7: Blackwattle Bay Marina B2 showing timber pylons and bracing beams

Further west is the Hanson Heidelberg Cement concrete batching plant (Photograph 8) which would become a part of the new Sydney Fish Market complex. Maps of the Investigation area indicate that wharfage in this location has been present since the 1920s. As noted in Section 3.2 of this report, no details of its construction and subsequent alterations have been completed to date. All pylons on this wharf that could be observed during the site inspection appear to have been replaced and/or sheathed. A Development Application (DA 9449) has been lodged by the Hansen Construction Material Pty Ltd with the Department of Planning and Environment for the demolition of the existing structures on this site but excluding the wharf.



Photograph 8: Hanson Heidelberg Cement wharf area

5.0 ARCHAEOLOGICAL POTENTIAL

SHIPWRECKS
MARITIME INFRASTRUCTURE
OTHER POTENTIAL RELICS WITHIN THE WATERS OF THE BAY
SUMMARY OF ARCHAEOLOGICAL POTENTIAL

5.0 ARCHAEOLOGICAL POTENTIAL

5.1 Shipwrecks

The analysis of the history of Blackwattle Bay, concludes that there is little likelihood of shipwrecks within the current waters of the Bay and only a small potential for historic shipwrecks to be located within landfill in the areas of proposed redevelopment of on the eastern shores of the Bay.

No historical evidence has been found to indicate that other vessels may be part of landfill works around Blackwattle Bay.

5.2 Maritime infrastructure

Studies to date have included details of the evolution of part of the wharf complex at the southern end of the Bay – with the exclusion of the c1920s Howard Smith wharf and depot is currently occupied by the Hanson Heidelberg Cement concrete batching plant.

The footprint of the new Sydney Fish Market development area sits over the footprint of the 1885-1886 wharf which was built along the seawall on the northern side of Pyrmont Bridge Road (this section now known as Bridge Road) (City Plan Heritage 2013:5) (Figure 7). The 2013 study notes that the wharf extended 9.14m beyond the seawall.

The c1920s Howard Smith wharf and depot is currently occupied by the Hanson Heidelberg Cement Group's concrete batching plant. This wharf has retained much of the original form shown in 1920s maps, with the exception of a triangular apron inserted on the western side. Impacts on any archaeological deposits that may have accumulated beneath the wharf since that time will be limited to disturbance accompanying with replacement of deteriorated piles.

5.3 Other potential relics within the new Sydney Fish Markets investigation area

Section 4 of this report has identified the potential for relics to flow down stormwater channels and to have been redeposited. In addition, existing studies have documented the history of industrial activities along the shoreline and shipping within the Bay. Through these activities, there is potential for items of equipment and other materials to have been discarded or to accidentally fallen into the Bay.

Nineteenth and early twentieth century dredging within the Bay will have removed substantial amounts of pre-dredging cultural deposits. However, post-dredging cultural deposits may be present beneath or adjacent to the wharves.

5.4 Summary of Archaeological Potential

There are no indicators to suggest the existence of shipwrecks to be present with the marine component of the Bay.

No maritime infrastructure that pre-dates reclamation works will be present in the investigation area.

The 1885-86 seawall has potential to provide details of its construction and of cumulative impacts arising from subsequent wharf development and maintenance.

The remains of timber pylons associated the 1885-86 wharf may be present within the sea bed. However, as the extent to which the wharf extended beyond the seawall is known (9.14m), the precise location of these pylons does not hold significant archaeological potential.

There is a low level of potential for archaeological deposits to be present within the vicinity of former wharves at the southern end of the Bay and from the late nineteenth century and early to mid-twentieth century timber jetties that once extended from the eastern shoreline. These deposits would be expected to consist of individual items that have fallen from the jetties or from vessels using those facilities and items that have been transported into the bay via the storm water drains at the head of the bay. Due to disturbance from propeller wash, these items are unlikely to form coherent layers of archaeological deposits.

6.0 SIGNIFICANCE ASSESSMENT

HERITAGE SIGNIFICANCE
BASIS OF HERITAGE SIGNIFICANCE
STATEMENT OF SIGNIFICANCE

6.0 SIGNIFICANCE ASSESSMENT

6.1 Heritage Significance

Heritage significance is an expression of the cultural value afforded a place, site or item. This assessment of significance is in accordance with the standard assessment criteria adopted by the Heritage Division of New South Wales as embodied in the Burra Charter.

The following assessment is based on the analysis of the literature review in Section 3 of this report.

6.2 Criteria

Criterion (a): *Historic Significance - (evolution): an item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area).*
Although no historic shipwrecks are known to be present within the investigation area, there is potential for these to be present under landfill. In the event that such relics are present, they could have potential to be of local or State significance in providing archaeological evidence of their construction and function in the late colonial or early post-colonial phases of the evolution of New South Wales.

Maritime infrastructure dating from the second half of the nineteenth century, in the form of the 1885-86 Government wharf and seawall at the southern end of Blackwattle Bay has potential to provide archaeological evidence of the construction and function of these items and their associated industries in colonial New South Wales at a level of local or State significance.

Relics, whether deposited from the wharves, from vessels at those wharves or transported through the stormwater channels and re-deposited into the Bay have potential to have preserved items associated with industrial and non-industrial activities both within and beyond the current investigation area. These items have potential to be of local significance.

Criterion (b): Associative Significance – (association): an item has strong or special association with the life or works of a person, or group of persons, or importance in NSW's cultural or natural history (or the cultural or natural history of the local area);
There are no identified maritime archaeological items of potential associative significance within the investigation area.

Criterion (c): *Aesthetic Significance - (scenic qualities / creative accomplishments) an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the cultural or natural history of the local area);*
There are no identified maritime archaeological items of potential aesthetic significance within the current investigation area.

Criterion (d): *Social Significance - (contemporary community esteem): an item has a strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons (or the cultural or natural history of the local area);*
There are no identified maritime archaeological items of potential social significance within the current investigation area.

Criterion (e): *Technical/Research Significance - (archaeological, educational, research potential and scientific values): an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area);*
The seawall and 1885-86 Government wharf at the southern end of Blackwattle Bay has potential to reveal technical details about construction of the wharf and to be significant at a local level.

Criterion (f): *Rarity - an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area);*
Shipwrecks in landfill are a small sub-set of the inventory of shipwrecks as a whole and, being supported by landfill, are likely to have been preserved close to their original form. Australian built vessels of that era were often poorly documented and such sites have the potential to provide significant insights into the materials and design elements of these vessels.

The seawall and remains of the 1885-86 Government wharf have potential to have retained significant form and information not available in archival records. These items have potential to be of local significance

Criterion (g): *Representativeness - an item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places of cultural or natural environments (or the cultural or natural history of the local area).*
There are no identified maritime archaeological items of potential social significance within the current investigation area.

6.3 Statement of significance

The maritime history of site of the proposed new Sydney Fish Market in Blackwattle Bay is one of the evolution of industrialisation, from a swamp to an area for waste disposal to an area for transhipment of various materials associated with the commercial development of Sydney and the State. The evolution of the maritime infrastructure, including wharves, jetties and dredging works have formed the background to the current form and character of the Bay. The seawall an 1885-86 Government wharf at the southern shoreline and represents the process of land reclamation in the latter part of the nineteenth century.

7.0 IMPACT AND MITIGATION

COFFERDAM INSTALLATION
REMOVAL OF EXISTING PILES
INSTALLATION OF NEW PILES
SILT RESISTRIBUTION
AREAS NOT SUBJECT TO SEDIMENT DISTURBANCE
UNEXPECTED FINDS PROCEDURE
INTERPRETATION

7.0 IMPACT AND MITIGATION

7.1 Cofferdam installation

Potential impacts

The installation of the southern wall of the cofferdam has the potential damage to remains of a nineteenth century seawall and government wharf along the southern shore.

As noted in section 2.1, the area within the cofferdam will not be dewatered. Any relics located on the seabed within the cofferdam would not be subjected to drying and accelerated decomposition.

Mitigation

The location of the nineteenth century seawall and original wharf along Bridge Street mapped by RPS Group (Appendix A). It is recommended that design development shows the relationship of the cofferdam to the sea wall and ensure that there is no impact to the seawall.

7.2 Removal of existing piles, installation of new piles and silt redistribution

Potential impacts

Removal of existing piles:

Existing piles are to be extracted by mechanical means where possible. In the event that piles cannot be extracted by conventional means, or the existing pile does not clash with the new Sydney Fish Market design, they will be cut off at sea bed level. The number of piles to be extracted and the number that are cut off is unknown. While cutting off piles has minimal potential impact on archaeological deposits. However, pile extraction has potential to disturb a significant proportion of the marine environment of the adjacent seabed area. Such relics may be in the form of remnants of tools or other equipment, as well as relics that have been transported via stormwater drains.

Installation of new piles:

The diameter of each of the new piles and the number of new piles is not yet known. If assumed to be at least 1m diameter and ~300 piles, this represents an area of direct disturbance of some 237m^2, not including disturbance radiating out from the pile driving. This has the potential to affect a large proportion of the investigation areas and to disturb artefacts that may be relics within the definition of the NSW *Heritage Act* 1977 and associated with the industrial history of the wharves. Such artefacts may include items such as tools or other equipment, as well as artefacts that have been transported via stormwater drains.

Silt redistribution:

In addition, approximately 560m^3 will be moved and redistributed as per the Basement Plan (Appendix B). The combined impact of pile extraction, introduction of new piles and redistribution of sediment will impact a large proportion of the seabed within the study area.

Historic shipwrecks:

No historic shipwrecks are predicted to be within the investigation area or impacted by the proposed works.

Mitigation

Mitigation measures are limited by:

- Contamination in the sediments at the head of the bay. Contaminants arising from the history of coal and other industrial activity in this area poses an unacceptable health risk which precludes the use of divers to engage in archaeological excavation.
- The depth of the water in the works area ranges from 4-7m. In portions of the study area, this precludes deployment of barge mounted excavator such as that utilised at Queens Wharf, Parramatta (see section 3.3). However, the accessible areas are those close to the head of the bay adjacent to the sea wall and close to the line of the original wharves.
- The cofferdam, which will allow control of water depth, will only be installed after the existing wharf piles have been extracted and associated disturbance to archaeological deposits has occurred.

In order to assess the presence of relics of local or State significance, within the meaning of the NSW *Heritage Act 1976,* it is recommended that the archaeological testing is undertaken. This testing should take place prior to disturbance of the seabed

through (a) the extraction of existing piles, (b) installation of the cofferdam, (c) redistribution of the c560m^3 of sediment, and (d) installation of new piles.

The recommended archaeological test excavation strategy is:

1. Use of a mechanical, barge mounted excavator, (a 'long reach excavator' if depth is an issue), to extract test samples from the top half metre of seabed sediment adjacent to and beneath the existing wharves and deposit them onto an adjacent screen for examination by an archaeological team equipped with pressure hoses (See Section 3.3 above).
2. The test sampling would be conducted in longitudinal trenches, each trench 1m in width, 10m in length, 0.5m deep. The sediment could be returned to the seabed within a silt curtain surrounding a barge mounted sieve screen.
3. The test trenches should be located in the areas of greatest potential for accumulation during the history of the wharves and in the areas of least disturbance during that history (see Figure 11).
4. Recovered artefacts would be identified, catalogued, assessed for their significance, and archivally recorded.
5. The NSW Heritage Council would be notified of any artefacts assessed as being relics under the NSW *Heritage Act 1977.*
6. Such relics would have potential for inclusion in an interpretation program to inform the public of the history of the investigation area.

The area of coverage for the archaeological test excavations should include sampling adjacent to the existing wharves as well as those areas designated for silt redistribution. Figure 11 is an indicative mapping of the distribution of the test trenches, including those area that will only be accessible once existing wharf platforms have been removed.

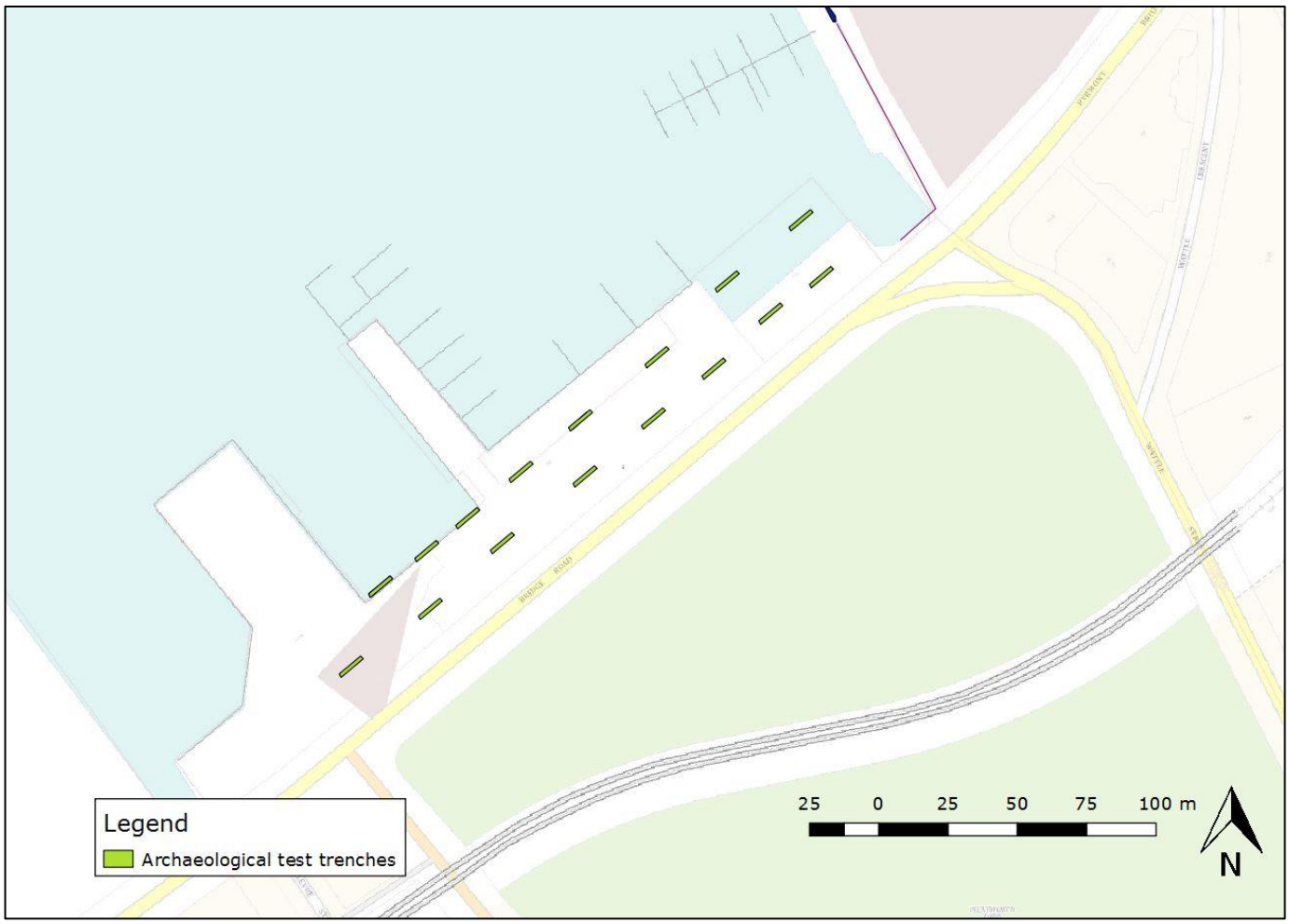


Figure 11: Indicative distribution of archaeological test excavations (Land and Property Information Place Point map in QGIS)

Site inductions for all employees, contractors and subcontractors engaged in undertaking works within the marine environment of the study area are to include protocols for responding to chance finds. These instructions should that in the event that a shipwreck or relic is located during construction works:

i. Work should cease immediately in the vicinity of the shipwreck or relic

ii. A qualified maritime archaeologist should be engaged to:
   a. Assess the significance of the shipwreck or relic
   b. Provide management recommendations which could include recovery and conservation or reburial of the relic.

7.3 Areas not subject to sediment disturbance:

For marine areas that are not subject to removal of existing piles, installation of new piles, trenching, installation of cofferdam or other disturbance of sediment within the marine environment, no mitigation measures are required, however, in the event that a potential relic is detected, the procedures in section 7.2 must be adopted.

7.4 Earthworks along the southern shore

Potential impacts
Earthworks, including piling, trenching for services, has potential to damage remains of a nineteenth century seawall and government wharf along the southern shore.

Mitigation
Any earthworks within the vicinity of the nineteenth century seawall and wharf should be monitored by a suitably qualified archaeologist. In the event that evidence of those structures is identified, work should immediately cease in that area to enable the archaeologist to assess the nature and significance of the feature and to provide advice on appropriate management.

7.5 Interpretation

The maritime history contained in this report and maritime archaeological evidence should be included in an interpretation plan. As indicated in the Bays Market District masterplanning principles (01 August 2017), physical evidence of the history of the evolution of the maritime character of Blackwattle Bay would provide opportunities to:

- *Explore and interpret the history of the site*
- *Pursue leading edge sustainability outcomes*

The strategies may range from *in-situ* preservation (preferred), archival recording, recovery and conservation of key components, to physical and/or electronic and printed interpretation materials.

For example, if a significant relic is uncovered during the redevelopment of the Bay, reuse strategies should be considered. Dependent upon the condition, material and significance of the item such opportunities could include:

- Incorporation as a waterside feature in design and interpretation plans for the reuse of the existing Sydney Fish Market site
- Relocation into the public domain as an artwork, similar to the approach adopted at Pyrmont with the tumbling balls retained from the former Cane-ite works.

8.0 RECOMMENDATIONS

8.0 RECOMMENDATIONS

The following recommendations are made on the basis of:

- The research and analysis outlined contained in this report.
- Results of the assessment as outlined in this report.

IT IS RECOMMENDED THAT:

The findings of this maritime Heritage Impact Assessment for SSD 8924 (Sydney Fish Markets – Concept development application and Stage 1 works comprising demolition and early works) and SSD 8925 (Sydney Fish Markets – Stage 2 main works) are:

1. The works under SSD 8924 and SSD 8925 have potential to disturb archaeological deposits of local significance within the sediment in the investigation area. The potential relics include those that may have originated from the use of the wharves as well as those carried into the bay via adjacent stormwater drains. The works under SSD 8924 and SSD 8925 therefore have potential to disturb archaeological deposits and relics submerged within the sediment in the investigation area. The potential relics include those that may have originated from the use of the wharves as well as those carried into the bay via adjacent stormwater drains.

2. Mitigation measures and archaeological test excavation strategy identified in Section 7 of this report should be adopted for the proposed works.

3. Site inductions for all employees, contractors and subcontractors engaged in undertaking works within the marine environment of the study area are to include protocols for responding to chance finds. These instructions should that in the event that a shipwreck or relic is located during construction works:
    I. Work should cease immediately in the vicinity of the shipwreck or relic
    II. A qualified maritime archaeologist should be engaged to:
        a. Assess the significance of the shipwreck or relic
        b. Provide management recommendations which could include recovery and conservation or reburial of the relic.

4. If a significant relic is uncovered during the redevelopment of the Bay, reuse strategies should be considered. Dependent upon the condition, material and significance of the item such opportunities could include:
    - Incorporation as a waterside feature in design and interpretation plans for the reuse of the current site of the Sydney Fish Market
    - Relocated into the public domain as an artwork, similar to the approach adopted at Pyrmont with the tumbling balls retained from the former Cane-ite works.

5. Any earthworks within the vicinity of the nineteenth century seawall and wharf should be monitored by a suitably qualified archaeologist. In the event that evidence of those structures is identified, work should immediately cease in that area to enable the archaeologist to assess the nature and significance of the feature and to provide advice on appropriate management.

REFERENCES

REFERENCES

3XN, BVN Architecture, Aspect Studios 2018. New Sydney Fish Market – SSD-DA Package: Stage 2 Main Works Proposal – draft

3XN, BVN Architecture 2019. New Sydney Fish Market -SSDA Stage 1 Drawing pack 22-03-2019 Version A

3XN, BVN Architecture 2019. New Sydney Fish Market -SSDA Stage 2 Drawing pack 22-03-2019 Version A

1251_180205_SSD-DA Stage 1 Demolition & Early Works_3XN Placeholder copy

1251_180202_SSD-DA Stage 2 Main Works_3XN Placeholder copy

Artefact Heritage 2017. The Bays Market Precinct Rezoning - Aboriginal Cultural Heritage Assessment Report (ACHAR). Report to UrbanGrowth NSW. Artefact Project 170119. 13 July 2017

Bower, R & Staniforth, M 1993. 'Report of the maritime archaeological survey of areas of the Upper Parramatta River affected by dredging for the Rivercat Ferry Service', Australian National Maritime Museum for the New South Wales Department of Transport.

City Plan Heritage 2013. Heritage Significance Assessment incorporating Heritage Impact Assessment, Terrestrial Archaeology, Blackwattle Bay Maritime Precinct. Report 1 for Blackwattle Bay Marina Pty Ltd, May 2013

City Plan Services 2017. Bays Market Precinct: Blackwattle Bay and Wentworth Park – History, Built Heritage, Archaeology and Landscape Study. Report to UrbanGrowth NSW, July 2017

City Plan Heritage 2014. City of Sydney Industrial & Warehouse Buildings Heritage Study. Report to City of Sydney Council

EDAW 1999. Blackwattle Bay Park Plan of Management. Report to Leichhardt Municipal Council, May 1999

Evesson W T 1939. Municipality of The Glebe, Detail Map. Housing Improvement Board of New South Wales. Drawn by W. T. Evesson – March 1939. The Glebe Occupational Survey.

Flapan, M (Ed) 2008. List of New South Wales Ship Builders and Boat Builders from the Register of Australian and New Zealand. http://www.boatregister.net/NSW_Builders.htm. Compiled by 21 March 2008)

fjmt studio 2017. Bays Market District masterplanning principles. 01 August 2017:

Gillett, R March 2003. Australia's First Warship – The Torpedo Boat Acheron. Naval Historical Review. Accessed on 1 September 2017 on http://www.navyhistory.org.au/australia's-first-warship-the-torpedo-boat-acheron

JK Geotechnics 2017. Factual Geotechnical Report – Geotechnical investigation for Proposed Bays Market District at Blackwattle Bay, Pyrmont, NSW. Report to UrbanGrowth NSW 3 April 2017

Nutley, D 2013. Berrys Bay Marina – Maritime Archaeological Assessment. Report to GML Heritage on behalf of Pacifica Developments

Nutley, D 2006. Underwater Archaeology. In *Maritime Archaeology – Australian Approaches.* Staniforth, M and Nash, N (eds). Springer.

Nutley, D 2005. The Last Global Warming – Archaeological Survival in Australian Waters. Flinders University Monograph Series Number 10., Department of Archaeology, Flinders University.

Maunsell Australia Pty Ltd 2006. Bank Street, Pyrmont Master Plan. Prepared for NSW Maritime, Forrester, A, Poulos Bros Seafoods Pty Ltd, BiDivest Australia Ltd, Hymix Australia Pty ltd 2006. December 2006

Thelem CONSULTING, 2018. Sydney Fish market Development Construction Environmental Management Plan (CEMP) – Stage 1 Demolition and Early works. (Draft, February 2018)

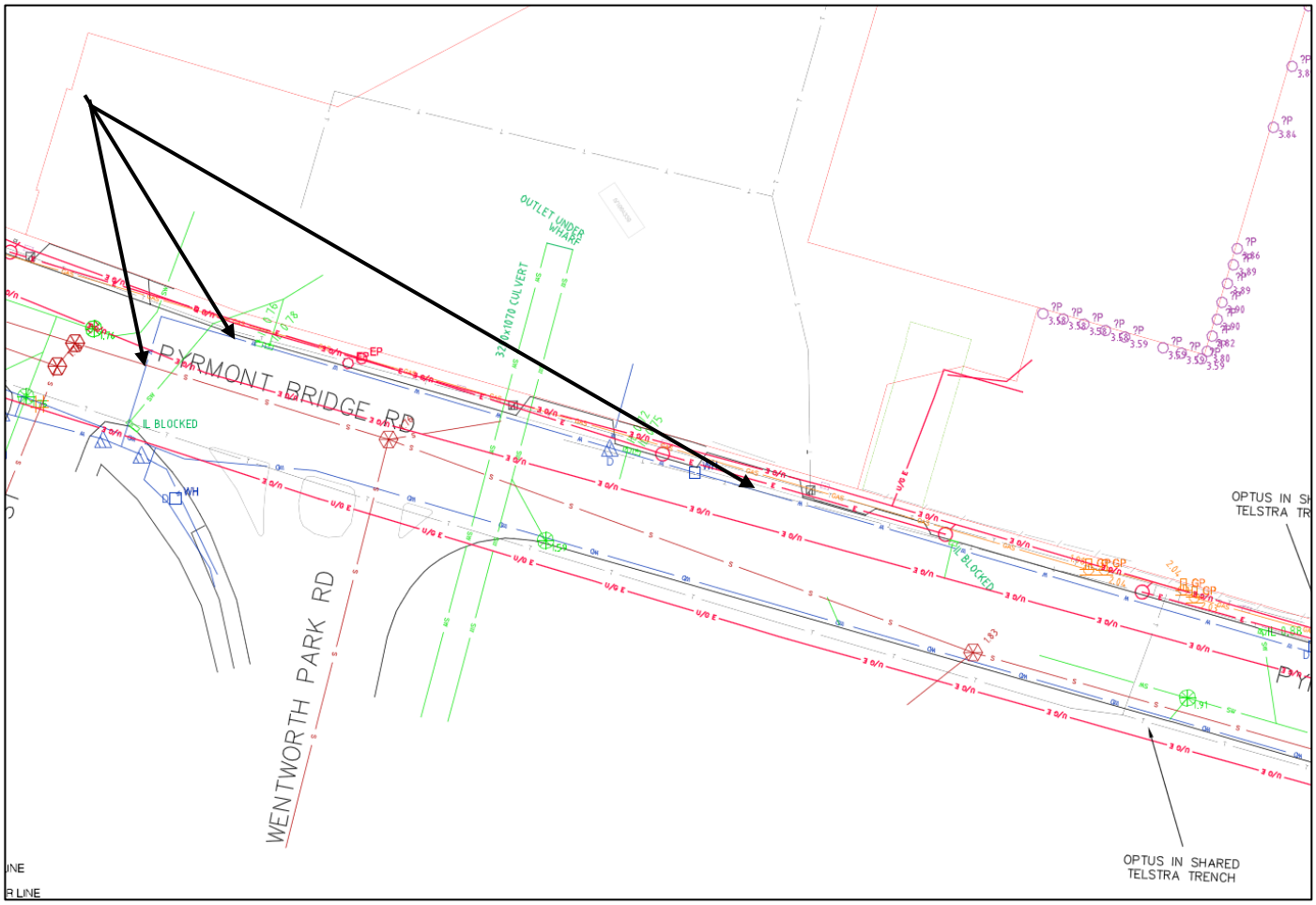
Waterways Authority 2000. Rozelle and Blackwattle Bay Master Plan

Waterway Construction Group, February 2012. Seabed Clearance Report Blackwattle Bay. Report to Roads and Maritime Services.

Wing, J, Wiltshier, S & Woodward, A 1997. Conservation management Plan: Coal Bins and Associated Structures, Pyrmont Bridge Road, Blackwattle Bay. Prepared by Perumal Murphy Wu Pty Ltd in association with Hughes Trueman Reinhold Pty Ltd and Judy Wing for The Office of Marine Administration, July 1997.

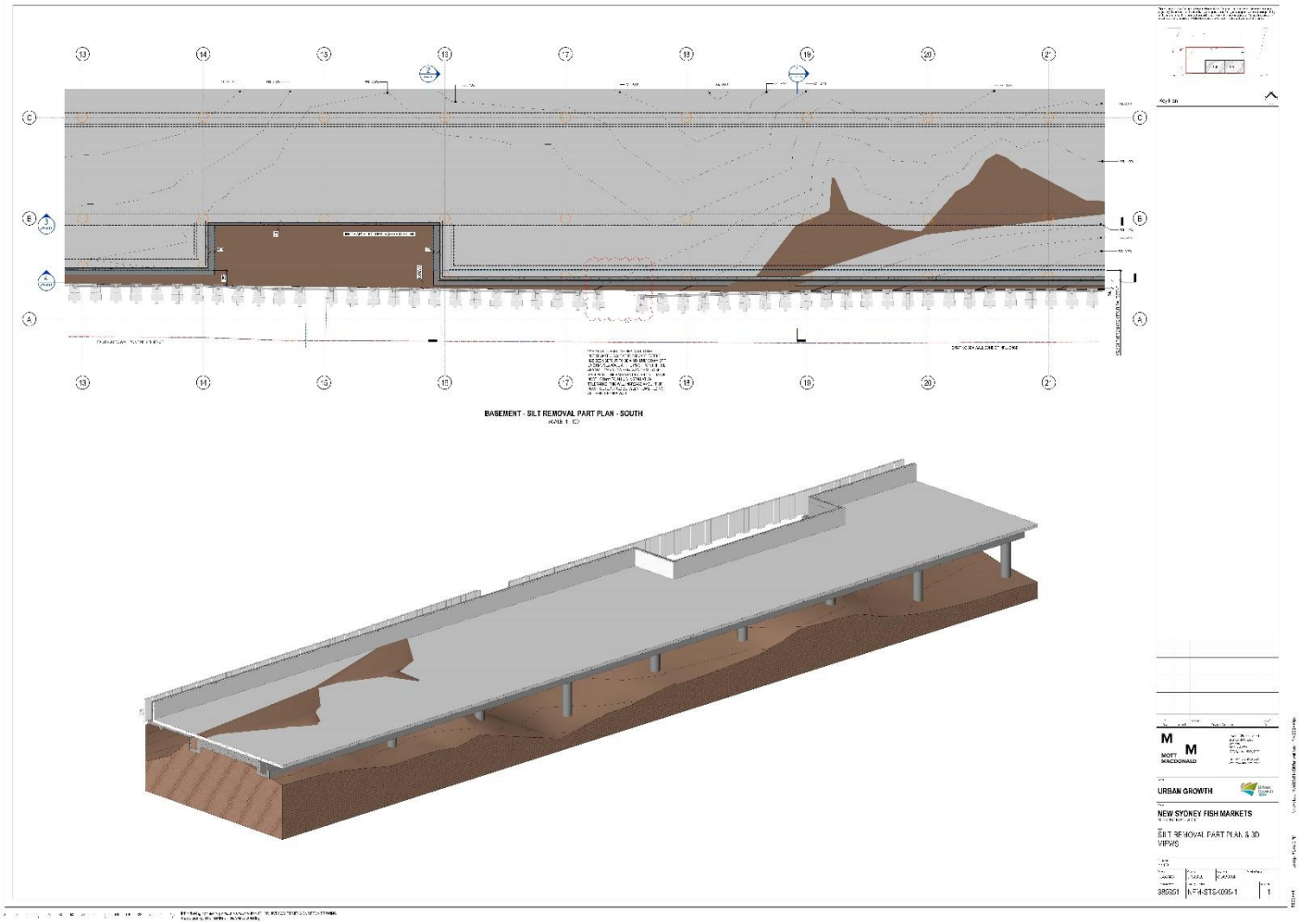
APPENDIX A

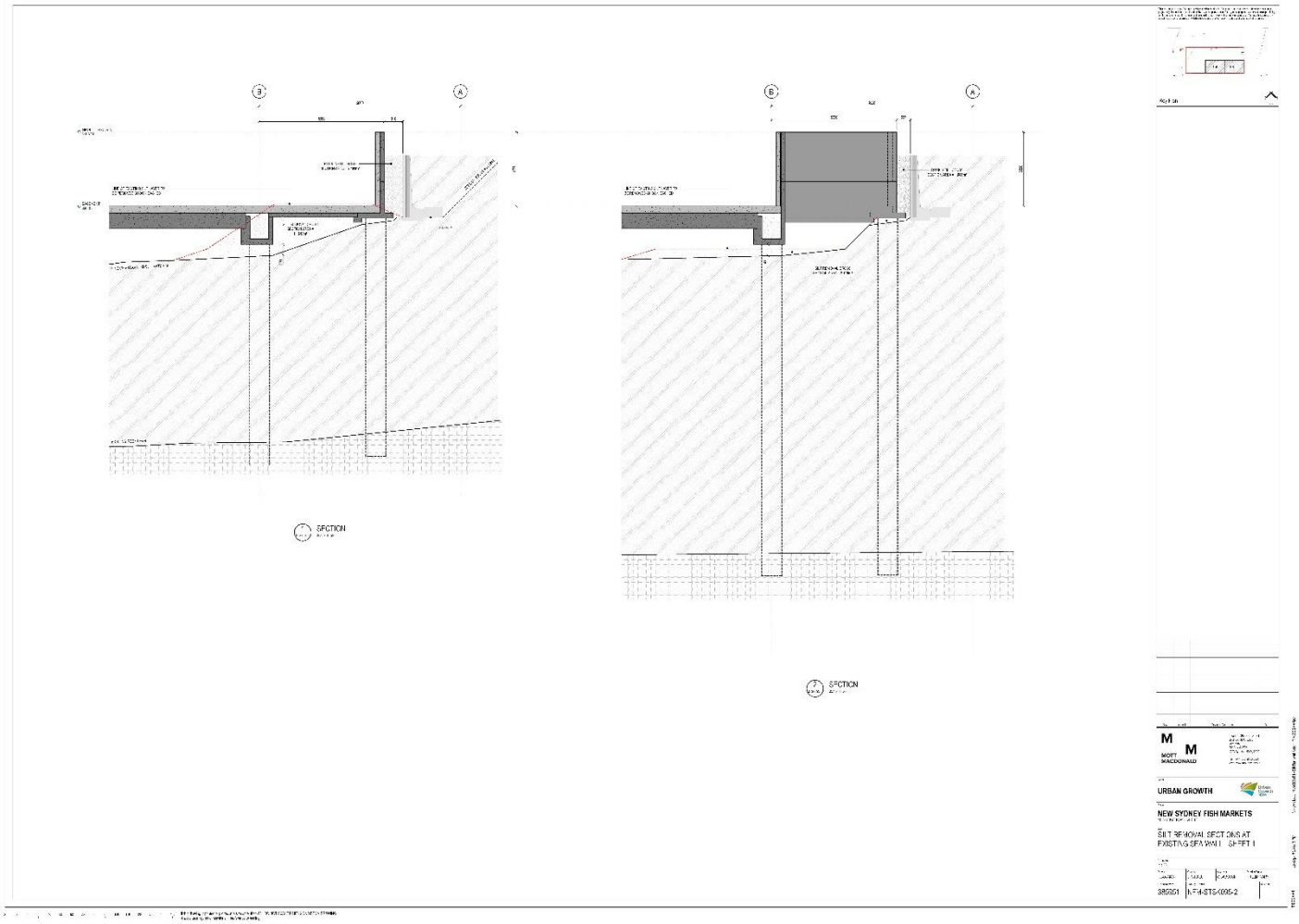
Portion of RPS plan: PRELIMINARY 3rd DRAFT DATA - BAYS MARKET DISTRICT 2016.02.11 showing the location of nineteenth century seawall (Blue line with 'W' and marked by arrows)

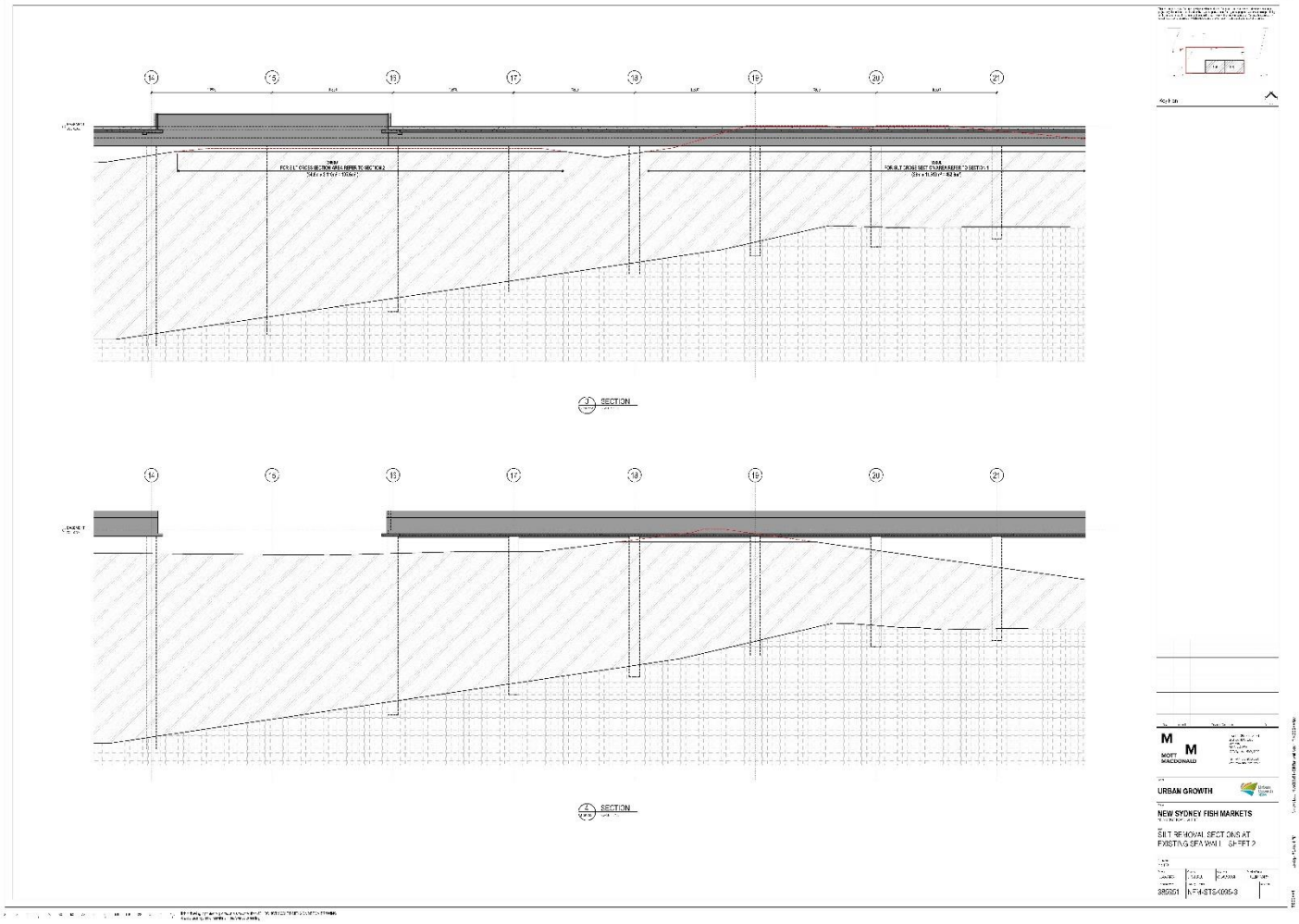


APPENDIX B

Silt Removal Sections Along Existing Sea Wall:




SECTION
SECTION
URBAN GROWTH
NEW SYDNEY FISH MARKETS
SILT REMOVAL SECTIONS AT EXISTING SEAWALL SHEET 1


SECTION
SECTION
URBAN GROWTH
NEW SYDNEY FISH MARKETS
SILT REMOVAL SECTIONS AT EXISTING SEAWALL SHEET 2

COMBER
CONSULTANTS

ARCHAEOLOGY – HERITAGE – MEDIATION – ARBITRATION

COMBER CONSULTANTS PTY LTD
ABN 96 109 670 573

76 EDWIN STREET NORTH
CROYDON, NSW, 2132
T 02 9799 6000
F 02 9799 6011
www.comber.net.au

DIRECTOR
JILLIAN COMBER

ASSOCIATE DIRECTOR, SYSTEMS
DAVID NUTLEY

ASSOCIATE DIRECTOR, PROJECTS
TORY STENING

Appendix 15: Arboriculture Impact Statement

Project No: WENT/PARK/17 Report No: BRIDGE/IMPROV/AIA/A

ARBORICULTURAL IMPACT ASSESSMENT
TREE PROTECTION SPECIFICATION

Bridge Road Improvements
Pyrmont

Prepared for: UrbanGrowth Development Corporation

26th June 2019
Revision A

Authors:

Anna Hopwood
Grad. Cert (Arboriculture)
Dip. Horticulture (Arboriculture)
Dip. Horticulture (Landscape Design)

Martin Peacock
BSc (hons.) Arboriculture
Dip. Horticulture (Landscape Design)
N Dip. Horticulture

p. 0404 424 264 | f. 02 9012 0924
po box 146 summer hill 2130
info@treeiQ.com.au
abn 62 139 088 832

treeiQ.com.au

Arboriculture Australia MEMBER

INSTITUTE OF AUSTRALIAN CONSULTING ARBORICULTURISTS
IACA
MANAGING URBAN TREES™

Contents

1.0 INTRODUCTION 3

1.1 Background 3
1.2 The Proposal 3

2.0 RESULTS 4

2.1 The Site 4
2.2 The Trees 4

3.0 ARBORICULTURAL IMPACT ASSESSMENT 7

3.1 Trees to be removed 7
3.2 Trees to be retained 7
3.3 Pruning 9

4.0 SUMMARY & CONCLUSIONS 10

5.0 LIMITATIONS & DISCLAIMER 11

6.0 BIBLIOGRAPHY & REFERENCES 11

7.0 APPENDICES 12

Appendix 1: Methodology 12
Appendix 2: Plans 14
Appendix 3: Tree Assessment Schedule 15
Appendix 4: Pruning Specification 22
Appendix 5: Plates 28
Appendix 6: Tree Protection Specification 29
Appendix 7: Typical Tree Protection Details 32

p. 0404 424 264 | f. 02 9012 0924
po box 146 summer hill 2130
info@treeiQ.com.au
abn 62 139 088 832

treeiQ.com.au

1.0 INTRODUCTION

1.1 Background

1.1.1 This Arboricultural Impact Assessment Report and Tree Protection Specification was prepared for UrbanGrowth Development Corporation in relation to a State Significant Development Application (SSDA) for road works for the improvement of Bridge Road, Pyrmont. The purpose of this Report is to undertake a Visual Tree Assessment[1] (VTA), provide an overview of the quality and value of the trees, determine the impact of the proposed works on the trees, and where appropriate, recommend the use of sensitive construction methods to minimise adverse impacts.

1.1.2 In preparing this Report, the author has considered the objectives of the *Sydney Local Environmental Plan 2012*, *Sydney Development Control Plan 2012 (Section 3.5 Urban Ecology), City of Sydney Register of Significant Trees (2013), Australian Standard 4970 Protection of Trees on Development Sites (2009)*, *Australian Standard 4373 Pruning of Amenity Trees (2007), Australian Standard 2303 Tree Stock for Landscape Use (2015)* and *Safe Work Australia Guide for Managing Risks of Tree Trimming and Removal Work (2016).*

Refer to Methodology **(Appendix 1)**

1.1.3 This impact assessment is based on an assessment of the following supplied documentation/plans only:

- Sydney Fish Market Bridge Road Upgrade from Wattle Street to Wentworth Park Road Drainage and Public Utilities Plan, (Issue 0), Sheets 1-3 (09.10.2018) – prepared by Mott MacDonald
- Sydney Fish Market Bridge Road Upgrade from Wattle Street to Wentworth Park Road Pavement Plan (Issue 0), Sheets 1-3 (09.10.2018) – prepared by Mott MacDonald
- Sydney Fish Market Bridge Road Upgrade from Wattle Street to Wentworth Park Road Roadworks Plan (Issue 0), Sheets 1-3 (09.10.2018) – prepared by Mott MacDonald
- Sydney Fish Market Bridge Road Upgrade from Wattle Street to Wentworth Park Road Typical Cross Sections (Issue 0), Sheets 1-3 (09.10.2018) – prepared by Mott MacDonald
- Sydney Fish Market Bridge Road Upgrade from Wattle Street to Wentworth Park Road Roadworks Longitudinal Sections (Issue 0), Sheets 1-3 (09.10.2018) – prepared by Mott MacDonald

Refer to Plans **(Appendix 2)**

1.1 The Proposal

1.2.1 The SSDA seeks approval for improvements to Bridge Road. The works will raise the level of Bridge Road to 3.1 RL, between the intersection of Bridge Road with Wentworth Park, Wentworth Park Road and Wattle Street. The proposed roadway works will provide a continuous linkage between the footpaths surrounding the new Sydney Fish Market development and the existing level of Wentworth Park, and will assist in managing flooding at the site.

1.2.2 The SSDA also seeks approval to widen Bridge Road to include a footpath area, a median, a dedicated drop-off area and cycle path, landscaping and compliant lane dimensions.

Refer to Plans **(Appendix 2)**

[1] Mattheck & Breloer (2003)

p. 0404 424 264 | f. 02 9012 0924
po box 146 summer hill 2130
info@treeiQ.com.au
abn 62 139 088 832

treeiQ.com.au

2.0 RESULTS

2.1 The Site

2.1.1 Location

The site includes a roughly triangular section of parkland at the northern end of Wentworth Park and the carriageway and road reserve of Bridge Road between Wentworth Park Road and Wattle Street.

2.1.2 Wentworth Park is elevated by approximately 1m above street level. A brick retaining wall is located on the park boundary on Bridge Road, Wattle Street and Wentworth Park Road. The wall along Bridge Road is intersected by three (3) pedestrian ramps and one (1) flight of stairs. A second flight of stairs is located in the retaining wall on Wentworth Park Road.

2.1.3 Historical Background

Wentworth Park was created through the reclamation of Blackwattle Bay during the late 19th century. The park came to serve as a focus for sports and community activities including concerts, celebrations and moving picture shows in the 1880's and 1890's. Numerous timber sheds were erected on the northern sports ground to store wool for the war effort during World War I. These sheds remained for some years after the end of the war.

2.1.4 The high-level railway viaduct was built in 1919. Greyhound racing began in the park in 1932 and subsequently grew to dominate the park. American troops established a large camp in Wentworth Park and more wool stores were built during World War II. These were eventually demolished in the 1950's.[2]

2.1.5 The Wentworth Park precinct includes a number of items of built and landscape heritage significance, including the Glebe and Wentworth Park Viaduct (an item of State significance as listed in the Heritage Act - s.170 NSW State Agency Heritage Register).[3]

2.2 The Trees

2.2.1 Sixty (60) trees were assessed using the Visual Tree Assessment[4] (VTA) criteria and notes and comprise of a mix of locally indigenous, Australian-native and exotic species. Trees 1WP-4WP and 13WP-56WP are located within Wentworth Park and Trees 41BMD-46BMD and 62BMD-66BMD are street trees located within the northern road reserve of Bridge Road. Tree A is a street tree located within the western road reserve of Wentworth Park Road.

2.2.2 As required by Clause 2.3.2 of *Australian Standard 4970 Protection of Trees on Development Sites (2009)*, each of the trees assessed has been allocated a Retention Value. The Retention Value is based on the tree's Useful Life Expectancy and Landscape Significance with consideration to its health, structural condition and site suitability. The Retention Values do not consider any proposed development works and are not a schedule for tree retention or removal. The trees have been allocated one of the following Retention Values:

- Priority for Retention
- Consider for Retention
- Consider for Removal
- Priority for Removal

Refer to Tree Assessment Schedule **(Appendix 3)**

[2] City of Sydney (2017)
[3] NSW Office of Environment & Heritage (2017)
[4] Mattheck & Breloer (2003)

p. 0404 424 264 | f. 02 9012 0924
po box 146 summer hill 2130
info@treeiQ.com.au
abn 62 139 088 832

treeiQ.com.au

2.2.3 A search of the BioNet Atlas of NSW Wildlife Database was undertaken in May 2019. No individual threatened tree species were listed within this database for the area were identified during the current field investigations of the site.[5] The ecological significance and habitat value of the trees has not been assessed and is beyond the scope of this report.

2.2.4 Tree 1WP

Tree 1WP was identified as *Corymbia citriodora* (Lemon Scented Gum) and is located in the north-eastern corner of the park, adjacent to Bridge Road. The tree is in good health and structural condition. Tree 1WP has an estimated Useful Life Expectancy (ULE) of 40+ years, is of high Landscape Significance and has been allocated a Retention Value of *Priority for Retention*.

2.2.5 Tree 2WP

Tree 2WP was identified as *Celtis sinensis* (Chinese Hackberry) and is located in the north-eastern corner of the park, at the junction of Wattle Street and Bridge Road. The tree is in good health and structural condition. Tree 2WP has an estimated ULE of 15-40 years, is of moderate Landscape Significance and has been allocated a Retention Value of *Consider for Retention*.

2.2.6 *Celtis sinensis* (Chinese Hackberry) is considered an environmental weeds species and is regulated by a *General Biosecurity Duty* by the Department of Primary Industries. It is not to be sold in NSW.[6]

2.2.7 Tree 3WP

Tree 3WP was identified as *Ficus microcarpa* var. *hillii* (Hills Weeping Fig) and is located in the north-eastern corner of the park, adjacent to Wattle Street. The tree is in good health and structural condition. Tree 3WP has an estimated ULE of 40+ years, is of very high Landscape Significance and has been allocated a Retention Value of *Priority for Retention*.

2.2.8 Tree 3WP is listed in the *City of Sydney Register of Significant Trees*.[7] The Register notes the tree possibly dates from the early period of park planting. An aerial photo of the site from 1943 shows a small tree in the same location as Tree 3WP. Refer to Plate 1 **(Appendix 4).**

2.2.9 Tree 4WP

Tree 4WP was identified as *Ficus macrophylla* (Moreton Bay Fig) and is located in the north-eastern corner of the park, adjacent to Wattle Street. The tree is a semi-mature specimen which is in good health and structural condition. Tree 4WP has an estimated ULE of 15-40 years, is moderate Landscape Significance and has been allocated a Retention Value of *Consider for Retention*.

2.2.10 Tree 13WP

Tree 13WP was identified as *Celtis australis* (European Hackberry) and is located at the western end of the park, adjacent to Wentworth Park Road. The tree is in good health and structural condition. Tree 13WP has an estimated ULE of 40+ years, is of high Landscape Significance and has been allocated a Retention Value of *Priority for Retention*.

2.2.11 Trees 14WP, 15WP, 17WP-21WP, 24-50WP & 52WP-56WP

Trees 14WP, 15WP, 17WP-21WP, 24-50WP and 52WP-56WP are the double row avenue of *Ficus macrophylla* (Moreton Bay Fig) located along the northern park boundary adjoining Bridge Road. The trees are in good health, and in general, good structural condition.

[5] NSW Office of Environment and Heritage (2011)
[6] Department of Primary Industries (2017)
[7] City of Sydney (2017)

p. 0404 424 264 | f. 02 9012 0924
po box 146 summer hill 2130
info@treeiQ.com.au
abn 62 139 088 832

treeiQ.com.au

2.2.12 Trees 18WP, 21WP, 24WP, 28WP, 30WP, 34WP, 44WP and 46WP are in fair structural condition due to the development of poor crown forms as a result of suppression by adjacent trees, and the presence of various, large wounds which exhibit advanced stages of decay. The presence of wounds in varying stages of decay is not uncommon in mature trees, and other than where specifically identified, do not require immediate remedial action. However, Trees 18WP, 28WP and 34WP have branches with wounds that extend over the footpath and carriageway on Bridge Road which require further assessment and may require pruning to reduce branch loading. All of the trees have stem injection plugs inserted into the cambium presumably for periodic applications of systemic insecticide.

2.2.13 Trees 14WP, 15WP, 17-21WP, 24-50WP and 52-56WP are listed in the *City of Sydney Register of Significant Trees*.[8] The avenue of Moreton Bay Figs is recognised as an outstanding example of the stylistic approach and influence of Charles Moore (Director, Sydney Royal Botanic Gardens 1848-1896). The avenue is typical of Victorian period public planting schemes with native figs planted along park boundaries. These public planting schemes have matured to produce landscapes which are dominated by large Moreton Bay Figs and Port Jackson Figs. This design approach became a defining feature of much of Sydney's parkland during the Victorian period, with other notable examples at Centennial Park and Moore Park.[9]

2.2.14 Aerial photos from 1943 illustrate that the avenue was well-established and it is thought the formation of the avenue dates from 1890 or the early 1900's.

2.2.15 Trees 16WP, 22WP, 23WP & 51WP

Trees 16WP, 22WP, 23WP and 51WP were identified as *Eucalyptus microcorys* (Tallowood) and are located along the northern park boundary adjoining Bridge Road. With the exception of Tree 16WP, the trees are in good health and structural condition. Tree 16WP is in fair structural condition due to the presence of bark inclusions. Trees 16WP, 22WP, 23WP and 51WP are of moderate Landscape Significance and have been allocated a Retention Value of *Consider for Retention*.

2.2.16 Whilst the trees meet the criteria to be allocated a Retention Value of *Consider for Retention*, generally the trees are suppressed by the adjacent trees within the avenue, and the trunks of Trees 22WP and 23WP have developed moderate and severe phototropic leans (respectively) towards Bridge Road. Arguably, the trees being of a different species, detract from the appearance of the avenue of Moreton Bay Figs. Periodic identification and removal of deadwood should be undertaken as the trees' crowns have developed towards (and mainly above) the footpath and carriageway on Bridge Road.

2.2.17 Trees 41BMD-46BMD & 62BMD-66BMD

Trees 41BMD-46BMD and 62BMD-66BMD were identified as *Lophostemon confertus* (Brush Box) and are semi-mature street trees growing within the northern road reserve of Bridge Road. In general, the trees are in good health and structural condition. These trees are of low Landscape Significance and have been allocated a Retention Value of *Consider for Removal.*

2.2.18 Tree A

Tree A was identified as *Afrocarpus falcatus* (Outeniqua) and is a mature street tree growing within the western road reserve of Wentworth Park Road. The tree is in good health and structural condition. The tree is of moderate Landscape Significance and has been allocated a Retention Value of *Consider for Retention.*

[8] City of Sydney (2017)
[9] City of Sydney (2017)

p. 0404 424 264 | f. 02 9012 0924
po box 146 summer hill 2130
info@treeiQ.com.au
abn 62 139 088 832

treeiQ.com.au

3.0 ARBORICULTURAL IMPACT ASSESSMENT

3.1 Trees to be removed

3.1.1 The supplied plans show that eleven (11) trees will need to be removed to accommodate the proposed Bridge Road improvement works. These are Trees 41BMD-46BMD and 62BMD-66BMD.

3.1.2 The trees to be removed are all small, semi-mature specimens which are of low Landscape Significance and have been allocated a Retention Value of *Consider for Removal*.

3.1.3 No trees with a Retention Value of *Priority for Retention* or *Consider for Retention* are proposed for removal.

3.2 Trees to be retained

3.2.1 The supplied plans show that forty-nine (49) trees are to be retained as part of the proposed development. This includes forty-two (42) trees with a Retention Value of *Priority for Retention* and seven (7) trees with a Retention Value of *Consider for Retention.*

3.2.2 Table 1: Trees to be removed

Priority for Retention	Consider for Retention	Consider for Removal	Priority for Removal
1WP, 3WP, 13WP, 14WP, 15WP, 17WP, 18WP, 19WP, 20WP, 21WP, 24WP, 25WP, 26WP, 27WP, 28WP, 29WP, 30WP, 31WP, 32WP, 33WP, 34WP, 35WP, 36WP, 37WP, 38WP, 39WP, 40WP, 41WP, 42WP, 43WP, 44WP, 45WP, 46WP, 47WP, 48WP, 49WP, 50WP, 52WP, 53WP, 54WP, 55WP & 56WP	2WP, 4WP, 16WP, 22WP, 23WP, 51WP & A		

3.2.3 No Works within TPZ Areas

The supplied plans show no works are proposed within the Tree Protection Zone (TPZ) areas of Trees 2WP, 38WP, 42WP-44WP, 46WP and 51WP.

3.2.4 Minor Encroachment

The supplied plans show that works including new kerbs and gutters, footpath reconstruction, raising of services pits and manhole covers, removal of existing services pits, and installation of new services pits and pipes are proposed within the TPZ areas of Trees 1WP, 4WP, 14WP, 39WP-41WP, 45WP, 47WP-50WP and 52WP-56WP. The encroachments are less than 10% of the TPZ and represent *Minor Encroachments* as defined by *Australian Standard 4970 (2009) Protection of Trees on Development Sites (AS-4970)*. *Minor Encroachments* are considered acceptable by AS-4970 when compensated for elsewhere and contiguous within the TPZ. The encroachment into the TPZ should be compensated for by extending the TPZ in areas not subject to encroachment.

p. 0404 424 264 | f. 02 9012 0924
po box 146 summer hill 2130
info@treeiQ.com.au
abn 62 139 088 832

treeiQ.com.au

3.2.5 Major Encroachment

The supplied plans show works including new kerbs and gutters, footpath reconstruction, raising of services pits and manhole covers, removal of existing services pits, and installation of new services pits and pipes are proposed the TPZ areas of Trees 3WP, 13WP, 15WP-37WP and A. The encroachments are greater than 10% of the TPZ or inside the Structural Root Zone (SRZ) and represent *Major Encroachment*s as defined by AS-4970.

3.2.6 Extensive information has been published relating to the use of tree sensitive design and construction methods which can be used to minimise impacts of development on tree health and reduce conflict between trees and built structures. Much of this information has been incorporated into best practice guidelines and standards (i.e. *British Standard 5837 Trees in Relation to Design, Demolition and Construction 2012* & *Australian Standard 4970-2009 Protection of Trees on Development Sites*). Specifically, Clause 3.3.4 of AS-4970, notes that design factors and tree sensitive methods can be used to minimise the impact of an encroachment. These methods should be confirmed as feasible by the relevant project consultants (i.e. architect, landscape architect, engineer etc) and may require flexibility at the time of construction.

3.2.7 The following tree sensitive methods should be used to minimise adverse impacts:

- Footpath, Kerb & Gutter Demolition: The demolition of the existing footpath, kerb and gutter along the southern side of Bridge Road should be supervised by the Project Arborist. The works should be undertaken using a compact excavator (<2T fitted with a flat bladed bucket). The excavator operator should be guided by a spotter at all times and machinery movements should be restricted to areas of existing pavement or ground protection. The asphalt surface, kerb and gutter should be broken up into small sections and carefully removed to minimise disturbance to the underlying sub-base/soil profile and prevent root damage.

  Existing underground structures and sub-base materials should be left in situ and reused (where possible). Where the removal of the sub-base is required, the works should be undertaken using a combination of machine excavation (<2T fitted with a flat bladed bucket) and hand excavation to prevent root damage. Roots (>25mmø) should be retained and protected for assessment by the Project Arborist.

- Road Demolition: The carriageway of Bridge Road is to be reconstructed with finished levels elevated above existing by up to 950mm (approx.). It is unlikely that any significant tree roots will be present below the road due to the depth of the existing road surface and highly compacted nature of the sub-base/sub-grade. Therefore, the demolition and reconstruction of the carriageway should not impact the trees and tree sensitive methods are not required.

  Machinery operators should be guided by a spotter when working along the southern side of the carriageway to ensure that the crowns of the trees in Wentworth Park are not damaged.

- Pit Decommissioning: Existing pits to be decommissioned within TPZ areas should be left in situ and infilled (where possible). Where their removal is required, the pits should broken-up into small sections and carefully removed to minimise disturbance to the adjacent sub-base/soil profile and prevent root damage.

- New Footpath: The footpath on Bridge Road is to be reconstructed with finished levels elevated above existing by up to 950mm (approx.). Minor excavation will be required in the TPZ areas of Tree 3WP and Tree A where the new footpath joins the existing footpath on Wattle Street and Wentworth Park Road.

p. 0404 424 264 | f. 02 9012 0924
po box 146 summer hill 2130
info@treeiQ.com.au
abn 62 139 088 832

treeiQ.com.au

The works should be undertaken using a combination of machine excavation and hand excavation (as detailed above) to minimise disturbance to the underlying sub-base/soil profile and prevent root damage. Roots (>25mmø) should be retained and protected for assessment by the Project Arborist. Existing sub-base layers should be retained and reused where possible.

New pavement sub-base layers should be thinned to enable the retention of roots (>25mmø) as required by the Project Arborist. Root pruning should be undertaken by the Project Arborist only. Roots to be retained should be protected by wrapping in Abelflex (or similar compressible material) with the new sub-base materials installed around the root. Compaction of the surrounding sub-base should be undertaken using hand tools only.

- Park Boundary Wall & Stairs: The existing park boundary wall has three (3) openings and a set of stairs that provide access to the footpath on Bridge Road. In addition, a section of boundary wall is cracked and bowed, presumably due to roots from the fig trees in the park exerting pressure on the rear of the wall. The supplied plans show no detail on how the proposed raised pavement levels will affect these openings/stairs or if repair of the damaged section of wall is to be undertaken as part of the works. Any works associated with these areas will need to use tree sensitive design and construction methods and may require preliminary, exploratory root investigations to ensure the root systems of the trees in the park is not significantly impacted.

- Kerb: Works to the kerb section in the SRZ of Tree A will need to use tree sensitive design and construction methods and may require preliminary, exploratory root investigations to ensure its root system is not significantly impacted.

- Underground Services: Sections of new stormwater pipes and pits connecting to existing infrastructure are to be installed along the southern edge of the carriageway of Bridge Road and existing pits within the footpath are to be raised in line with new footpath levels. The installation of underground services and pits should be supervised by the Project Arborist. The works should be undertaken using a combination of machine excavation and hand excavation (as detailed above) to prevent root damage. Roots (>25mmø) should be retained and protected for assessment by the Project Arborist.

  Services should be located around/below roots (>25mmø) and the location of pits adjusted as required by the Project Arborist. Existing pits that are to be raised in line with new footpath levels should be retained and extended rather than replaced with new pits (where possible).

  Alternatively, boring methods may be used for underground service installation where the obvert level (highest interior level of pipe) is greater than 1500mm below existing grade. Excavations for starting and receiving pits for boring equipment should be located outside of the TPZ areas or located to avoid roots (>25mmø) as required by the Project Arborist.

3.3 Pruning

3.3.1 The supplied plans show that the Trees 1WP, 15-23WP and 25-37WP will require Crown Lifting to provide additional vertical clearance for the reconstructed carriageway of Bridge Road. Refer to Pruning Specification **(Appendix 4)**.

3.3.2 It should be noted that the assessment of pruning requirements was estimated from the footpath on Bridge Road using a height pole. It was not possible to stand in the carriageway immediately below the crowns of the trees due to safety reasons. A second assessment of pruning requirements should be undertaken at the completion of the construction period when Bridge Road is still closed to vehicular traffic. This two-stage approach is also recommended to reduce the potential for unnecessary over pruning.

p. 0404 424 264 | f. 02 9012 0924
po box 146 summer hill 2130
info@treeiQ.com.au
abn 62 139 088 832

treeiQ.com.au

3.3.3 The Stage 1 pruning as outlined within the Pruning Specification **(Appendix 4)** addresses the main branches where conflict will occur and provides additional access for construction machinery. The Stage 2 pruning will involve minor pruning at the completion of the works to address any (generally smaller) conflicting branches which could not be accurately identified during the initial assessment. In addition, as part of the second pruning assessment the trees should be inspected for structural defects and significant deadwood (>25mmø) which require additional pruning works.

3.3.4 Pruning works should be carried out by a Practising Arborist. The Practising Arborist should hold a minimum qualification equivalent (using the Australian Qualifications Framework) of Level 3 or above, in Arboriculture or its recognised equivalent. The Practising Arborist should have a minimum of 3 years' experience in practical Arboriculture. Pruning work should be undertaken in accordance with *Australian Standard 4373: Pruning of Amenity Trees (2007), Safe Work Australia Guide for Managing Risks of Tree Trimming and Removal Work (2016)* and other applicable legislation and codes.

4.0 SUMMARY & CONCLUSIONS

4.1.1 Sixty (60) trees were addressed within this report and comprise of a mix of locally indigenous, Australian-native and exotic species. Trees 3WP, 14WP, 15WP, 17WP-21WP, 24WP-56WP are listed in the *City of Sydney Register of Significant Trees*.[10]

4.1.2 The SSDA seeks approval for improvements to Bridge Road including the raising the level of road and footpath, and the construction of a median, a dedicated drop-off area and cycle path, landscaping and compliant lane dimensions.

4.1.3 The supplied plans show that eleven (11) trees will need to be removed to accommodate the proposed Bridge Road improvement works. These are Trees 41BMD-46BMD and 62BMD-66BMD. The trees to be removed are all small, semi-mature specimens which are of low Landscape Significance and have been allocated a Retention Value of *Consider for Removal*. No trees with a Retention Value of *Priority for Retention* or *Consider for Retention* are proposed for removal.

4.1.4 The supplied plans show that forty-nine (49) trees are to be retained as part of the proposed development. These are Trees 1WP-4WP, 13WP-56WP and A. Tree sensitive methods (as outlined within Section 3.2.7) should be used within the TPZ areas of Trees 3WP, 13WP, 15WP-37WP and A to minimise adverse impacts. The trees to be retained should be protected in accordance with the Tree Plan **(Appendix 2)** and Tree Protection Specification **(Appendix 6)**.

4.1.5 The supplied plans show that the Trees 1WP, 15-23WP and 25-37WP will require Crown Lifting to provide additional vertical clearance for the reconstructed carriageway of Bridge Road. Pruning work should be undertaken in accordance with *Australian Standard 4373: Pruning of Amenity Trees (2007), Safe Work Australia Guide for Managing Risks of Tree Trimming and Removal Work (2016)* and other applicable legislation and codes.

[10] City of Sydney (2017)

p. 0404 424 264 | f. 02 9012 0924
po box 146 summer hill 2130
info@treeiQ.com.au
abn 62 139 088 832

treeiQ.com.au

5.0 LIMITATIONS & DISCLAIMER

TreeiQ takes care to obtain information from reliable sources. However, TreeiQ can neither guarantee nor be responsible for the accuracy of information provided by others. Plans, diagrams, graphs and photographs in this Arboricultural Report are visual aids only and are not necessarily to scale. This Report provides recommendations relating to tree management only. Advice should be sought from appropriately qualified consultants regarding design/construction/ecological/heritage etc issues.

This Report has been prepared for exclusive use by the client. This Report shall not be used by others or for any other reason outside its intended target or without the prior written consent of TreeiQ. Unauthorised alteration or separate use of any section of the Report invalidates the Report.

Many factors may contribute to tree failure and cannot always be predicted. TreeiQ takes care to accurately assess tree health and structural condition. However, a tree's internal structural condition may not always correlate to visible external indicators. There is no warranty or guarantee, expressed or implied that problems or deficiencies regarding the trees or site may not arise in the future. Information contained in this report covers only the trees assessed and reflects the condition of the trees at the time of inspection. Additional information regarding the methodology used in the preparation of this Report is attached as Appendix 1. A comprehensive tree risk assessment and management plan for the trees is beyond the scope of this Report.

Reference should be made to any relevant legislation including Tree Management Controls. All recommendations contained within this Report are subject to approval from the relevant Consent Authority.

This Report is based on Standards Australia Ltd copyrighted material that is distributed by SAI Global Ltd on Standards Australia Ltd's behalf. It may be reproduced and modified in accordance with the terms of SAI Global Ltd's Licence 1110-c049 to TreeiQ ('the Licensee'). All amended, marked-up and licensed copies of this document must be obtained from the Licensee. Standards Australia Ltd's copyright material is not for resale, reproduction or distribution in whole or in part without written permission from SAI Global Ltd: tel +61 2 8206 6355 or *copyright@saiglobal.com.*

6.0 BIBLIOGRAPHY & REFERENCES

Barrell (1995), 'Pre-development Tree Assessments', in *Trees & Building Sites, Proceedings of an International Conference Held in the Interest of Developing a Scientific Basis for Managing Trees in Proximity to Buildings*, International Society of Arboriculture, Illinois, USA, pp. 132-142

City of Sydney (2012), *Development Control Plan 2012 (Section 3.5 Urban Ecology)*

City of Sydney (2017), *Register of Significant Trees*

Harris, Clark & Matheny (1999), *Arboriculture: Integrated Management of Landscape Trees, Shrubs and Vines*, Prentice Hall, New Jersey.

Mattheck & Breloer (2003), *The Body Language of Trees: A Handbook for Failure Analysis*, The Stationary Office, London

Office of Environment and Heritage (2011), *BioNet Atlas of NSW Wildlife*

Safe Work Australia (2016), *Guide for Managing Risks of Tree Trimming and Removal Work*

Simon, Dormer &Hartshorne (1973), *Lowson's Botany*, Bell & Hyman, London

Standards Australia (2009), *Protection of Trees on Development Sites AS-4970*

Standards Australia (2007), *Pruning of Amenity Trees AS-4373*

Standards Australia (2015) *Tree Stock for Landscape Use AS-2303*

p. 0404 424 264 | f. 02 9012 0924
po box 146 summer hill 2130
info@treeiQ.com.au
abn 62 139 088 832

treeiQ.com.au

7.0 APPENDICES

Appendix 1: Methodology

1.1 **Site Inspection**: This report was determined as a result of a comprehensive site inspection during May 2019.

1.2 **Visual Tree Assessment (VTA)**: The subject tree(s) was assessed using the Visual Tree Assessment criteria and notes as described in *The Body Language of Trees – A Handbook for Failure Analysis.*[11] The inspection was limited to a visual examination of the subject tree(s) from ground level only. The inspection was limited to a visual examination of the subject tree(s) from ground level only. No internal diagnostic or tissue testing was undertaken as part of this assessment. Trees outside the subject site were assessed from the property boundaries only.

1.3 **Tree Dimensions**: The dimensions of the subject tree(s) are approximate only.

1.4 **Tree Locations:** The location of the subject tree(s) was determined from the supplied plans. Trees not shown on the supplied plans have been plotted in their **approximate location only.**

1.5 **Trees & Development**: Tree Protection Zones, Tree Protection Measures and Sensitive Construction Methods for the subject tree were based on methods outlined in *Australian Standard 4970-2009 Protection of Trees on Development Sites*.

The *Tree Protection Zone* (TPZ) is described in AS-4970 as a combination of the root area and crown area requiring protection. It is an area isolated from construction disturbance, so that the tree remains viable.

The *Structural Root Zone* (SRZ) is described in AS-4970 as the area around the base of a tree required for the tree's stability in the ground. Severance of structural roots within the SRZ is not recommended as it may lead to the destabilisation and/or demise of the tree.

In some cases it may be possible to encroach into or make variations to the theoretical TPZ. A *Minor Encroachment* is less than 10% of the area of the TPZ and is outside the SRZ. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ. A *Major Encroachment* is greater than 10% of the TPZ or inside the SRZ. In this situation the Project Arborist must demonstrate that the tree would remain viable. This may require root investigation by non-destructive methods or the use of sensitive construction methods.

1.6 **Tree Health**: The health of the subject tree(s) was rated as *Good*, *Fair* or *Poor* based on an assessment of the following factors:

I. Foliage size and colour
II. Pest and disease infestation
III. Extension growth
IV. Crown density
V. Deadwood size and volume
VI. Presence of epicormic growth

1.7 **Tree Structural Condition**: The structural condition of the subject tree(s) was rated as *Good*, *Fair* or *Poor* based on an assessment of the following factors:

I. Assessment of branching structure
(i.e co-dominant/bark inclusions, crossing branches, branch taper, terminal loading, previous branch failures)
II. Visible evidence of structural defects or instability
(i.e root plate movement, wounds, decay, cavities, fungal brackets, adaptive growth)
III. Evidence of previous pruning or physical damage
(root severance/damage, lopping, flush-cutting, lions tailing, mechanical damage)

1.8 **Useful Life Expectancy (ULE)**: The ULE is an estimate of the longevity of the subject tree(s) in its growing environment. The ULE is modified where necessary to take in consideration tree(s) health, structural condition and site suitability. The tree(s) has been allocated one of the following ULE categories (Modified from Barrell, 2001):

I. 40 years +
II. 15-40 years
III. 5-15 years
IV. Less than 5 years

[11] Mattheck & Breloer (2003)

p. 0404 424 264 | f. 02 9012 0924
po box 146 summer hill 2130
info@treeiQ.com.au
abn 62 139 088 832

treeiQ.com.au

1.9 **Landscape Significance**: Landscape Significance was determined by assessing the combination of the cultural, environmental and aesthetic values of the subject tree(s). Whilst these values are subjective, a rating of high, moderate, low or insignificant has been allocated to the tree(s). This provides a relative value of the tree's Landscape Significance which may aid in determining its Retention Value. If the tree(s) can be categorized into more than one value, the higher value has been allocated.

Landscape Significance	Description
Very High	The subject tree is listed as a Heritage Item under the *Local Environmental Plan* with a local or state level of significance.
	The subject tree is listed on Council's Significant Tree Register or is considered to meet the criteria for significance assessment of trees and/or landscapes by a suitably qualified professional. The criteria are based on general principles outlines in the Burra Charter and on criteria from the Register of the National Estate.
High	The subject tree creates a 'sense of place' or is considered 'landmark' tree.
	The subject tree is of local, cultural or historical importance or is widely known.
	The subject tree forms part of the curtilage of a heritage item with a known or documented association with that item.
	The subject tree has been identified by a suitably qualified professional as a species scheduled as a Threatened or Vulnerable Species for the site defined under the provisions of the NSW *Biodiversity Conservation Act (2016)* or the Commonwealth *Environmental Protection and Biodiversity Conservation Act* (1999).
	The subject tree is known to contain nesting hollows to a species scheduled as a Threatened or Vulnerable Species for the site as defined under the provisions of the NSW *Biodiversity Conservation Act (2016)* or the Commonwealth *Environmental Protection and Biodiversity Conservation Act* (1999).
	The subject tree is an excellent representative of the species in terms of aesthetic value.
	The subject tree is of significant size, scale or makes a significant contribution to the canopy cover of the locality.
Moderate	The subject tree makes a positive contribution to the visual character or amenity of the area.
	The subject tree provides a specific function such as screening or minimising the scale of a building.
	The subject tree is a good representative of the species in terms of aesthetic value.
Low	The subject tree is a known environmental weed species or is exempt under the provisions of the local Council's Tree Management Controls
	The subject tree makes little or no contribution to the amenity of the locality.
	The subject tree is a poor representative of the species in terms of aesthetic value.

1.10 **Retention Value**: Retention Value was based on the subject tree's Useful Life Expectancy and Landscape Significance. The Retention Value was modified where necessary to take in consideration the subject tree's health, structural condition and site suitability. The subject tree(s) has been allocated one of the following Retention Values:

I. Priority for Retention
II. Consider for Retention
III. Consider for Removal
IV. Priority for Removal

ULE		Landscape Significance		
	Very High	High	Moderate	Low
40 years +	Priority for Retention	Priority for Retention		Consider for Removal
15-40 years		Priority for Retention	Consider for Retention	
5-15 years		Consider for Retention		
Less than 5 years	Consider for Removal	Priority for Removal		

The above table has been modified from the Footprint Green Tree Significance and Retention Value Matrix.

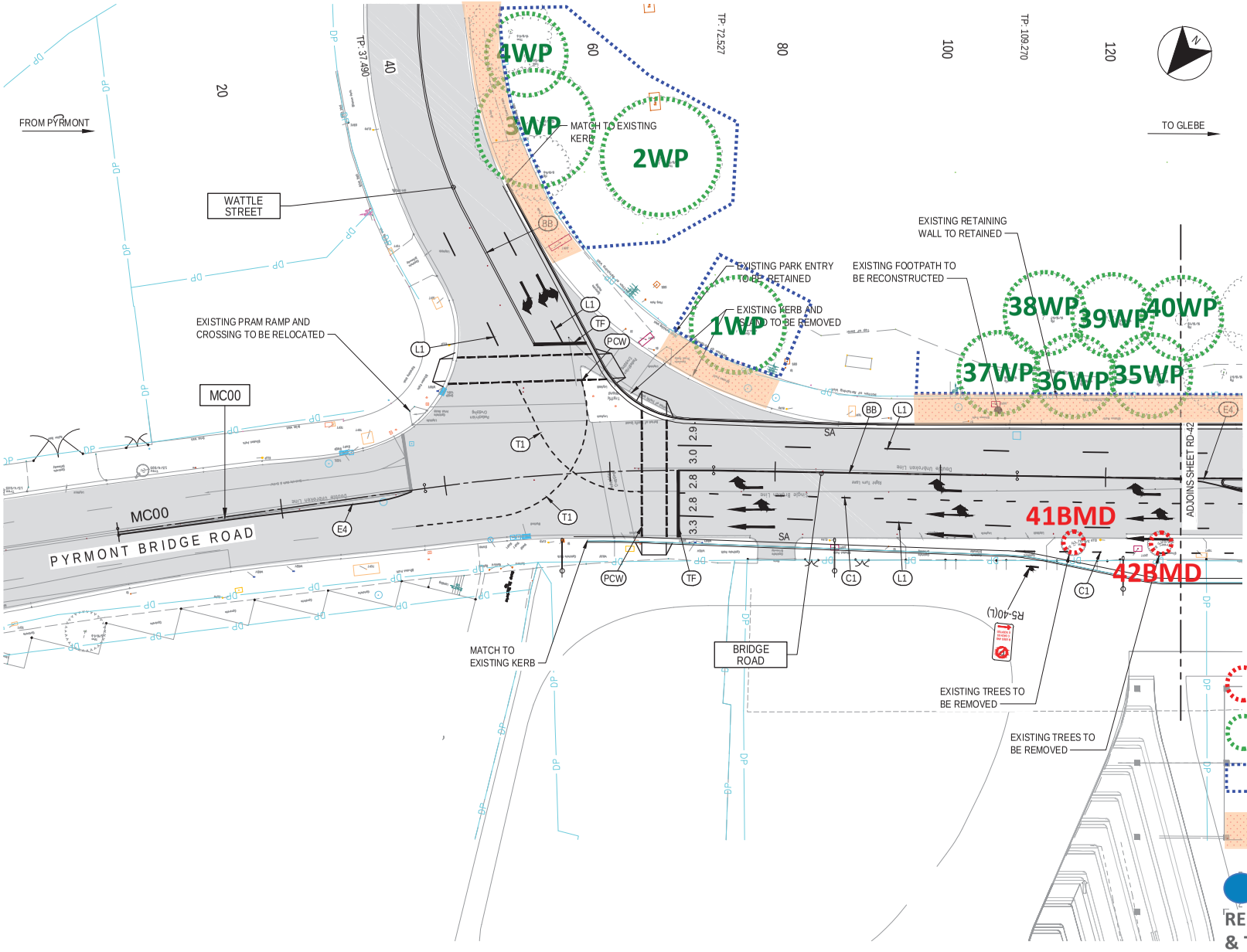
p. 0404 424 264 | f. 02 9012 0924
po box 146 summer hill 2130
info@treeiQ.com.au
abn 62 139 088 832

treeiQ.com.au

Appendix 2: Plans

p. 0404 424 264 | f. 02 9012 0924
po box 146 summer hill 2130
info@treeiQ.com.au
abn 62 139 088 832

treeiQ.com.au



GENERAL ARRANGEMENT LEGEND

- EXISTING DP BOUNDARY
- EXISTING TREE
- EXISTING WATER COURSE (eWC)
- EXISTING EDGE OF GARDEN
- EXISTING FENCE
- EXISTING MANPROOF FENCE
- EXISTING GATE
- EXISTING PAVEMENT
- MC00 — MASTER CONTROL LINE LABEL
- SA — KERB TYPE, FOR DETAILS REFER TO RMS STANDARD DRAWING R0300-01
- NEW STREET LIGHT
- PAVEMENT ARROW AR1
- PAVEMENT ARROW AR2
- PAVEMENT ARROW AR3 (L OR R)
- PAVEMENT ARROW AR4 (L OR R)
- PAVEMENT ARROW ARU5
- PAVEMENT ARROW AR9
- EXISTING PAVEMENT ARROW
- C1 — PAVEMENT MARKING INDICATOR

TREE TO BE REMOVED

TREE TO BE RETAINED & PROTECTED

TPZ FENCING

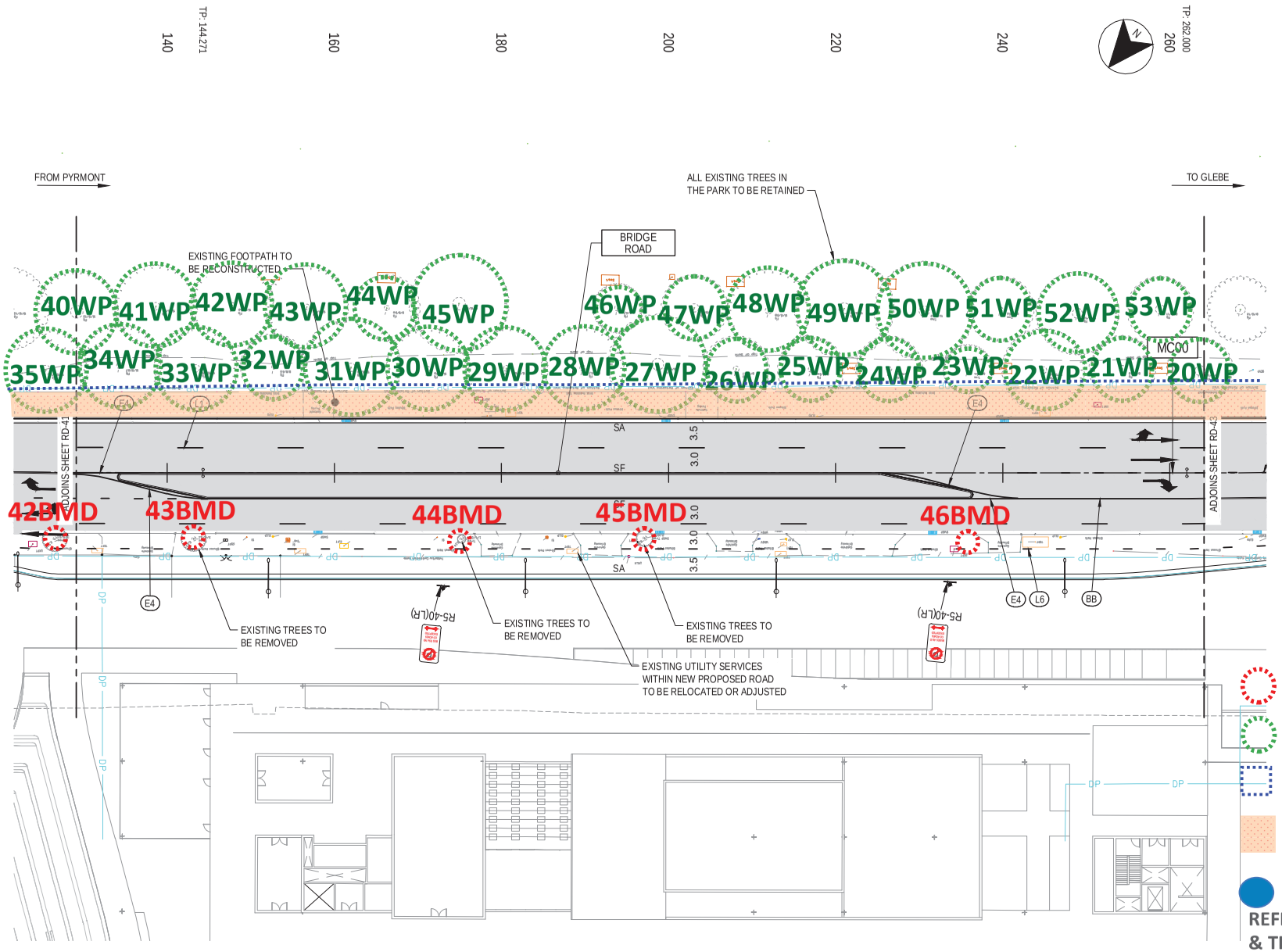
TREE SENSITIVE DEMOLITION & CONSTRUCTION MEASURES REQUIRED

TRUNK PROTECTION

REFER TO TREE PROTECTION SPECIFICATION & TREE PROTECTIONS DETAILS APPENDICES 6 & 7

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

| | | |



GENERAL ARRANGEMENT LEGEND

- EXISTING DP BOUNDARY
- EXISTING TREE
- EXISTING WATER COURSE
- EXISTING EDGE OF GARDEN
- EXISTING FENCE
- EXISTING MANPROOF FENCE
- EXISTING GATE
- EXISTING PAVEMENT
- MC00 — MASTER CONTROL LINE LABEL
- SA — KERB TYPE, FOR DETAILS REFER TO RMS STANDARD DRAWING R0300-01
- NEW STREET LIGHT
- PAVEMENT ARROW AR1
- PAVEMENT ARROW AR2
- PAVEMENT ARROW AR3 (L OR R)
- PAVEMENT ARROW AR4 (L OR R)
- PAVEMENT ARROW ARU5
- PAVEMENT ARROW AR9
- EXISTING PAVEMENT ARROW
- C1 — PAVEMENT MARKING INDICATOR

TREE TO BE REMOVED

TREE TO BE RETAINED & PROTECTED

TPZ FENCING

TREE SENSITIVE DEMOLITION & CONSTRUCTION MEASURES REQUIRED

TRUNK PROTECTION

REFER TO TREE PROTECTION SPECIFICATION & TREE PROTECTIONS DETAILS APPENDICES 6 & 7

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED
0 5 10 15 20 25 30 35 40 45 50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: P:\Sydney\Projects\38xxxx\385951 Sydney Fish Markets\04 Working\01 Drafting\Civil\Drawings\CI-RD3-B20 RD-0302.dwg	DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	PLOT DATE / TIME: 9/10/2018 4:59:48 PM; PLOT BY: JED64037

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
	0	9.10.2018	ISSUED FOR CONCEPT DESIGN		B.SOO

SCALES ON A3 SIZE DRAWING: 0 5 10 15 20 PLAN 1:500

CO-ORDINATE SYSTEM: MGA ZONE 56; HEIGHT DATUM: AHD

DRAWINGS / DESIGN PREPARED BY: MM — MOTT MACDONALD, Level 10, 383 Kent Street, Sydney, NSW 2000, Australia, PO Box Q1678, QVB Sydney NSW 1230, Australia, T +61 (0)2 9098 6800, W www.mottmac.com

MM DRAWING NUMBER: CI-RD3-B20 RD-0302

	TITLE	NAME	DATE
DRAWN		M.HOFFMANN	09.10.18
DRG CHECK		B.SOO	09.10.18
DESIGN		M.JEDNIUK	09.10.18
DESIGN CHECK		V.SOFREVSKI	09.10.18
DESIGN MNGR		B.SOO	09.10.18
PROJECT MNGR		G.BABCOCK	09.10.18

CLIENT: UrbanGrowth NSW Development Corporation

PREPARED FOR: URBAN GROWTH

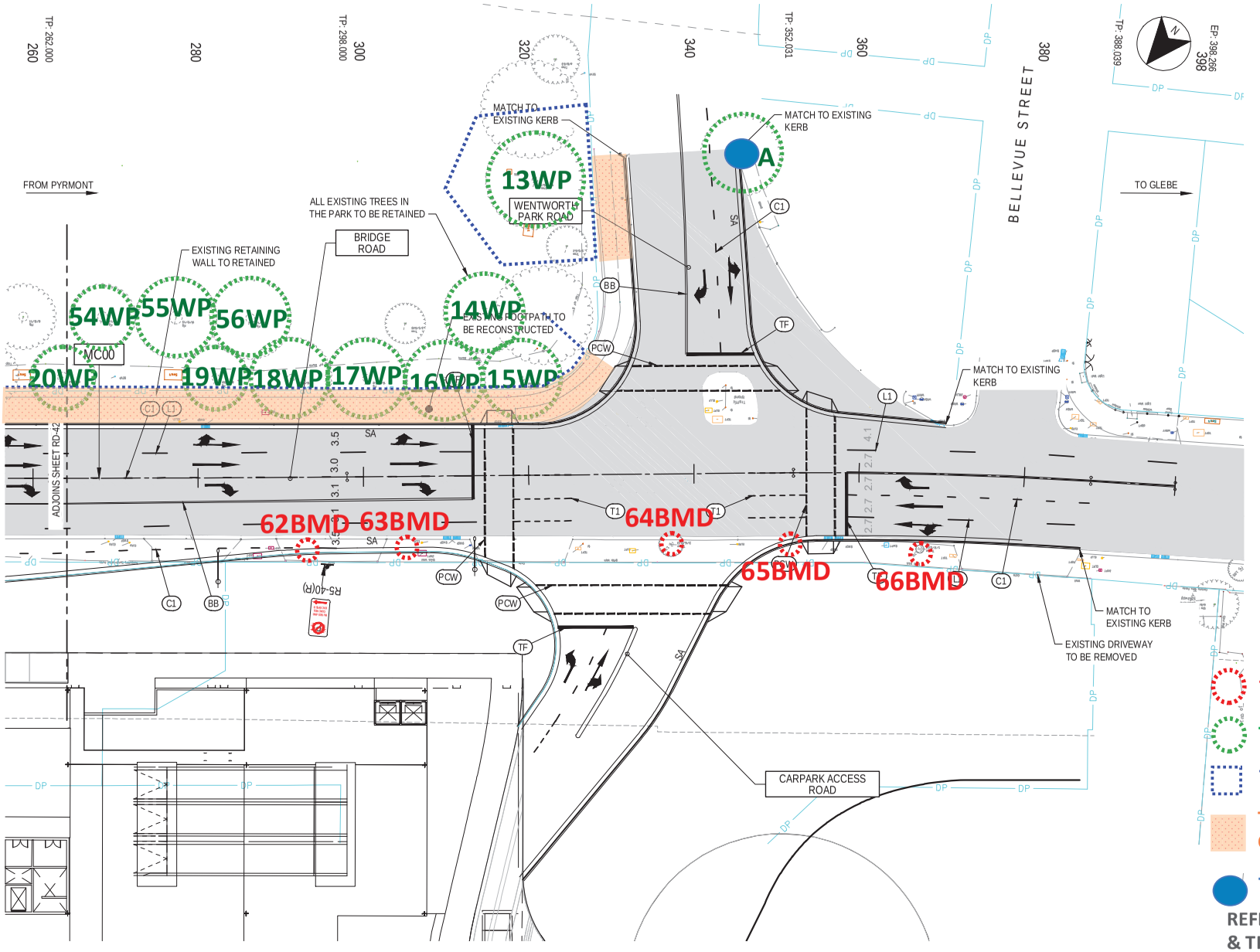
ULTIMO - CITY OF SYDNEY
MR 00000 - BRIDGE ROAD
SYDNEY FISH MARKET
BRIDGE ROAD UPGRADE
FROM WATTLE STREET TO WENTWORTH PARK ROAD
ROADWORKS PLAN — SHEET 2 OF 3

A3

RMS REGISTRATION No.: DS2018/XXXXXX — PART 01

ISSUE STATUS: CONCEPT DESIGN; EDMS No.: ; SHEET No.: RD-0302; ISSUE: 0

© Roads and Maritime Services



GENERAL ARRANGEMENT LEGEND

- EXISTING DP BOUNDARY
- EXISTING TREE
- EXISTING WATER COURSE
- EXISTING EDGE OF GARDEN
- EXISTING FENCE
- EXISTING MANPROOF FENCE
- EXISTING GATE
- EXISTING PAVEMENT
- MC00 — MASTER CONTROL LINE LABEL
- SA — KERB TYPE, FOR DETAILS REFER TO RMS STANDARD DRAWING R0300-01
- NEW STREET LIGHT
- PAVEMENT ARROW AR1
- PAVEMENT ARROW AR2
- PAVEMENT ARROW AR3 (L OR R)
- PAVEMENT ARROW AR4 (L OR R)
- PAVEMENT ARROW ARU5
- PAVEMENT ARROW AR9
- EXISTING PAVEMENT ARROW
- C1 — PAVEMENT MARKING INDICATOR

TREE TO BE REMOVED

TREE TO BE RETAINED & PROTECTED

TPZ FENCING

TREE SENSITIVE DEMOLITION & CONSTRUCTION MEASURES REQUIRED

TRUNK PROTECTION

REFER TO TREE PROTECTION SPECIFICATION & TREE PROTECTIONS DETAILS APPENDICES 6 & 7

THIS DRAWING MAY BE PREPARED IN COLOUR AND MAY BE INCOMPLETE IF COPIED

50mm ON A3 SIZE ORIGINAL

DRAWING FILE LOCATION / NAME: P:\Sydney\Projects\38xxxx\385951 Sydney Fish Markets\04 Working\01 Drafting\Civil\Drawings\CI-RD3-B20 RD-0303.dwg

DESIGN LOT CODE:

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING:

PLOT DATE / TIME: 9/10/2018 5:00:04 PM

PLOT BY: JED64037

EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL
	0	9.10.2018	ISSUED FOR CONCEPT DESIGN		B.SOO

SCALES ON A3 SIZE DRAWING: 0 5 10 15 20 PLAN 1:500

DRAWINGS / DESIGN PREPARED BY: MOTT MACDONALD, Level 10, 383 Kent Street, Sydney, NSW 2000, Australia, PO Box Q1678, QVB Sydney NSW 1230, Australia, T +61 (0)2 9098 6800, W www.mottmac.com

CO-ORDINATE SYSTEM: MGA ZONE 56

HEIGHT DATUM: AHD

MM DRAWING NUMBER: CI-RD3-B20 RD-0303

	NAME	DATE
TITLE		
DRAWN	M.HOFFMANN	09.10.18
DRG CHECK	B.SOO	09.10.18
DESIGN	M.JEDNIUK	09.10.18
DESIGN CHECK	V.SOFREVSKI	09.10.18
DESIGN MNGR	B.SOO	09.10.18
PROJECT MNGR	G.BABCOCK	09.10.18

CLIENT: UrbanGrowth NSW Development Corporation

PREPARED FOR: URBAN GROWTH

ULTIMO - CITY OF SYDNEY
MR 00000 - BRIDGE ROAD
SYDNEY FISH MARKET
BRIDGE ROAD UPGRADE
FROM WATTLE STREET TO WENTWORTH PARK ROAD
ROADWORKS PLAN

A3

SHEET 3 OF 3

RMS REGISTRATION No.: DS2018/XXXXXX

PART: 01

ISSUE STATUS: CONCEPT DESIGN

EDMS No.:

SHEET No.: RD-0303

ISSUE: 0

© Roads and Maritime Services

Appendix 3: Tree Assessment Schedule

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Condition Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
1WP	*Corymbia citriodora* (Lemon Scented Gum)	600	14	7	Good	Good	Small (<25mm) diameter deadwood in low volumes.	40+	High	Priority for Retention	7.2	2.7	Retain. Minor encroachment, footpath.
2WP	*Celtis sinensis* (Chinese Hackberry)	800	13	9	Good	Good	Partially suppressed. Medium (25-75mm) diameter deadwood in low volumes. Wound/s, no visible signs of decay.	15-40	Moderate	Consider for Retention	9.6	3.1	Retain. No works within TPZ.
3WP	*Ficus microcarpa* var. *hillii* (Hills Weeping Fig)	1550	25	13	Good	Good	Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Small (<25mm) diameter epicormic growth in low volumes.	40+	Very High	Priority for Retention	15	4.0	Retain. Major encroachment, road & footpath.
4WP	*Ficus macrophylla* (Moreton Bay Fig)	200	7	2	Good	Good	Semi-mature specimen.	15-40	Moderate	Consider for Retention	2.4	1.7	Retain. Minor encroachment, footpath.
13WP	*Celtis australis* (European Hackberry)	900	9	6	Good	Good	Wound/s, no visible signs of decay. Small (<25mm) epicormic growth in low volumes.	40+	High	Priority for Retention	10.8	3.2	Retain. Major encroachment, footpath.
14WP	*Ficus macrophylla* (Moreton Bay Fig)	1200	15	12	Good	Good	Partially suppressed. Wound/s, early stages of decay-not structurally significant. Medium (25-75mm) diameter deadwood in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	14.4	3.6	Retain. Minor encroachment, footpath.
15WP	*Ficus macrophylla* (Moreton Bay Fig)	700	9	8	Good	Good	Partially suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Small (<25mm) epicormic growth in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	8.4	2.9	Retain. Major encroachment, road & footpath.
16WP	*Eucalyptus microcorys* (Tallowood)	750	24	7	Good	Fair	Co-dominant inclusion. Branch inclusion/s, minor.	15-40	Moderate	Consider for Retention	9	3.0	Retain. Major encroachment, road & footpath.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Condition Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
17WP	*Ficus macrophylla* (Moreton Bay Fig)	750	14	9	Good	Good	Partially suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Small (<25mm) diameter deadwood in low volumes. Small (<25mm) diameter epicormic growth in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	9	3.0	Retain. Major encroachment, road & footpath.
18WP	*Ficus macrophylla* (Moreton Bay Fig)	850	16	11	Good	Fair	Wound with advanced stages of decay on second order branch over road-further assessment required. Medium (25-75mm) diameter epicormic growth in low volumes. stem injection. Partially suppressed. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	10.2	3.1	Retain. Major encroachment, road & footpath.
19WP	*Ficus macrophylla* (Moreton Bay Fig)	850	13	9	Good	Good	Partially suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay. Rubbing branch at 7m. Stem injection plugs.	40+	Very High	Priority for Retention	10.2	3.1	Retain. Major encroachment, road & footpath.
20WP	*Ficus macrophylla* (Moreton Bay Fig)	1000	16	8	Good	Good	Partially suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Small (<25mm) diameter epicormic growth in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	12	3.4	Retain. Major encroachment, road & footpath.
21WP	*Ficus macrophylla* (Moreton Bay Fig)	650	10	7	Good	Fair	Partially suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Small (<25mm) diameter epicormic growth in low volumes. Stem injection plugs in trunk.	15-40	Very High	Priority for Retention	7.8	2.8	Retain. Major encroachment, road & footpath.
22WP	*Eucalyptus microcorys* (Tallowood)	800	18	10	Good	Good	Phototropic lean, moderate. Partially suppressed. Medium (25-75mm) diameter deadwood in low volumes. Small (<25mm) epicormic growth in low volumes.	15-40	Moderate	Consider for Retention	9.6	3.1	Retain. Major encroachment, road & footpath.
23WP	*Eucalyptus microcorys* (Tallowood)	500	8	10	Good	Good	Phototropic lean, severe. Heavily suppressed. Small (<25mm) epicormic growth in low volumes. Wound/s, no visible signs of decay.	5-15	Moderate	Consider for Retention	6	2.5	Retain. Major encroachment, road & footpath.
24WP	*Ficus macrophylla* (Moreton Bay Fig)	600	9	5	Good	Fair	Heavily suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Crown consists mainly of mature epicormic growth. Stem injection plugs in trunk.	15-40	Very High	Priority for Retention	7.2	2.7	Retain. Major encroachment, road & footpath.
25WP	*Ficus macrophylla* (Moreton Bay Fig)	600	11	7	Good	Good	Heavily suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Medium (25-75mm) epicormic growth in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	7.2	2.7	Retain. Major encroachment, road & footpath.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Condition Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
26WP	*Ficus macrophylla* (Moreton Bay Fig)	600	12	8	Good	Good	Partially suppressed. Wound/s, advanced stages of decay. Wound/s, early stages of decay-not structurally significant. Small (<25mm) epicormic growth in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	7.2	2.7	Retain. Major encroachment, road & footpath.
27WP	*Ficus macrophylla* (Moreton Bay Fig)	1500	19	10	Good	Good	Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Small (<25mm) diameter deadwood in low volumes. Small (<25mm) epicormic growth in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	15	4.0	Retain. Major encroachment, road & footpath.
28WP	*Ficus macrophylla* (Moreton Bay Fig)	800	10	9	Good	Fair	Partially suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Longitudinal wound on upper side of second order branch over road-further assessment required. Small (<25mm) epicormic growth in low volumes. Stem injection plugs in trunk.	15-40	Very High	Priority for Retention	9.6	3.1	Retain. Major encroachment, road & footpath.
29WP	*Ficus macrophylla* (Moreton Bay Fig)	850	15	9	Good	Good	Partially suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay. Branch inclusion/s, minor. Small (<25mm) diameter epicormic growth in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	10.2	3.1	Retain. Major encroachment, road & footpath.
30WP	*Ficus macrophylla* (Moreton Bay Fig)	600	7	9	Good	Fair	Heavily suppressed. Wound/s, advanced stages of decay. Small (<25mm) diameter deadwood in low volumes. Stem injection plugs in trunk.	15-40	Very High	Priority for Retention	7.2	2.7	Retain. Major encroachment, road & footpath.
31WP	*Ficus macrophylla* (Moreton Bay Fig)	1100	17	10	Good	Good	Partially suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Small (<25mm) diameter epicormic growth. Medium (25-75mm) epicormic growth in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	13.2	3.5	Retain. Major encroachment, road & footpath.
32WP	*Ficus macrophylla* (Moreton Bay Fig)	450	8	7	Good	Good	Heavily suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Trunk cavity, minor. Stem injection plugs in trunk.	15-40	Very High	Priority for Retention	5.4	2.4	Retain. Major encroachment, road & footpath.
33WP	*Ficus macrophylla* (Moreton Bay Fig)	1200	14	9	Good	Good	Partially suppressed. Wound/s, advanced stages of decay. Wound/s, early stages of decay-not structurally significant. Small (<25mm) epicormic growth. in low volumes.	40+	Very High	Priority for Retention	14.4	3.6	Retain. Major encroachment, road & footpath.
34WP	*Ficus macrophylla* (Moreton Bay Fig)	500	7	9	Good	Fair	Heavily suppressed. Wound/s, early stages of decay on upper side of first order branch over road-further assessment required. Wound/s, advanced stages of decay. Stem injection plugs in trunk.	15-40	Very High	Priority for Retention	6	2.5	Retain. Major encroachment, road & footpath.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Condition Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
35WP	*Ficus macrophylla* (Moreton Bay Fig)	1200	18	9	Good	Good	Partially suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Medium (25-75mm) diameter epicormic growth in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	14.4	3.6	Retain. Major encroachment, road & footpath.
36WP	*Ficus macrophylla* (Moreton Bay Fig)	900	10	9	Good	Good	Heavily suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Small (<25mm) diameter epicormic growth. Medium (25-75mm) epicormic growth in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	10.8	3.2	Retain. Major encroachment, road & footpath.
37WP	*Ficus macrophylla* (Moreton Bay Fig)	800	10	8	Good	Good	Partially suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	9.6	3.1	Retain. Major encroachment, road & footpath.
38WP	*Ficus macrophylla* (Moreton Bay Fig)	550	10	8	Good	Good	Partially suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Small (<25mm) diameter epicormic growth in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	6.6	2.6	Retain. No works within TPZ.
39WP	*Ficus macrophylla* (Moreton Bay Fig)	1200	20	11	Good	Good	Partially suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Small (<25mm) & medium (25-75mm) diameter epicormic growth in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	14.4	3.6	Retain. Minor encroachment, footpath.
40WP	*Ficus macrophylla* (Moreton Bay Fig)	1500	23	11	Good	Good	Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Branch inclusion/s, minor. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	15	4.0	Retain. Minor encroachment, footpath.
41WP	*Ficus macrophylla* (Moreton Bay Fig)	1500	12	10	Good	Good	Partially suppressed. Trunk cavity, minor. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Small (<25mm) diameter epicormic growth in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	15	4.0	Retain. Minor encroachment, footpath.
42WP	*Ficus macrophylla* (Moreton Bay Fig)	700	8	6	Good	Good	Partially suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Small (<25mm) diameter epicormic growth in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	8.4	2.9	Retain. No works within TPZ.
43WP	*Ficus macrophylla* (Moreton Bay Fig)	700	11	8	Good	Good	Partially suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Small (<25mm) diameter deadwood in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	8.4	2.9	Retain. No works within TPZ.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Condition Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
44WP	*Ficus macrophylla* (Moreton Bay Fig)	500	8	9	Good	Fair	Heavily suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Majority of crown previously removed. Small (<25mm) epicormic growth in low volumes. Stem injection plugs in trunk.	15-40	Very High	Priority for Retention	6	2.5	Retain. No works within TPZ.
45WP	*Ficus macrophylla* (Moreton Bay Fig)	1700	18	12	Good	Good	Wound/s, no visible signs of decay. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Small (<25mm) & medium (25-75mm) diameter epicormic growth in moderate volumes. Hollow trunk-not structurally significant. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	15	4.2	Retain. Minor encroachment, footpath.
46WP	*Ficus macrophylla* (Moreton Bay Fig)	600	7	9	Good	Fair	Heavily suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Stem injection plugs in trunk.	15-40	Very High	Priority for Retention	7.2	2.7	Retain. No works within TPZ.
47WP	*Ficus macrophylla* (Moreton Bay Fig)	1000	15	9	Good	Good	Partially suppressed. Crown density 75-100%. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Stem injection plugs in trunk.	15-40	Very High	Priority for Retention	12	3.4	Retain. Minor encroachment, footpath.
48WP	*Ficus macrophylla* (Moreton Bay Fig)	900	16	10	Good	Good	Partially suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	10.8	3.2	Retain. Minor encroachment, footpath.
49WP	*Ficus macrophylla* (Moreton Bay Fig)	1100	17	11	Good	Good	Wound/s, early stages of decay. Wound/s, advanced stages of decay. Small (<25mm) diameter deadwood in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	13.2	3.5	Retain. Minor encroachment, footpath.
50WP	*Ficus macrophylla* (Moreton Bay Fig)	1150	16	10	Good	Good	Wound/s, early stages of decay. Wound/s, advanced stages of decay. Small (<25mm) diameter epicormic growth in moderate volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	13.8	3.6	Retain. Minor encroachment, footpath.
51WP	*Eucalyptus microcorys* (Tallowood)	600	22	7	Good	Good	Large (>75mm) diameter deadwood in low volumes.	15-40	Moderate	Consider for Retention	7.2	2.7	Retain. No works within TPZ.
52WP	*Ficus macrophylla* (Moreton Bay Fig)	1300	19	11	Good	Good	Partially suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Large (>75mm) diameter deadwood in low volumes. Small (<25mm) epicormic growth in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	15	3.7	Retain. Minor encroachment, footpath.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Condition Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
53WP	*Ficus macrophylla* (Moreton Bay Fig)	800	16	10	Good	Good	Partially suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Small (<25mm) epicormic growth in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	9.6	3.1	Retain. Minor encroachment, footpath.
54WP	*Ficus macrophylla* (Moreton Bay Fig)	1100	19	12	Good	Good	Partially suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay. Small (<25mm) & medium (25-75mm) diameter epicormic growth in low volumes. Trunk cavity, minor. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	13.2	3.5	Retain. Minor encroachment, footpath.
55WP	*Ficus macrophylla* (Moreton Bay Fig)	1600	18	11	Good	Good	Partially suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay. Small (<25mm) epicormic growth. in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	15	4.1	Retain. Minor encroachment, footpath.
56WP	*Ficus macrophylla* (Moreton Bay Fig)	1350	20	10	Good	Good	Partially suppressed. Wound/s, early stages of decay. Wound/s, advanced stages of decay-not structurally significant. Small (<25mm) diameter epicormic growth in low volumes. Stem injection plugs in trunk.	40+	Very High	Priority for Retention	15	3.8	Retain. Minor encroachment, footpath.
41BMD	*Lophostemon confertus* (Brush Box)	100	8	3	Good	Fair	Trunk cavity(s), major. Structures within SRZ.	5-15	Low	Consider for Removal	2	1.5	Remove. Road widening.
42BMD	*Lophostemon confertus* (Brush Box)	75	5	2	Good	Good	Structures within SRZ.	15-40	Low	Consider for Removal	2	1.5	Remove. Road widening.
43BMD	*Lophostemon confertus* (Brush Box)	100	7	2	Good	Good	Structures within SRZ.	15-40	Low	Consider for Removal	2	1.5	Remove. Road widening.
44BMD	*Lophostemon confertus* (Brush Box)	50	2	1	Fair	Good	Crown density 50-75%.	5-15	Low	Consider for Removal	2	1.5	Remove. Road widening.
45BMD	*Lophostemon confertus* (Brush Box)	100	4	1	Good	Good	Structures within SRZ.	15-40	Low	Consider for Removal	2	1.5	Remove. Road widening.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Condition Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
46BMD	*Lophostemon confertus* (Brush Box)	75	3	1	Good	Good		15-40	Low	Consider for Removal	2	1.5	Remove. Road widening.
62BMD	*Lophostemon confertus* (Brush Box)	100	4	1	Good	Good		15-40	Low	Consider for Removal	2	1.5	Remove. Road widening.
63BMD	*Lophostemon confertus* (Brush Box)	100	3	1	Good	Good		15-40	Low	Consider for Removal	2	1.5	Remove. Road widening.
64BMD	*Lophostemon confertus* (Brush Box)	150	6	2	Good	Good		15-40	Low	Consider for Removal	2	1.5	Remove. Carpark access road.
65BMD	*Lophostemon confertus* (Brush Box)	75	3	1	Good	Good		15-40	Low	Consider for Removal	2	1.5	Remove. Road widening.
66BMD	*Lophostemon confertus* (Brush Box)	75	3	1	Good	Good		15-40	Low	Consider for Removal	2	1.5	Remove. Road widening.
A	*Afrocarpus falcatus* (Outeniqua)	650	14	10	Good	Good	Kerb displacement. Large surface root. Branch impact damage. Powerlines through crown.	15-40	Moderate	Consider for Retention	7.8	2.8	Retain. Major encroachment, road & footpath.

Appendix 4: Pruning Specification

Tree No.	Branch 1 ⌀ (mm)	Branch 1 Order	Branch 1 4373 Code	Branch 1 Orientation	Branch 1 Height (m)	Branch 1 (%)	Branch 2 ⌀ (mm)	Branch 2 Order	Branch 2 4373 Code	Branch 2 Orientation	Branch 2 Height (m)	Branch 2 (%)	Branch 3 ⌀ (mm)	Branch 3 Order	Branch 3 4373 Code	Branch 3 Orientation	Branch 3 Height (m)	Branch 3 (%)	Crown Total (%)
1WP	<25	Higher	Crown Lifting (C)	West	2.5	1%													1%
15WP	100	Second	Crown Lifting (C)	West	4m	2%	50	Higher	Crown Lifting (C)	North	4.5m	2%							4%
16WP	50	Higher	Crown Lifting (C)	North-West	4.5	2%													2%
17WP	50	Higher	Crown Lifting (C)	North-West	4.5	2%													2%
18WP	100	Higher	Crown Lifting (C)	North	4.5	5%													5%
19WP	200	Second	Crown Lifting (C)	North-West	4.5	2%	50	Higher	Crown Lifting (C)	North	4.5	2%							4%
20WP	50	Higher	Crown Lifting (C)	North	4.5	2%													2%
21WP	75	Higher	Crown Lifting (C)	North	4.5	5%													5%
22WP	75	Higher	Crown Lifting (C)	North	4.5	2%													2%
23WP	125	Third	Crown Lifting (C)	North-West	6	2%	50	Higher	Crown Lifting (C)	North	4.5	2%							4%
25WP	100x2	Third x2	Crown Lifting (C)	North	6	2%													2%

Tree No.	Branch 1 ⌀ (mm)	Branch 1 Order	Branch 1 4373 Code	Branch 1 Orientation	Branch 1 Height (m)	Branch 1 (%)	Branch 2 ⌀ (mm)	Branch 2 Order	Branch 2 4373 Code	Branch 2 Orientation	Branch 2 Height (m)	Branch 2 (%)	Branch 3 ⌀ (mm)	Branch 3 Order	Branch 3 4373 Code	Branch 3 Orientation	Branch 3 Height (m)	Branch 3 (%)	Crown Total (%)
26WP	225	First	Crown Lifting (C)	North-West	5	5%	125x2	Secondx2	Crown Lifting (C)	North	4.5	2%							7%
27WP	250	Third	Crown Lifting (C)	North-West	5.5	3%	150	Higher	Crown Lifting (C)	North-West	5	3%	150	Higher	Crown Lifting (C)	North	5	3%	9%
28WP	175	Second	Crown Lifting (C)	North	4	5%	100	Third	Crown Lifting (C)	North-West	5	2%	150	Second	Crown Lifting (C)	North-West	3	3%	10%
29WP	100	Second	Crown Lifting (C)	North	5	2%	125	Third	Crown Lifting (C)	North-West	5.5	2%	100	Higher	Crown Lifting (C)	North-West	5	2%	6%
30WP	200	First	Reduction Pruning (R)	North-West	4.5	5%	75	Higher	Crown Lifting (C)	North	5.5	2%							7%
31WP	125	Higher	Crown Lifting (C)	North	4.5	5%													5%
32WP	100	Higher	Crown Lifting (C)	North	4.5	5%													5%
33WP	175	Third	Crown Lifting (C)	North-West	4.5	3%	175	Third	Crown Lifting (C)	North	5	2%	75	Higher	Crown Lifting (C)	North	4.5	3%	8%
34WP	150	First	Reduction Pruning (R)	North	2.5	5%													5%
35WP	175	Second	Crown Lifting (C)	North	5	3%													3%
36WP	100	Higher	Crown Lifting (C)	North	4.5	5%													5%
37WP	50	Higher	Crown Lifting (C)	North	4.5	2%													2%



Tree 1 - Pruning



Tree 15 - Pruning



Tree 15 - Pruning



Tree 16 - Pruning



Tree 17 - Pruning



Tree 18 - Pruning



Tree 19 - Pruning



Tree 19 - Pruning



Tree 20 - Pruning



Tree 21 - Pruning



Tree 22 - Pruning



Tree 23 - Pruning



Tree 25 - Pruning



Tree 26 - Pruning



Tree 26 - Pruning



Tree 27 - Pruning



Tree 27 - Pruning



Tree 27 - Pruning



Tree 28 - Pruning



Tree 29 - Pruning



Tree 30 - Pruning



Tree 30 - Pruning



Tree 31 - Pruning



Tree 32 - Pruning



Tree 33 - Pruning



Tree 33 - Pruning



Tree 34 - Pruning



Tree 35 - Pruning



Tree 36 - Pruning



Tree 37 - Pruning

Appendix 5: Plates



Plate 1: Showing 1974 aerial photos of the site *(From The Skies 1943)*



Plate 2: Showing Tree 3



Plate 3: Showing double row of *Ficus macrophylla* (Moreton bay Fig)



Plate 4: Showing double row of *Ficus macrophylla* (Moreton bay Fig)



Plate 5: Showing Tree 44 and the Bridge Road

Appendix 6: Tree Protection Specification

1.0 Appointment of Project Arborist

A Project Arborist shall be engaged prior the commencement of work on-site and monitor compliance with the protection measures. The Project Arborist shall inspect the tree protection measures and Compliance Certification shall be prepared by the Project Arborist for review by the Principal Certifying Authority prior to the release of the Compliance Certificate.

The Project Arborist shall have a minimum qualification equivalent (using the Australian Qualifications Framework) of NSW TAFE Certificate Level 5 or above in Arboriculture.

1.1 Compliance

Contractors and site workers shall receive a copy of these specifications a minimum of 3 working days prior to commencing work on-site. Contractors and site workers undertaking works within the Tree Protection Zone shall sign the site log confirming they have read and understand these specifications, prior to undertaking works on-site.

The Project Arborist shall undertake regular site inspections and certify that the works are being undertaken in accordance with this specification.

Compliance Documentation shall be prepared by the Project Arborist following each site inspection. The Compliance Documentation shall include documentary evidence of compliance with the tree protection measures and methods as outlined within this Specification. Upon the completion of the works, a final assessment of the trees shall be undertaken by the Project Arborist and future recommended management strategies implemented as required.

1.2 Tree & Vegetation Removal

The trees to be removed shall be removed prior to the establishment of the tree protection measures. Tree removal works shall be undertaken in accordance with the *Safe Work Australia Guide for Managing Risks of Tree Trimming and Removal Work (2016).*

Tree and vegetation removal shall not damage the trees to be retained.

1.3 Tree Protection Zone

The trees to be retained shall be protected prior and during construction from activities that may result in an adverse effect on their health or structural condition. The area within the Tree Protection Zone (TPZ) shall exclude the following activities, unless otherwise stated:

- Modification of existing soil levels, excavations, trenching or movement or rock
- Mechanical removal of vegetation
- Storage of materials, plant or equipment or erection of site sheds
- Affixing of signage or hoarding to the trees
- Preparation of building materials, refueling or disposal of waste materials and chemicals
- Lighting fires
- Movement of pedestrian or vehicular traffic
- Temporary or permanent location of services, or the works required for their installation
- Any other activities that may cause damage to the tree

NOTE: If access, encroachment or incursion into the TPZ is deemed essential, prior authorisation is required by the Project Arborist.

1.4 Tree Protection Fencing

TPZ fencing shall be installed as shown on the Tree Plan **(Appendix 2)**. Fencing set back distances may be reduced for demolition/construction access with approval from the Project Arborist and where ground protection is installed to the unfenced areas of the TPZ. The exact location of the fencing shall be confirmed through consultation between the Head Contractor/Project Manager and the Project Arborist prior to the commencement of works.

p. 0404 424 264 | f. 02 9012 0924
po box 146 summer hill 2130
info@treeiQ.com.au
abn 62 139 088 832

treeiQ.com.au

As a minimum, the Tree Protection Fence shall consist of 1.8m high wire mesh panels supported by concrete feet. Panels shall be fastened together and supported to prevent sideways movement. The tree shall not be damaged during the installation of the Tree Protection Fencing. Refer to Typical Tree Protection Details (3) **(Appendix 7)**.

1.5 Site Management

Materials, waste storage, and temporary services shall not be located within the TPZ.

1.6 Works within the Tree Protection Zones

In some cases works within the TPZ may be authorised by the determining authority. **These works shall be supervised by the Project Arborist**. When undertaking works within the TPZ, care should be taken to avoid damage to the tree's root system, trunks and lower branches.

If roots (>25mmø) are encountered during the demolition, excavation and construction works, these roots must be retained in an undamaged condition and advice sought from the Project Arborist. Adjustment of final levels and design shall remain flexible to enable the retention of roots (>25mmø) where deemed necessary by the Project Arborist.

1.7 Ground Protection

Where deemed necessary by the Project Arborist, machinery movements shall be restricted to areas of existing pavement or from areas of temporary ground protection such as ground mats or steel road plates. Refer to Typical Tree Protection Details (3) **(Appendix 7).**

1.8 Trunk Protection

Trunk protection shall be installed on Tree A and as deemed necessary by the Project Arborist. Trunk protection shall be installed by wrapping padding (either carpet underlay or 10mm thick jute geotextile mat) around the trunk and first order branches to a minimum height of 2m. Timber battens (90 x 45mm) spaced at 150mm centres shall be strapped together and placed over the padding. Timber battens must not be fixed to the trees. Refer to Typical Tree Protection Details (3) **(Appendix 7)**.

Branch protection shall be installed as deemed necessary by the Project Arborist.

1.9 Structure & Pavement Demolition

Demolition of existing structures/pavement within the TPZ shall be supervised by the Project Arborist. Machinery is to be excluded from the TPZ unless operating from the existing slabs, pavements or areas of ground protection (refer to Section 1.8). Machinery should not contact the tree's roots, trunk, branches and crown.

The existing pavement shall be carefully lifted to minimise damage to the existing sub-base and to prevent damage to tree roots. Wherever possible, the existing sub-base material shall remain in-situ. Machinery shall work backwards out of the TPZ to ensure machinery remains on un-demolished sections of pavement at all times.

Structures below grade shall be retained to minimise disturbance to the tree's roots. Where this is not possible structures shall be shattered prior to removal with a hand-operated pneumatic/electric breaker. Where the Project Arborist determines that the tree is using underground elements (i.e footings, pipes, rocks etc.) for support, these structures shall be left in-situ.

If roots (>25mmø) are encountered during the demolition works, these roots must be retained in an undamaged condition and advice sought from the Project Arborist. Exposed roots shall be protected from direct sunlight, drying out and extremes of temperature by covering with a 10mm thick jute geotextile fabric. The geotextile fabric shall be kept in a damp condition at all times.

1.10 Pavement Installation

New pavements (including sub-base materials) within TPZ areas shall be installed above existing grade. Pavement sub-base layers shall either be thinned or finished pavement levels modified as required to enable the retention of roots (>25mmø) as deemed necessary by the Project Arborist.

p. 0404 424 264 | f. 02 9012 0924
po box 146 summer hill 2130
info@treeiQ.com.au
abn 62 139 088 832

treeiQ.com.au

1.11 Underground Services

Underground service installation within the TPZ shall be supervised by the Project Arborist.

The installation of underground services shall be located outside of the TPZ. Where this is not possible, they shall be installed using tree sensitive excavation methods (hand/hydrovac/airspade) with the services installed around/below roots (>25mmø, or as determined by the Project Arborist). Excavation using compact machinery (<2t) fitted with a flat bladed bucket is permissible where approved by the Project Arborist. Excavation using compact machinery should be undertaken in small increments, guided by a spotter who is to look for and prevent damage to roots (>25mmø).

Alternatively, boring methods may be used for underground service installation where the obvert level (highest interior level of pipe) is greater than 1000mm below existing grade. Excavations for starting and receiving pits for boring equipment should be located outside of the TPZ areas or located to avoid roots (>25mmø) as deemed necessary by the Project Arborist. OSD tanks (where required) should be located outside of the TPZ areas.

1.12 Excavations, Root Protection & Root Pruning

All excavation works (including root investigations) within TPZ areas shall supervised by the Project Arborist and utilise tree sensitive methods (hand/hydrovac/airspade). Excavation using compact machinery (<2t) fitted with a flat bladed bucket is permissible where approved by the Project Arborist. Excavation using compact machinery should be undertaken in small increments, guided by a spotter who is to look for and prevent damage to roots (>25mmø).

Exposed roots shall be protected from direct sunlight, drying out and extremes of temperature by covering with a 10mm thick jute mat, followed by a layer of plastic membrane. Coverings shall be weighted to secure them in place. The mat shall be kept in a damp condition at all times.

No over-excavation, battering or benching shall be undertaken beyond the footprint of any structure unless approved by the Project Arborist. Tree sensitive excavation and root pruning shall be undertaken along the excavation line prior to the commencement of mechanical excavation to prevent tearing and shattering damage to the roots from excavation equipment.

Roots (>25mmø) shall be pruned by the Project Arborist only. Roots (<25mmø) may be pruned by the Principal Contractor. Root pruning shall be undertaken with clean, sharp secateurs or a pruning saw to ensure a smooth wound face, free from tears. Damaged roots shall be pruned behind the damaged tissues with the final cut made to an undamaged part of the root.

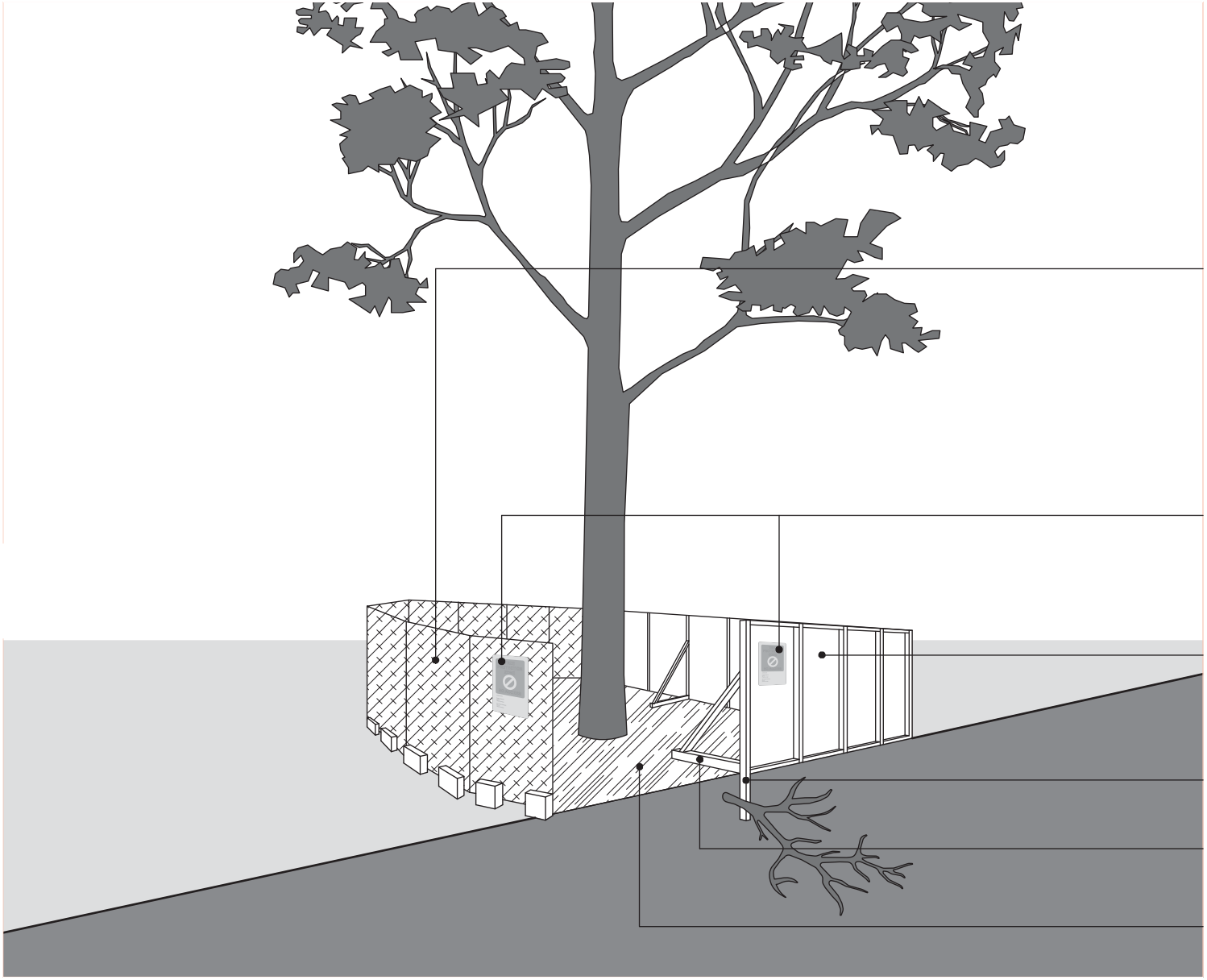
p. 0404 424 264 | f. 02 9012 0924
po box 146 summer hill 2130
info@treeiQ.com.au
abn 62 139 088 832

treeiQ.com.au

Appendix 7: Typical Tree Protection Details

p. 0404 424 264 | f. 02 9012 0924
po box 146 summer hill 2130
info@treeiQ.com.au
abn 62 139 088 832

treeiQ.com.au



Note:
No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.

Option 1 - Fencing
1.8m high chain wire mesh panels with shade cloth attached (if required), held in place with concrete feet.

Tree Protection Zone (TPZ) sign

Option 2 - Fencing
Plywood or wooden panel paling fence. This type of fencing material also prevents building materials or soil entering the TPZ.

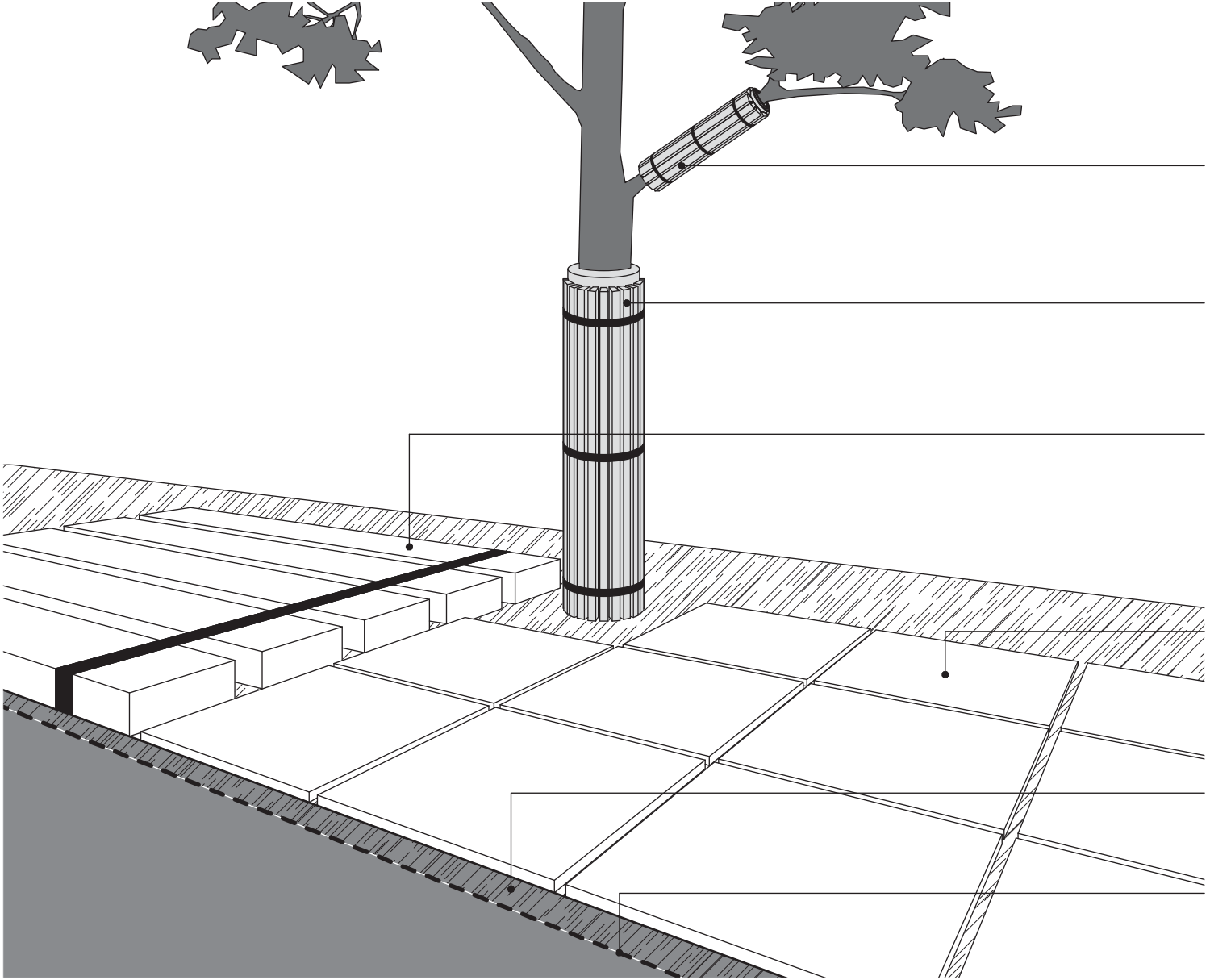
Installation of supports should avoid damaging roots.

Bracing is permissible within the TPZ.

Maximum 100mm and minimum 50mm depth mulch or aggregate layer installed across surface of TPZ.

03 Tree Protection Fencing

Not to Scale



Branch Protection - use boards and padding to prevent damage to bark on branch. Boards are to be strapped, not screwed or nailed to the branch.

Trunk Protection - use boards and padding to prevent damage to bark (minimum 2m). Boards are to be strapped, not screwed or nailed to the trunk.

Ground Protection - use device strapped over mulch or aggregate layer. Ground protection device should be of a suitable thickness to prevent soil compaction and root damage.

Steel plates (or approved equivalent) with or without mulch or aggregate layer below.

Maximum 100mm and minimum 50mm depth mulch or aggregate layer.

Geotextile fabric underneath mulch or aggregate layer.

04 Examples of Branch, Trunk and Ground Protection

Not to Scale

Appendix 16: Marine Ecology Statement

The new Sydney Fish Market

Marine Ecology Assessment – Stage 1 (Concept & Demolition) and Stage 2 (Main Works)

Prepared for
UrbanGrowth NSW Development Corporation

20 January 2022



DOCUMENT TRACKING

Item	Detail
Project Name	The new Sydney Fish Market: Marine Ecology Assessment
Project Number	17WOL-7553
Project Manager	Ian Dixon 02 4201 2208 Suite 204, Level 2, 62 Moore Street, Austinmer NSW 2515
Prepared by	Emily Messer and Ian Dixon
Reviewed by	Ian Dixon
Approved by	David Bonjer
Status	Final
Version Control	V6 – 2 April 2019, approved under SSD-8925 V7 – 20 Jan 2022, MOD 8 assessment included in Appendix E
Last saved on	20 January 2022
Cover photo	Proposed location of the new Sydney Fish Market. Photo Ian Dixon, July 2017

This report should be cited as 'Eco Logical Australia 2019. *The new Sydney Fish Market Upgrade: Marine Ecology Assessment*. Prepared for UrbanGrowth NSW Development Corporation.'

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from UrbanGrowth NSW Development Corporation.

Disclaimer

This document may only be used for the purpose for which it was commissioned and in accordance with the contract between Eco Logical Australia Pty Ltd and UrbanGrowth NSW Development Corporation. The scope of services was defined in consultation with UrbanGrowth NSW, by time and budgetary constraints imposed by the client, and the availability of reports and other data on the subject area. Changes to available information, legislation and schedules are made on an ongoing basis and readers should obtain up to date information.

Eco Logical Australia Pty Ltd accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report and its supporting material by any third party. Information provided is not intended to be a substitute for site-specific assessment or legal advice in relation to any matter. Unauthorised use of this report in any form is prohibited.

Template 29/9/2015

Contents

Executive summary **6**

1 Introduction and overview **7**
1.1 Background 7
1.2 Site and context 7
1.3 Approval strategy 7
1.4 Summary of the development 8
1.4.1 Concept development application 8
1.4.2 Main Works development application 9
1.5 Purpose of this report 10
1.6 Marine ecology 10

2 Legislative context **11**
2.1 Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) 11
2.2 NSW Environmental Planning and Assessment Act 1979 (EP&A Act) 11
2.3 NSW Biodiversity Conservation Act 2016 (BC Act) 11
2.4 NSW Fisheries Management Act 1994 (FM Act) 11
2.5 Sydney Regional Environmental Plan (SREP, Sydney Harbour Catchment) 2005 12
2.6 NSW Coastal Management Act 2016 (CM Act) 12

3 Methods **13**
3.1 Desktop assessment 13
3.2 Field survey 13

4 Aquatic habitats and ecology **14**
4.1 Previous aquatic habitat mapping 14
4.2 Aquatic habitats at Blackwattle Bay 16
4.3 Presence or likelihood of threatened and protected species and populations 21
4.3.1 Fish, sharks and marine vegetation 22
4.3.2 Other listed or protected species 23

5 Impact assessment and mitigation **24**
5.1 Assessment of demolition and construction impact 24
5.2 Assessment of operational impact 26
5.3 Fisheries Management Act habitat protection and permit requirements 27
5.4 Matters of National Environmental Significance (MNES) 31
5.5 Sydney Regional Environmental Plan (SREP, Sydney Harbour Catchment) 2005 31
5.6 Recommended mitigation measures 33

© ECO LOGICAL AUSTRALIA PTY LTD

5.7 Habitat opportunities (increase biodiversity value) 34

6 Conclusion 36

7 References 37

Appendix A: Threatened species likelihood of occurrence and impact 38

Appendix B: Key fish habitat types 43

Appendix C: Habitat opportunities 44

Appendix D: Sediment Reprofiling 48

Appendix E: MOD 8 Assessment (January 2022) 52

List of figures

Figure 1: Sydney Harbour - Foreshores and Waterways Area Development Control Plan: Ecological Communities and Landscape Characters (map sheet 8) 14

Figure 2: Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005: Wetlands Protection Area (map sheet 4) 15

Figure 3: DPI Fisheries mapping of estuarine macrophytes (Creese et al 2009) 15

Figure 4: Field survey of key fish habitat (KFH) July 2017 17

Figure 5: Proposed footprint and shading impact 18

Figure 6: Manmade structures in Blackwattle Bay 19

Figure 7: Subtidal sand 21

Figure 8: Intertidal and subtidal rock rubble 21

Figure 9: Example habitat opportunity areas on the new Sydney Fish Market (Image taken from SSD-DA Package: Stage 1 Concept Proposal – 3XN) 47

List of tables

Table 1: Impact to key fish habitat (KFH) 30

Table 2: Matters of National Environmental Significance from database search 31

Abbreviations

Abbreviation	Description
BC Act	NSW *Biodiversity Conservation Act 2016*
CM Act	NSW *Coastal Management Act 2016*
CEMP	Construction Environmental Management Plan
DPI	NSW Department of Primary Industries
ELA	Eco Logical Australia Pty Ltd
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
FM Act	NSW *Fisheries Management Act 1994*
KFH	Key fish habitat

© ECO LOGICAL AUSTRALIA PTY LTD

Executive summary

Eco Logical Australia (ELA) has been commissioned by UrbanGrowth NSW Development Corporation (UrbanGrowth NSW) to undertake a Marine Ecology Assessment for the proposed new Sydney Fish Market within Blackwattle Bay.

The project is a State Significant Development for which Secretary's Environmental Assessment Requirements (SEARs) have been issued. The SEARS relevant to this report are as follows:

10. Biodiversity
    - 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.
    - Include consideration for the relevant policies and guidelines, including the *Policy and Guidelines for Fish Habitat Conservation and Management (2013), DPI Fisheries Threatened Species Assessment Guidelines, NSW Biodiversity Offsets Policy for Major Projects – Aquatic Biodiversity Factsheet* and *About Fish Friendly Marine Infrastructure*.

The aim of this marine assessment is to understand the biota and habitat occurring in the subject site (defined as the development footprint of the new Sydney Fish Market) and surrounding study area (defined as the extent of Blackwattle Bay including the adjoining seawall, **Figure 4**). With this understanding, we determined if any impact would occur to threatened species, communities or populations as a result of the proposed project. We also determined if any environmental offsets are required in accordance with the DPI Fisheries Policy and Guidelines for Fish Habitat Conservation and Management (update 2013).

A desktop search using online databases was used to identify threatened aquatic species, populations or communities near the study area. A field survey using a boat-mounted underwater camera was completed to map the 'key fish habitat' within Blackwattle Bay and determine if any threatened aquatic species, populations or communities were present or could potentially use the area and be impacted by the works.

We conclude there would be no direct or indirect impacts to threatened aquatic species, populations or ecological communities or their habitat as a result of the project. Direct and indirect impact through piling and shading would occur on unvegetated substrate (minimally sensitive key fish habitat). New hard surfaces from piles, pontoons and vertical walls may supplement habitat loss due to the new structure, but there would still be an overall net loss of key fish habitat (type 3). The use of habitat enhancing features would also increase and improve habitat and help offset the loss of type 3 habitat. Three small mangrove seedlings would be harmed equating to the loss of less than 1 m^2 of type 2 key fish habitat.

Recommended mitigation measures to reduce the impact of the project are outlined in this report, such as habitat enhancement, and complement the Construction Environmental Management Plan in addressing pollution, contamination and unnecessary disturbance during construction.

© ECO LOGICAL AUSTRALIA PTY LTD

1 Introduction and overview

1.1 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 Sydney 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 UrbanGrowth NSW and Sydney Fish Market Pty Ltd (SFM), to develop the design for the new fish market. As announced by the NSW Premier, works are planned to commence in 2019.

1.2 Site and context

The site is located at the head of Blackwattle Bay between the Pyrmont Peninsula and the foreshore of Glebe, situated less than 2 km west of Sydney's CBD and is partially within the City of Sydney 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 of Lot 1 in DP 835794. Works to connect to the existing waterfront promenade to the west of the site are located on Lot 3 in DP 1018801. The development footprint is irregular in shape and has an area of approximately 36,800 m^2. 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 Fish Market, Wentworth Park, and Glebe Light Rail stops which are serviced by the Dulwich Hill Line which is a 23 stop, 12.8 km 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.

1.3 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 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 *Sydney Regional Environmental Plan No 26—City West* (SREP26). This concept development application will also set out details of the first stage of the development is the demolition of land and water-based structures on the site including removal of marine piles and any resulting repairs to the existing seawall.
2. A development application for the construction of the new fish market.
3. An application to amend the planning controls applying to the site to enable the proposed development to be a permissible use on all of the site. This is to be achieved by an amendment to SREP26.

These applications are lodged concurrently.

1.4 Summary of the development

The proposal is to build a new Sydney Fish Market 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 links 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 Sydney 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.

1.4.1 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 m^2 contained within a defined building envelop
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 is the demolition of land and water-based structures on the site including removal of marine piles and any resulting repairs to the existing seawall, and related services relocations.

© ECO LOGICAL AUSTRALIA PTY LTD

1.4.2 Main Works development application

The Main Works development application seeks approval for:

1. the construction of a new Sydney Fish Market including land and water-based structures
2. the use of the site for the fish market including waterfront commercial and tourist facilities and ancillary uses and the distribution of uses
3. a gross floor area (GFA) of approximately 26,000 m^2 as calculated according to the definition of GFA under SREP 26 (approximately 25,600 m^2 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
- Publicly accessible promenade.

Ground Level - Within Building Envelope

- Wholesale services space including product storage and processing
- 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
- Circulation areas.

Upper Level 2 (Mezzanine)

- Catering space
- The Sydney Seafood School

© ECO LOGICAL AUSTRALIA PTY LTD

- Tenant and subtenant office space
- Plant and storage space.

1.5 Purpose of this report

The purpose of this report is to address the SEARs:

- 10. Biodiversity
    - 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 for the relevant policies and guidelines, including the *Policy and Guidelines for Fish Habitat Conservation and Management (2013), DPI Fisheries Threatened Species Assessment Guidelines, NSW Biodiversity Offsets Policy for Major Projects – Aquatic Biodiversity Factsheet* and *About Fish Friendly Marine Infrastructure*.

The point above regarding a BDAR is addressed in a separate report by ELA that assesses terrestrial ecology.

1.6 Marine ecology

The aim of this Marine Ecology Assessment is to increase knowledge of the biota and habitats that occur in the study area (all of Blackwattle Bay) and within the subject site (the proposed extent of the new Sydney Fish Market). To achieve this, the following tasks were undertaken:

- Desktop review of existing literature and local data to confirm the presence of known and likely species and habitats in the study area (the extent of Blackwattle Bay including the adjoining seawall, **Figure 4**)
- Aquatic survey during optimum conditions (calm seas with high water clarity)
- Mapping, photography and identification of aquatic vegetation and key fish habitat (eg macroalgae, seagrasses, mangroves and saltmarsh)
- Assessment of the density and condition of aquatic vegetation and key fish habitat, including verification of any threatened or protected species, populations or ecological communities, pest species or presence of 'critical habitat' that may occur locally
- Provide recommendations to avoid, reduce and offset any impacts, increase the habitat value and assist management of construction and operational outcomes.

The following policies and guidelines have been considered:

- Policy and Guidelines for Fish Habitat Conservation and Management (2013 update, Fairfull 2013)
- DPI Fisheries Threatened Species Assessment Guidelines
- NSW Biodiversity Offsets Policy for Major Projects – Aquatic Biodiversity Factsheet
- About Fish Friendly Marine Infrastructure Guidelines
- Guiding Principles for Marine Foreshore Developments.

© ECO LOGICAL AUSTRALIA PTY LTD

2 Legislative context

2.1 Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

Under the EPBC Act, the Commonwealth Environment Minister needs to approve any development that is likely to have a significant impact on Matters of National Environmental Significance (MNES). Should such an impact, as defined in the EPBC Act Policy Statement 1.1 – Significant Impact Guidelines (DEWHA 2009) be likely, the proposal should be referred to the Commonwealth to determine if it is a Controlled Action that requires approval of the Commonwealth.

2.2 NSW Environmental Planning and Assessment Act 1979 (EP&A Act)

All developments in NSW are assessed in accordance with the provisions of the EP&A Act and the EP&A Regulation. The EP&A Act provides a system for environmental planning and assessment, including approvals and environmental impact assessment requirements for proposed developments. Implementation of the EP&A Act is the responsibility of the Minister for Planning, statutory authorities and local councils.

Under s.78A (8) of the EP&A Act and schedule 2 of the Environmental Planning and Assessment Regulation 2000, the project is State Significant Development (SSD 8925) and the Minister for Planning is the consenting authority. This report addresses the Secretary's Environmental Assessment Requirements (SEARs) Application Number SSD 8925, under Specific Matter 10 - Biodiversity:

- 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.

- Include consideration of the relevant policies and guidelines, including the Policy and Guidelines for Fish Habitat Conservation and Management (2013), DPI Fisheries Threatened Species Assessment Guidelines, NSW Biodiversity Offsets Policy for Major Projects – Aquatic Biodiversity Factsheet and About Fish Friendly Marine Infrastructure.

2.3 NSW Biodiversity Conservation Act 2016 (BC Act)

Under the BC Act, an assessment of significance must be completed to determine the significance of impacts to threatened species, populations and/or communities or their habitat. This report focusses exclusively on the marine environment: please refer to the Biodiversity Development Assessment Report (ELA 2018), for further information on terrestrial ecology.

2.4 NSW Fisheries Management Act 1994 (FM Act)

The FM Act is the principal piece of legislation protecting aquatic habitat in NSW. The act aims to conserve fish stocks, key fish habitat, aquatic vegetation, and threatened species, populations and communities. Threatened aquatic species, populations and communities are listed under Schedules 4, 4A and 5 of the FM Act, while key threatening processes are listed under Schedule 6. Permits under Part 7 of the FM Act

© ECO LOGICAL AUSTRALIA PTY LTD

to harm marine vegetation, obstruct fish passage, dredge or reclaim land do not apply to State Significant Developments, however, the offset policy applies to ensure there is 'no net loss' of key fish habitat (KFH) in NSW.

DPI Fisheries has identified the area within Blackwattle Bay and around the new Sydney Fish Market development as KFH. The development would only harm <1 m^2 of marine vegetation but would shade unvegetated substrate, reprofile shallow sediment beneath the structure, involve modifications to the seawall and temporarily obstruct fish passage during construction. There would be a 'net loss' of KFH (type 3), therefore, environmental compensation may be required.

There are unlikely to be any threatened species, populations or communities listed under the FM Act that depend on the site for habitat. Therefore, these would not be impacted as a result of the works and an assessment of significance is not required.

2.5 Sydney Regional Environmental Plan (SREP, Sydney Harbour Catchment) 2005

The proposal is located within the Sydney Harbour Catchment and is subject to the SREP (Sydney Harbour Catchment) 2005, in particular, Clause 21: biodiversity, ecology and environment protection. Water-based recreation and entertainment facilities which have a direct structural connection to the foreshore are currently prohibited in this W1 zone. S89E(3) of the EP&A Act provides that development consent may be granted to State Significant Development despite the development being partly prohibited by an environmental planning instrument. Notwithstanding this provision, an amendment is sought to the planning controls applying to the site to ensure the proposed development is wholly permissible. This amendment has been concurrently lodged with this EIS.

2.6 NSW Coastal Management Act 2016 (CM Act)

The CM Act came into effect 3 April 2018, replacing the *Coastal Protection Act 1979*. The objective of this Act is to manage the coastal environment of NSW in a manner consistent with the principles of ecologically sustainable development for the social, cultural and economic well-being of the people of the State. Part 2 of the CM Act identifies objectives related to four coastal management areas of the 'coastal zone':

- Coastal wetlands and littoral rainforests area
- Coastal vulnerability area
- Coastal environment area
- Coastal use area.

Under the State Environmental Planning Policy (Coastal Management) 2018 (Coastal Management SEPP), the area of the proposed works is mapped as 'coastal environment area'. However, under clause 13 (3) of the Coastal Management SEPP, the development objectives for the coastal environment area do not apply to the Foreshores and Waterway Areas within the SREP. Therefore, the Coastal Management SEPP is not applicable to this project.

© ECO LOGICAL AUSTRALIA PTY LTD

3 Methods

3.1 Desktop assessment

Online database searches were used to confirm the presence of recorded species in the region prior to the field survey. This was then used to infer what is likely to be present in the study area. The desktop search covered Port Jackson (Sydney Harbour including tidal areas of Parramatta River and Lane Cove River) plus a 10 km buffer. The desktop search grid was about 50 x 30 km using the coordinates:

- Latitude: -33.6974792526866, Longitude: 150.915584274089
- Latitude: -33.6974792526866, Longitude: 151.474105513707
- Latitude: -33.9762150862402, Longitude: 151.474105513707
- Latitude: -33.9762150862402, Longitude: 150.915584274089

Only species known to use estuarine/marine water or intertidal foreshores were considered in this aquatic assessment. Databases accessed include:

- EPBC Act – Protected Matters Search Tool
- BC Act – Threatened Species Search Tool (BioNet)
- FM Act – Listed protected and threatened species and populations, including species profiles, 'Primefact' publications and expected distribution maps (Riches et al 2016)
- Online Zoological Collections of Australian Museums (OZCAM) – individual species searches to determine the likelihood of occurrence of threatened species.

3.2 Field survey

A survey was undertaken on 24 – 25 July 2017 to inspect the aquatic habitat of Blackwattle Bay. The survey area included benthic and intertidal habitat within the entire bay. Weather conditions were calm and water clarity was good. Underwater visibility was approximately four meters.

The survey was undertaken by lowering a video camera to the seafloor and around foreshore structures. A triple camera setup (Sea-View, Go-Pro and Kaiser Baas brands) angled down and front allowed for live streaming of habitat features to an on-board monitor (colour/infrared). We were unable to survey directly beneath fixed structures and moored vessels. The shallow intertidal area and foreshore were photographed from the water and on foot where boat access was limited. Habitat types were mapped using a spatial application on a tablet to ensure all habitat types were surveyed adequately. High-definition footage and photographs were also viewed later to confirm habitat extent and condition. ArcMap Version 10.2 was used to merge data into a final map for spatial analysis.

© ECO LOGICAL AUSTRALIA PTY LTD

4 Aquatic habitats and ecology

4.1 Previous aquatic habitat mapping

Map 8 of the 'Sydney Harbour - Foreshores and Waterways Area Development Control Plan 2005: Ecological Communities and Landscape Characters', identifies the study area as 'Mixed Rocky Intertidal and Rock Platform', 'Water' and 'Grassland' (**Figure 1**).

Sheet 4 of the 'Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005: Wetlands Protection Area', shows that there are no Wetland Protection Areas within or near the site, therefore Clause 61 of the SREP is not triggered. (**Figure 2**).

The State-wide mapping of estuarine macrophytes (mangroves, saltmarsh and seagrass) by DPI Fisheries have not mapped mangrove communities within Blackwattle Bay. The nearest patch of mangroves in Rozelle Bay is outside the study area. There are no records of the threatened *Posidonia* seagrass population within the bay (Creese et al 2009, **Figure 3**).

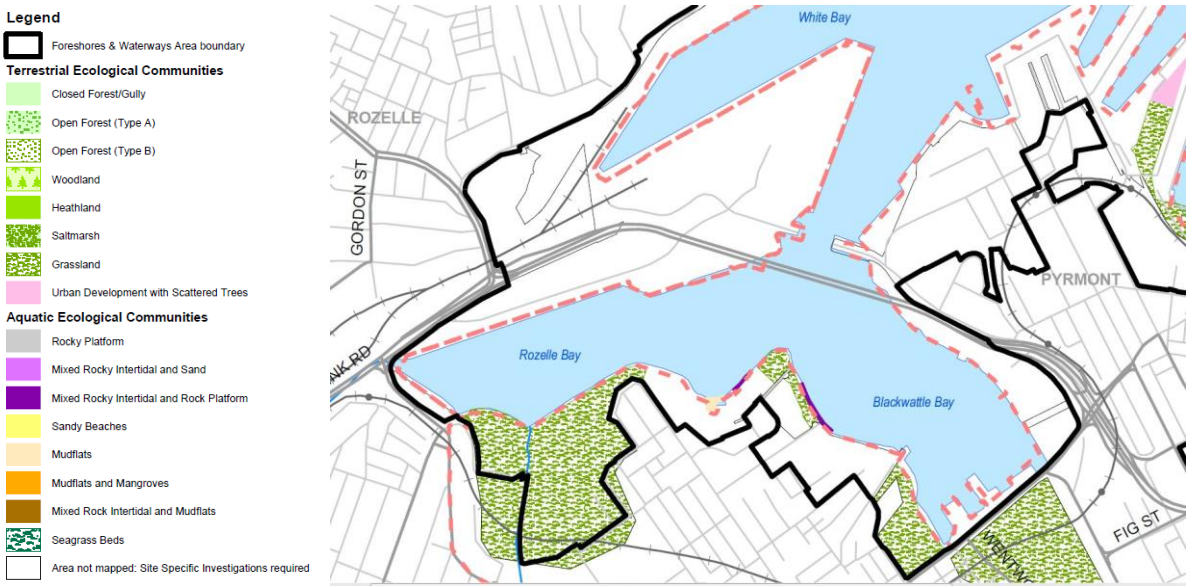


Figure 1: Sydney Harbour - Foreshores and Waterways Area Development Control Plan: Ecological Communities and Landscape Characters (map sheet 8)

Source: http://www.planning.nsw.gov.au/Policy-and-Legislation/Environment-and-Heritage/Sharing-Sydney-Harbour

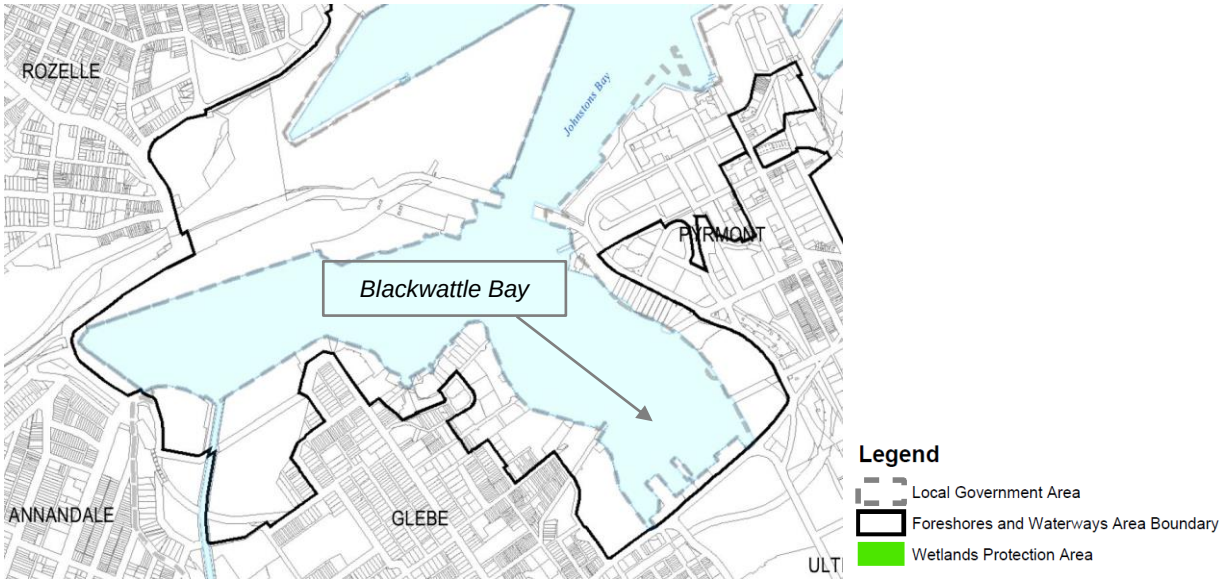


Figure 2: Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005: Wetlands Protection Area (map sheet 4)

Source: http://www.planning.nsw.gov.au/Policy-and-Legislation/Environment-and-Heritage/Sharing-Sydney-Harbour

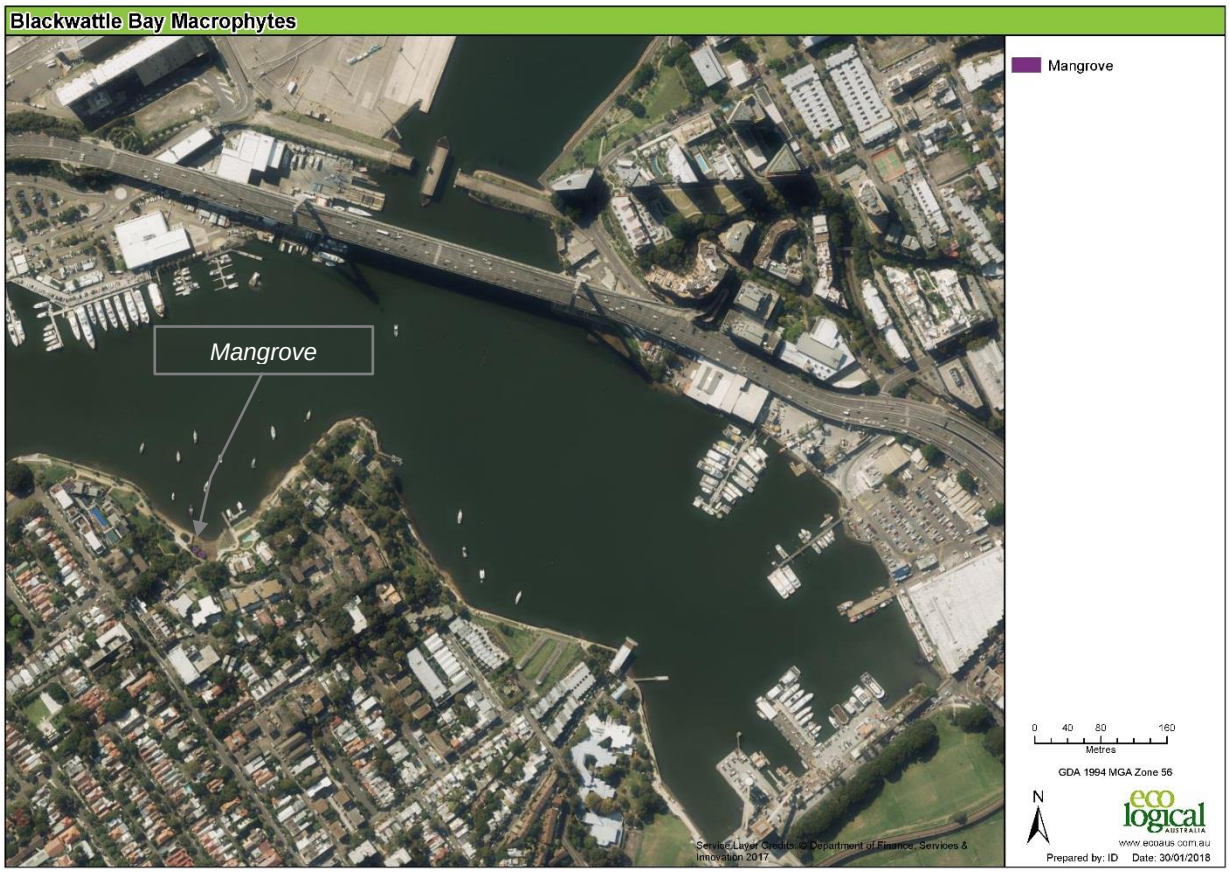


Figure 3: DPI Fisheries mapping of estuarine macrophytes (Creese et al 2009)

Source: http://www.dpi.nsw.gov.au/content/research/areas/aquatic-ecosystems/estuarine-habitats-maps.

4.2 Aquatic habitats at Blackwattle Bay

Recent surveys of Blackwattle Bay (Bugnot et al 2016) found the aquatic habitat and biodiversity to be comparable, if not slightly worse, than other bays within Sydney Harbour (Rozelle, White and Johnstons Bay, Gore and Iron Cove). The subtidal sediment had high metal concentrations, with Annelids (worms) as the predominate infauna species. These are indicative of a disturbed environment. A low biodiversity and number of fish were observed within the Bays Precinct, potentially due to the lack of habitat complexity.

ELA documented the aquatic habitat in the study area, which had been modified by a vertical seawall, wharf structure, pontoons, piles and disturbance by regular boat traffic. These are similar habitat conditions described by Bugnot et al (2016). The following distinct zones were mapped during the field survey (**Figure 4** and **Figure 5**):

- *Manmade structures* (**Figure 6**) – The foreshore habitat was highly modified by industrial buildings, a footpath and seawall. The seawall creates a barrier between the intertidal zone and foreshore, constraining the deposition of sediment and establishment of marine/riparian vegetation. The industrial area was built out over the bay, supported by thousands of piles. These piles were covered in encrusting organisms, turfing algae, bryozoans, barnacles, oysters and mussels.
- *Subtidal sand* (**Figure 7**) – The subtidal zone was characterised by coarse sediment, covered with a variety of features including shell fragments, woody debris, rubbish and scattered rocky rubble. Moderate to dense bioturbation was evident throughout the site. No seagrass was observed.
- *Intertidal rock rubble* (**Figure 8**) – The intertidal zone was characterised by rock rubble extending from the base of the seawall was intertidal rock rubble that was covered with sessile organisms including, oysters, barnacles and algae.
- *Macroalgae* (**Figure 8**) – The subtidal zone also featured *Sargassum linearifolium* attached on rock rubble. Densities varied throughout Blackwattle Bay, with the majority of the macroalgae found along the western boundary of the study area.

DPI Fisheries identify three types of key fish habitat (KFH) in their Policy and Guidelines for Fish Habitat Conservation and Management (Fairfull 2013, **Appendix B**). KFH types occurring in the study area are mapped on **Figure 4**, comprising:

- Type 1 (highly sensitive KFH) – no type 1 KFH habitat was observed within the study area
- Type 2 (moderately sensitive KFH) – represented onsite by the various densities of *Sargassum linearifolium* (brown macroalgae) and three mangrove seedlings on an intertidal rock bench
- Type 3 (minimally sensitive KFH) – represented onsite by the subtidal substrate and intertidal seawall.

No threatened species, populations or communities were observed in the subject site or study area, or are expected to use the subject site (see **Section 4.3** and likelihood of occurrence assessment in **Appendix A**). Seahorses and their relatives (syngnathiformes) were not observed during the field survey. They may occur in the macroalgae along the western shoreline but are unlikely near the piles as there was very little macroalgae in this location. Management for these species is not required during construction, as the proposed footprint would not impact macroalgae, and Construction Environmental Management Plan (CEMP) mitigation measures would prevent unintended impacts.

© ECO LOGICAL AUSTRALIA PTY LTD

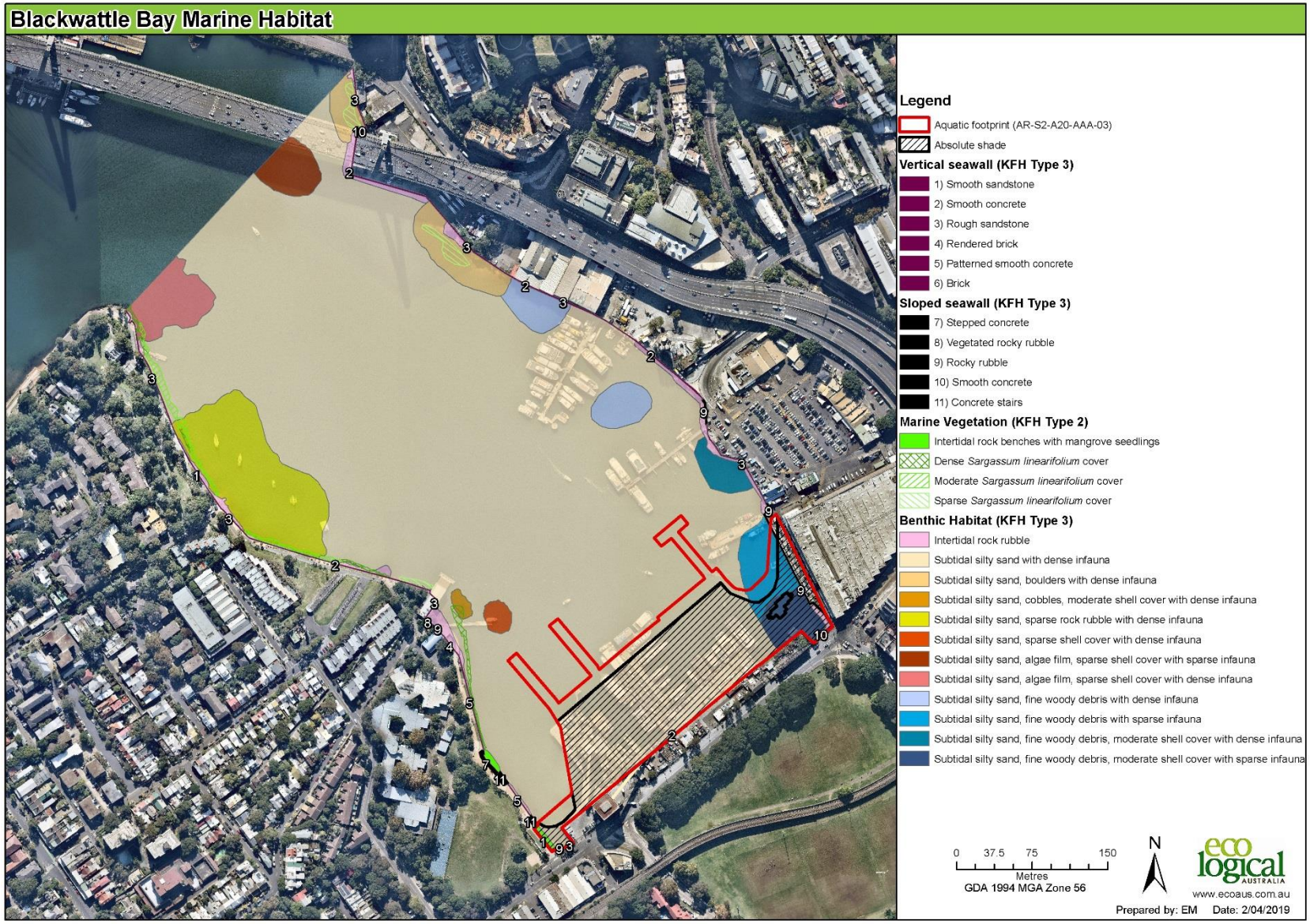


Figure 4: Field survey of key fish habitat (KFH) July 2017

© ECO LOGICAL AUSTRALIA PTY LTD

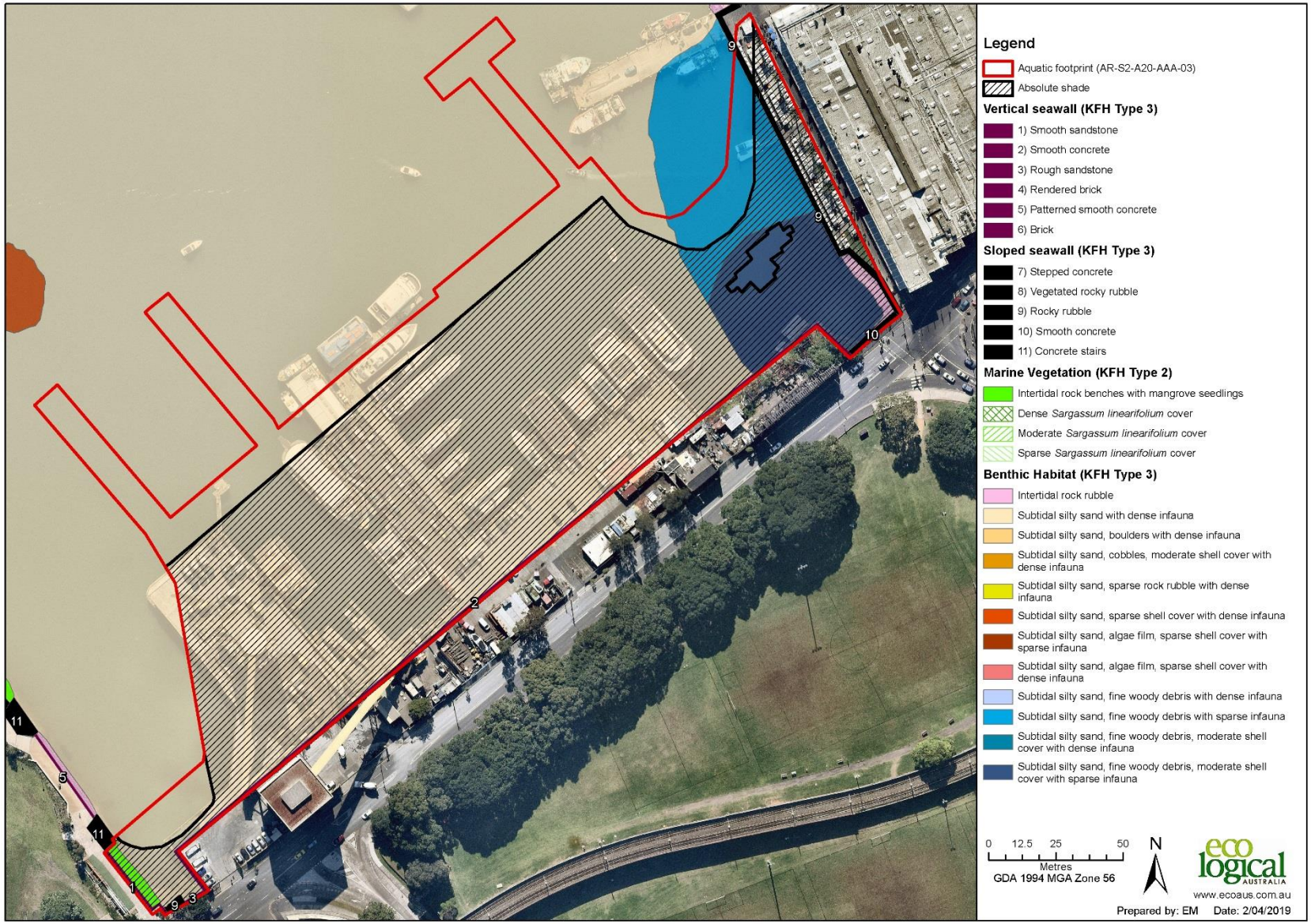


Figure 5: Proposed footprint and shading impact

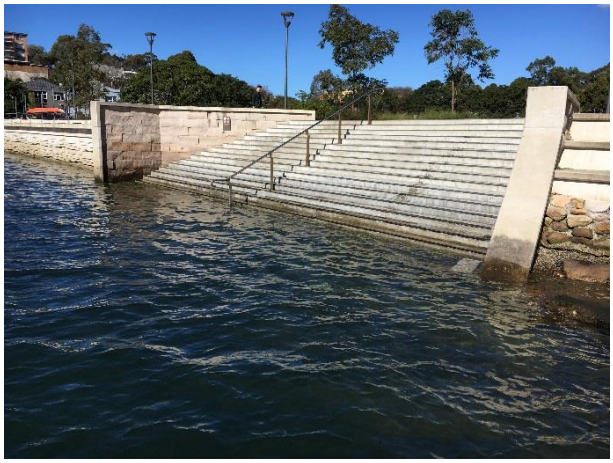
© ECO LOGICAL AUSTRALIA PTY LTD



Pontoon and gangway extending from fish markets



Sydney Fish Market



Stepped concrete stairs with intertidal toe



Intertidal rock bench with mangrove seedlings



Concrete batch plant on foreshore
(removal of the batch plant not assessed in this report)



Industry built on wharf

Figure 6: Manmade structures in Blackwattle Bay

© ECO LOGICAL AUSTRALIA PTY LTD



Barnacles and encrusting algae on piles



Stormwater outlet with oyster growth

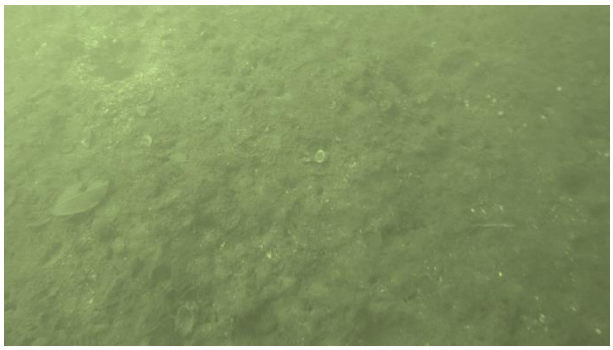


Encrusting organisms on pontoon (subtidal)



Oysters on rough seawall (intertidal)

Figure 6: Manmade structures continued

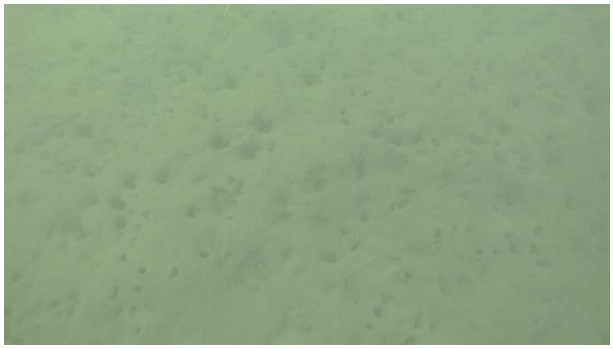


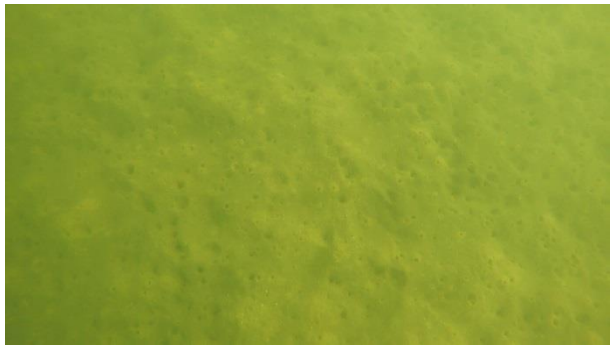
Shell fragments and fine algae crust on subtidal sand



Fine woody debris and leaf litter on subtidal sand

© ECO LOGICAL AUSTRALIA PTY LTD





Dense bioturbation from infauna

Fine algae crust with dense infauna

Figure 7: Subtidal sand





Rock rubble with Sargassum linifolium





Algae encrusted rock rubble

Figure 8: Intertidal and subtidal rock rubble

4.3 Presence or likelihood of threatened and protected species and populations

Threatened species, populations or communities listed under the FM Act, BC Act and EPBC Act that are known or expected to occur in the region are listed in **Appendix A**. Within the study area, the only habitat capable of supporting threatened species was the macroalgae growing predominately along the western seawall of the bay. The closest macroalgae patch to the subject site was approximately 100 m to the west of the subject site. Syngnathiformes occur in the harbour and are known to use similar habitats. No

seahorses or other Syngnathiformes were observed during the field survey, and are unlikely to use the structures within the proposed area of works as habitat. No other threatened species, populations or communities were observed on site although it is possible that some species may pass through the area, given the connectivity to Sydney Harbour and coastal habitats. It is unlikely that they would rely on the site for habitat or survival.

4.3.1 Fish, sharks and marine vegetation

Protected fauna listed under the FM Act were assessed for their likelihood of occurrence. Listed marine or estuarine species include one shark, six fishes and the taxonomic order of Syngnathiformes (seahorses, seadragons, pipefish, pipehorses, ghostpipefish and seamoths). The species assessed included:

- The Herbst's nurse shark, which only occurs in deep water (150-600 m) and would not be present in the study area.
- Listed fishes known to occur around offshore rocky reefs, which do not occur in the study area.
- Estuary cod occurs in a range of habitats, from turbid shallow estuarine waters (juveniles) to the base of drop-offs and deeper water (adults). Sydney is the southern extent of estuary cod, with no records in Blackwattle Bay, or the harbour.
- Syngnathiformes occur in the harbour and are known to use a variety of habitats, such as macroalgae, wharf/jetty piles, seagrass beds and unvegetated shallows. These habitats occur within the site. The wharves/jetty piles within the proposed area of works would not be suitable habitat as they have no macroalgae growing on them. Seahorses are more likely to use macroalgae along the western boundary, which would not be impacted. As of Note. *Hippocampus whitei* (White's Seahorse) is proposed for listing as endangered under the FM Act has been addressed below.

Hippocampus whitei (White's Seahorse) is unlikely to occur in the study area, therefore, an assessment of significant in accordance with Section 220ZZ of the FM Act is not required.

Threatened fish are unlikely to occur in the study area because there is no suitable habitat. The species identified in the desktop assessment as possibly occurring within the search grid either require freshwater, rocky reefs, caves, rocky overhangs. None of these habitat features occurs within Blackwattle Bay. Deep water occurs within Blackwattle Bay, but not near the subject site. Species that utilise deep water would be deterred by frequent boat traffic and are more likely in coastal waters.

Threatened sharks and rays may enter the area while exploring or chasing prey. If they do enter the area, a lack of habitat and frequent boat traffic makes it unlikely they would stay for extended periods.

The threatened seagrass population of *Posidonia australis* occurs in the harbour, and is known to grow on subtidal sand up to 10 m deep, however, there are no records of *Posidonia* upstream of Darling Point. *Posidonia australis* was not observed and is not likely within the study area.

Marine vegetation is protected under the FM Act and includes saltmarsh, seagrasses, mangroves and macroalgae (seaweeds). No seagrass was observed within the study area. Seagrass requires soft sediment with good light penetration which was present within the study area. However, no seagrass was observed or has been mapped in the area by DPI Fisheries. Mangrove trees can occur in protected bays and tidal waterways with soft intertidal sediment. Three small mangrove trees have grown in an artificial intertidal shelf in the southwest corner of the site. These would be removed as part of the demolition works. Combined, these mangrove seedlings equal less than 1 m^2 of habitat. The threatened ecological community, coastal saltmarsh, was not observed within the study area. The intertidal zone, where

© ECO LOGICAL AUSTRALIA PTY LTD

saltmarsh is found, is steep and artificial (seawall), so no plants have established. Macroalgae occurs in the harbour along rocky fringes and deeper hard substrate reefs. *Sargassum linearifolium* was observed within the study area in shallow water, attached to intertidal and subtidal rubble and the fringing hard substrate. These plants are outside the subject site, and if CEMP mitigation measures are followed would be unaffected by the works.

4.3.2 Other listed or protected species

Threatened aquatic mammals (whales, dolphins, and seals) are known to occur in the harbour and/or along the coast. Large mammals are unlikely to use habitat this close to shore. Dugongs require seagrass beds for foraging, which do not occur on site. Furthermore, there are no records of dugongs within Sydney Harbour. Seals have been sighted near Birchgrove Point, but there is no record of them in Blackwattle Bay. Whales have been recorded in the Harbour, but not west of the Sydney Harbour Bridge. It is unlikely they would venture through the narrow entrance to Blackwattle Bay. Other marine mammals may explore this area but are unlikely to stay for prolonged periods as there is no breeding or foraging habitat. The narrow channel to enter Blackwattle Bay and frequent use of the area by boats would also be a deterrent.

Threatened aquatic reptiles (turtles) are more common along coastal waters than in the harbour. They may explore the greater area but would not depend on the site for feeding habitat or nesting as there is no seagrass.

Threatened shore, wetland, migratory, and pelagic birds use intertidal zones to forage, but are unlikely to occur in the study area, as the intertidal zones are steep and artificial (seawall). They also avoid areas with concentrated human activities. Aerial foragers may follow a coastal route, fly over open water or hunt over decomposing wrack. Given the large scale of more suitable habitat nearby, the works are not expected to affect their migration or food resources.

© ECO LOGICAL AUSTRALIA PTY LTD

5 Impact assessment and mitigation

5.1 Assessment of demolition and construction impact

As per the CEMP dated August 2018 (Thelem 2018) the stage one works would include the demolition of water-based structures include removal of the marine piles. The following structures are proposed to be demolished:

- A wharf structure comprising a reinforced concrete deck supported by 250 x 250 mm hardwood girders
- A finger jetty
- A concrete jetty
- Piles supporting the existing wharves and jetty structures
- Concrete batching facilities including concrete and steel-clad silos and hoppers (to be removed as part of a separate DA)
- The former Jones Coal Loader
- All other associated land and water-based structures.

Following stage one works (demolition), a cofferdam would be installed around the site for stage two works (construction). This cofferdam would have a gap for barge access during the initial installation of foundations piles. The gap would be sealed off for construction of the superstructure. More detailed demolition methodology is not yet available, therefore, ELA has based this assessment on the CEMP.

Once the existing structures have been demolished, minor sediment reprofiling would occur within the coffer dam area. This is to allow sufficient depth to construct the superstructure supported on piles. Currently, sediment deposits have built up in small mounds close to the seawall. The works require about 500 m^3 of sediment to be excavated and spread over adjacent substrate (of the same habitat type) within the coffer dam area (**Appendix D**). The likely construction methodology would be the use of a long-armed excavator mounted on a barge, scraping the material along the sea bed.

Three impact types are likely to occur during wharf demolition and construction:

- Underwater noise generation and disturbance during pile removal and installation
- Benthic disturbance from demolition/construction vessels and sediment reprofiling
- Changes to water quality, circulation and sedimentation.

Pile removal and installation

Based on the current wharf structure, ELA has estimated there is approximately one pile per 4 m^2 supporting the current wooden/concrete wharf structure and one pile per 25 m^2 supporting the pontoons. All of these piles (estimated at 1914) would be removed. Each pile has an approximate diameter of 0.61 m^2, and wetted heights between 3 m and 5 m. Therefore, 14,675 m^2 of type 3 fish habitat would be removed.

Approximately 244 new piles would be installed. ELA has estimated that 200 of these piles would be enclosed by the submerged concrete basement wall and have no light exposure. These piles would, therefore, provide no additional habitat due to absolute shading. Approximately 44 piles would be placed outside of this enclosed space, and with an approximate diameter of 0.61 m^2 and wetted height between 5 m and 6 m would create 464 m^2 of new type 3 fish habitat. Piling would not have a direct or indirect impact on marine vegetation.

© ECO LOGICAL AUSTRALIA PTY LTD

Any potential sediment pluming that occurs during pile removal and installation would be contained by a silt curtain as prescribed in the CEMP. As the piling is through bedrock and predominantly coarse sands and would be performed during calm conditions, drill cuttings and suspended sediments are likely to settle locally in a similar habitat type. Finer sediments could disperse further, depending on tidal dynamics, but would be contained within a silt curtain surrounding the works.

The site is classed as having a 'high probability' of acid sulphate soil (ASS) within the benthic sediments. These soils can cause harm to marine flora and fauna if disturbed, exposed to oxygen and then resubmerged (eg piling in an intertidal area during low tide which exposes the soil, which is then covered again at high tide). Fine-scale sediment plumes, which may release the acid sulphate, would be contained within the construction site by a silt curtain in stage one and a cofferdam with a silt curtain covering the access gap during stage two. The silt curtain should not be removed until the risk of sediment contamination is negligible. **Section 5.6** discusses relevant measures to mitigate the harm to marine flora and fauna. If neutralising substances are used, as per section 5.3.2 of the Acid Sulphate Soil Management Plan (JBS&G), the environmental risk (eg contamination of surrounding water) associated with the compounds used needs to be assessed.

Underwater noise from hammering piles has the potential to cause disturbance or physical impact to marine fauna in the area. Fish in the vicinity would be affected by excessive underwater noise. Impacts range from mortality to interruption of communication, depending on species anatomy (eg fish with swim bladders closer to the ear are more sensitive to acoustic impact than species with swim bladders further from the ear). Due to the shallow depth, fish would not be able to escape under the silt curtain. Estimates on the number or type of fish are not part of this impact assessment.

Demolition/construction vessel impact

There would be little direct or indirect impact caused by construction vessels if best practice environmental management procedures are in place and effective. Best practice management procedures are discussed further in **Section 5.6**.

Scouring of benthic sediments, either from propeller operation, dragging anchor or mooring chain, or water movement from shallow barge operation could cause bed sediment particles to become entrained in the water, increasing turbidity. The increased sediment load would reduce light penetration through the water column, and sediment particles may settle on aquatic plants or benthic infauna burrows. If mitigation measures are followed, then it is unlikely that large volumes of sediment would be moved and damage to aquatic plants would not occur. Damage to infauna burrows would be temporary and insignificant.

Chemical or material spills from machinery, propeller scouring in shallow water and mooring impacts from barges are potential impacts which would increase with unfavourable swell and weather conditions. Chemical spills, although unlikely, may also occur when refuelling of boats or if there is a hydraulic fluid leak. Spilt chemicals have the potential to kill or impair fauna within the area and disperse in the water.

Vessels may also be a vector for movement of marine pests, especially if construction vessels are not from the local area. For example, machinery and boats used on other sites where the noxious alga *Caulerpa taxifolia* was present could introduce the weed if hygiene procedures aren't followed. To ensure that this doesn't happen, barges moving from areas where *Caulerpa* is present should be inspected before entering the site. If *Caulerpa* becomes established around the fish market, then commercial and recreational vessels using the area have the potential to become vectors and spread the weed throughout Sydney Harbour and other estuaries.

© ECO LOGICAL AUSTRALIA PTY LTD

During sediment reprofiling, there would be a direct loss of benthic infauna and smothering of adjacent similar habitat. Given the area is currently heavily shaded by the existing wharf, the species occupying the sediment would likely be those tolerant of disturbed areas. Species would recolonise the area over time, resulting in only a minor and temporary impact to the benthic infauna, and foraging resources in the area. Indirect impact may arise if bed sediment particles become entrained in the water, increasing turbidity and potentially releasing contaminants, if present. Best practise construction methods, such as a silt curtain and water quality monitoring (turbidity), would reduce this risk and the potential impact would be minor.

Changes to water quality, circulation and sedimentation

The submerged wall surrounding the basement would be constructed to allow tidal inundation beneath the structure and around enclosed piles. The existing area in the subject site has a magnitude of piles that have historically influenced the local tidal dynamics. Given the existing and proposed character of the stub of this bay, it is unlikely the new development would markedly affect the tidal prism or local hydrology. No dredging of the approach channel would occur and the site would continue to be frequented by boats, maintaining the current conditions.

It is unlikely there would be significant change to marine water quality during construction if CEMP measures are followed, eg placing sediment barriers downslope of works and spoil stockpiles (Thelem 2018). However, the results of the MUSIC modelling in the Flooding and Water Quality Assessment (FWQA) (Cardno 2018) indicated that Water Sensitive Urban Design (WSUD) strategies are anticipated to create an overall improvement in water quality. Rainwater harvesting, gross pollutant traps and bioretention basins are proposed to be adapted and would reduce the stormwater runoff and pollution by over 71%. If these WSUD strategies are not in place then an increase in pollution including total suspended solids, total nitrogen, total phosphorus and gross pollutants is expected. An increase may have a negative effect on the surrounding marine ecology. For example, eutrophication (an increase of nitrogen and phosphorus) can result in algal blooms, loss of marine vegetation and a reduction in available oxygen (Mayer-Pinto et al 2015). Also, increase in total suspended solids can reduce primary productivity by reducing light availability.

There are identified hazardous materials on-site including lead-based paint, which are addressed in the Hazardous Materials Management Plan (JBS&G 2018). These are primarily land-based hazards. The removal works procedures outlined in that plan should be followed to mitigate the spread of these substances into the marine environment. If the relevant procedures are followed, there are no anticipated changes to water quality as a result of these materials.

5.2 Assessment of operational impact

Three impact types are likely to occur during operation of the fish markets:

- Boat traffic using the facility
- Shading impact on benthic habitat
- Creation of new aquatic habitat.

Boat traffic impact

The impacts which could occur to marine habitats during operation are typically associated with boat wash, disturbance of sediments, and an increase in pollutants and litter. Given the location and existing high-intensity use of the area, the following impacts are considered minor:

- Boat wash would not impact the foreshore, which is stabilised by a seawall.
- Pollutants expelled from boats would be the same as the existing conditions. Commercial fishing vessels, ferries and recreational vessels all frequent the area regularly. Frequency is not expected to increase significantly.

Shading impact

Absolute and partial shading from the proposed works may have an indirect impact on benthic habitat. There is currently approximately 8190 m² of seafloor shaded by the wharf and pontoons. The new works would shade an additional 23,735 m² of the unvegetated sandy substrate. Of this, 18,034 m² would be absolute shading caused by the elevated superstructure and submerged boundary wall. No light is expected to reach beneath the superstructure, leading to the loss of type 3 KFH.

There would be 5701 m² of partial shading over unvegetated sediment. This is made up of the areas fringing the basement wall that would receive some light penetration throughout the day. This partial shading impact may be reduced through the use of meshed or clear material along wharves, pontoons, steps and decks (addressed in **Section 5.7**). Organisms on piles (barnacles) and subtidal sediment (infauna) would not be significantly impacted by partial shading as they do not need large amounts of light and already exist in shaded areas onsite.

Creation of new aquatic habitat

Once installed, 44 of the piles would create new areas of vertical hard substrate. Piles, if possible, should be textured to increase their surface area and attractiveness as habitat. This provides areas for the attachment of sessile marine organisms and structural habitat for small fish (likely type 3 KFH). Exposure to partial sunlight allows for macroalgae to potentially establish. The number of piles to be removed equates to 14,675 m² of type 3 KFH, which is greater than the number of piles to be installed in light-accessible areas (based on 44 of the 244 new piles creating habitat). The wetted underside of new structures (pontoons), new piles and wetted areas of the outer basement wall would create 2930 m² of hard substrate (type 3 KFH). Therefore, the project would create a net loss of key fish habitat on site.

5.3 Fisheries Management Act habitat protection and permit requirements

DPI Fisheries' Policy and Guidelines for Fish Habitat Conservation and Management (Fairfull 2013) outline requirements for assessing the impact of waterfront development to ensure the sustainable management, and 'no net loss', of key fish habitats in NSW. Part 7 of the FM Act addresses the protection of aquatic habitats and work that requires a permit. Part 7 permits do not apply to State Significant Developments, but the offset policy does apply to ensure there is 'no net loss' of key fish habitat. A net loss of type 3 key fish habitat is expected, therefore, offsetting through environmental compensation or habitat compensation may be required.

Threatened species, populations or communities

No threatened species, populations or communities listed under the FM Act are likely to occur in the study area or be directly or indirectly harmed by the proposed work (see **Section 4.3** and **Appendix A**). As such, an assessment of significance is not required.

Protected vegetation

Protected vegetation occurs in the study area in the form *Sargassum linearifolium* (macroalgae), which is located outside the subject site and potential construction zone. Three mangrove seedlings are located

on the edge of the footprint. These seedlings would be removed as part of the demolition process. Combined, they equate to less than 1 m^2 of KFH.

Protected fauna

Protected fauna are unlikely to occur in the area of proposed works and would not be impacted (see **Section 4.3** for detail). Syngnathiformes (seahorses and their relatives) were not observed during the field survey but may use the macroalgae along the western boundary as habitat. They are unlikely to use structures within the subject site as there is no macroalgae growing, and better habitat elsewhere in the study area.

Critical habitat

There is only one registered critical habitat NSW. The study area does not have habitat that is critical to any threatened species and is not within or near the critical habitats for Grey Nurse Shark (Part 7A of the FM Act), so would have no impact on the species.

Commercial Fisheries and Aquaculture

There are no aquaculture leases within Blackwattle Bay, or within Sydney Harbour. Commercial fishing has not been permitted in Sydney Harbour since 2006, therefore, the proposed works would not impact commercial fishing or aquaculture. Access to the fish market, by commercial fishing vessels, would not be impacted. The proposed works would maintain access for vessels to the existing markets during the construction phase.

Key threatening processes

Key threatening processes have the potential to adversely affect threatened species, populations or ecological communities, or could cause species, populations or ecological communities that are not threatened to become threatened. Processes (Part 7A of the FM Act) relevant to an aquatic impact assessment, but would not occur during the development of the new Sydney Fish Market include:

- current shark meshing program in NSW waters
- hook and line fishing in areas important for the survival of threatened fish species
- human-caused climate change
- instream structures and other mechanisms that alter natural flow
- introduction of non-indigenous fish and marine vegetation to the coastal waters of NSW
- the introduction of fish to fresh waters within a river catchment outside their natural range
- the removal of large woody debris from NSW rivers and streams
- the degradation of native riparian vegetation along NSW watercourses.

No net loss of key fish habitat

Significant environmental impacts (direct and indirect) are to be offset by environmental compensation. Compensation to offset fisheries resource or habitat loss is considered only after it is demonstrated that the proposed loss is unavoidable, in the best interests of the community in general and is in accordance with the FM Act, Regulations and Fisheries policies and guidelines. Habitat replacement (as a compensation measure) needs to account for both direct and indirect impacts from the development to ensure that there is ‘no net loss’ of key fish habitats.

© ECO LOGICAL AUSTRALIA PTY LTD

Calculation of habitat lost versus gained is itemised in **Table 1**. Sediment reprofiling is not calculated here because it is unclear how far the smothering of benthic habitat would extend (estimated 500 m^3 of sediment to be spread). Removal of the existing piles and pontoons would result in the loss of approximately 16,105 m^2 of wetted surface area and a gain of 1064 m^2 of newly exposed subtidal sand. However, the construction would result in absolute shading (no light availability) of 18,034 m^2 of unvegetated substrate (excluding area shaded by existing structures), plus partial shading of 5701 m^2 of this habitat. The calculation of absolute shading is based on the aquatic area proposed to be enclosed by a semi-submerged wall. Partial shading is based on the area seaward of the wall, which would receive some light penetration throughout the day. There would be a gain of hard substrate through the installation of exposed piles and pontoon structures of 2930 m^2. Therefore, there would be a total loss of type 3 KFH, due to the absolute shading of subtidal sand.

© ECO LOGICAL AUSTRALIA PTY LTD

Table 1: Impact to key fish habitat (KFH)

Aquatic habitat (KFH type)	Available in study area (m^2)	Impact type	Loss (m^2)	Gain (m^2)
Existing piles (wetted surface area) (type 3)	14,675	All piles removed	14,675	-
New piles (exposed to partial sunlight) (type 3)	-	44 gained	-	464
New piles (no sunlight exposure) (no KFH)		200 gained	-	-
Existing pontoons (wetted surface area) (type 3)	1430	4 removed	1430	-
New pontoons (wetted surface area) (type 3)	-	1 gained	-	1063
Intertidal seawall (type 3)	2750	Absolute shading	818	-
Basement wall (type 3)	-	1 gained	-	1403
Unvegetated subtidal habitat (type 3)	234,726	Partial shading	5701**	1064*
		Absolute shading	18,034**	-
		Sediment reprofiling	About 500 m^3 reshaped on same habitat	
Macroalgae (type 2)	2674	No impact	-	-
Intertidal flats with mangrove (type 2)	240	3 mangrove seedlings removed	1	-
Total	**256,496**		**40,659**	**3994**

* area previously shaded that would be exposed

**excludes existing shaded areas that would remain shaded

© ECO LOGICAL AUSTRALIA PTY LTD

5.4 Matters of National Environmental Significance (MNES)

The following MNES (**Table 2**) were returned from the database search for a 5 km radius around coordinates -33.8733, 151.19241. No MNES would be impacted by the proposed works.

Table 2: Matters of National Environmental Significance from database search

Matter of NES	Count	Comment	Impact Assessment
World Heritage Properties	6	Not near site - terrestrial	No impact
National Heritage Places	6	Not near site - terrestrial	No impact
Wetlands of International Importance	1	Not near site (Towra Point Nature Reserve)	No impact
Great Barrier Reef Marine Park	None		No impact
Commonwealth Marine Areas	None		No impact
Listed Threatened Ecological Communities	5	See likelihood of occurrence in **Appendix A** for estuarine communities. None on site.	No impact
Listed Threatened Species	74	See likelihood of occurrence in **Appendix A** for estuarine species (terrestrial species excluded).	No impact
Listed Migratory Species	60	See likelihood of occurrence in **Appendix A** for estuarine migratory species (terrestrial species excluded).	No impact

5.5 Sydney Regional Environmental Plan (SREP, Sydney Harbour Catchment) 2005

Clause 21 of the SREP provides nine matters to be taken into consideration in relation to biodiversity, ecology and environment protection:

21(a) Development should have a neutral or beneficial effect on the quality of water entering the waterways.

During construction, potential impact to water quality would be controlled by implementation of a Construction Environmental Management Plan (CEMP). The operational use would not be hugely different from the current use, so the works are not expected to alter the quality of the water.

There is a risk that ASSs would be disturbed during the construction, which would directly harm marine flora and fauna within the study area. The CEMP will directly address this and provide further mitigation measures on how to reduce this impact.

21(b) Development should protect and enhance terrestrial and aquatic species, populations and ecological communities and, in particular, should avoid physical damage and shading of aquatic vegetation (such as seagrass, saltmarsh and algal and mangrove communities).

No communities of seagrass, saltmarsh or macroalgae would be directly or indirectly harmed by the proposed works. Three small mangrove seedlings in the southwestern corner of the subject site would be harmed by the works. Combined, these seedlings equal <1 m^2 of habitat.

21(c) Development should promote ecological connectivity between neighbouring areas of aquatic vegetation (such as seagrass, saltmarsh and algal and mangrove communities).

© ECO LOGICAL AUSTRALIA PTY LTD

The proposal would not disconnect any aquatic vegetation patches and would not inhibit the movement of plant propagules through the water body or along the substrate.

21(d) Development should avoid indirect impacts on aquatic vegetation (such as changes to flow, current and wave action and changes to water quality) as a result of increased access.

The proposed piles would influence the localised hydrology by creating back-eddies, however, this would not increase as there are already a large number of closely spaced piles in the site. The site is subject to high boat frequency and tidal movement already, so it is unlikely that there would be a significant change in hydrology.

21(e) Development should protect and reinstate natural intertidal foreshore areas, natural landforms and native vegetation.

The proposal would not affect natural foreshore areas, as they do not exist. The proposal has the potential to reinstate foreshore areas by creating additional sloped surfaces and habitat availability. **Section 5.7** has additional information on habitat opportunities which may be included in the final works.

21(f) Development should retain, rehabilitate and restore riparian land.

The proposal would not interfere with any riparian vegetation or riparian land.

21(g) Development on land adjoining wetlands should maintain and enhance the ecological integrity of the wetlands and, where possible, should provide a vegetative buffer to protect the wetlands.

The proposal is not on, or adjoining wetlands identified on the Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 – Wetland Protection Map.

21(h) The cumulative environmental impact of development.

The foreshore and aquatic habitat are highly modified by a footpath, extensive seawall, wharf/pontoon structures and commercial and recreational boat traffic. There would be an increase in partial shading of unvegetated substrate, which would be offset by the creation of hard substrate (piles). Increased signage and bins would reduce rubbish entering the water. The use of transparent materials and/or meshed decking (recommended in **Section 5.7**) may have a positive impact, by increasing light availability to the subtidal sand currently shaded. Overall, the proposed works, although they have not been finalised yet, are not expected to increase environmental impact above the current conditions.

21(i) Whether sediments in the waterway adjacent to the development are contaminated, and what means will minimise their disturbance.

The site is located in an area classed as having a 'high probability' of ASSs within the bottom sediments of the bay. The long-standing use of the bay as an industrial environment may have also had an impact on soils. Disturbance to the soil would arise from removing and drilling the piles in intertidal zones at low tide. Fine-scale sediment plumes, which may release the acid sulphate, would be avoided by working at high tide. The silt curtain should not be removed until the risk of sediment contamination is negligible. The CEMP has directly addressed ASS management.

© ECO LOGICAL AUSTRALIA PTY LTD

5.6 Recommended mitigation measures

Although the work would not directly or indirectly harm marine vegetation (besides three small mangrove seedlings), the following mitigation measures are recommended to minimise the risk of impact during construction and operation. These are adapted from guidelines issued by DPI Fisheries for instream and foreshore work with additional measures recommended in response to potential water quality impacts. These mitigation measures are in addition to the Construction Environmental Management Plan (CEMP) developed by Theme (August 2018) and at a minimum include:

- machinery and engine maintenance schedule to reduce oil/fuel leakage
- low impact barge positioning to prevent propeller scouring and thrust wash onto shallow habitats
- minimise footprint and establish no-go zones in sensitive habitats
- biological hygiene (eg prevent spread of noxious species on and off the site)
- aquatic fauna management (see below)
- other measures listed below.

- Establish no-go zones to avoid damage to nearby habitats (eg macroalgae in **Figure 4**). No-go zones should be marked on a map and displayed inside the construction barge and office. All staff responsible for maneuvering the barge should check the map before selecting a new position. A brief pre-construction survey should be undertaken to confirm the extent of sensitive habitat types (no-go zones) present, eg the extent of macroalgae to the west of the subject site.

- Work positioning barges, drilling and pile driving should occur during calm conditions.

- No anchors or mooring blocks/lines should be placed on the intertidal rock habitat. All lines should be suspended off the seafloor to minimise drag across benthic communities.

- Use a floating boom with silt curtain to contain sediment plumes during sediment reprofiling, pile removal, drilling and pile hammering. As the site is large, the silt curtain should encompass the area where work is being undertaken, rather than encompassing the entire site. The silt curtain should not be removed until the risk of sedimentation is negligible. The silt curtain should be placed across the gap in cofferdam or around piling activities until it is closed after piling.

- All waste material should be disposed of on land, stored away from stormwater drains and not reused in the construction.

- Syngnathids (seahorses and their relatives) were not observed during the field survey and are unlikely to use the construction area. Pre-construction surveys are not required.

- The noxious marine alga *Caulerpa taxifolia* was not observed in the study area. Care should be taken not to introduce this species to the area by using contaminated vessels and machinery. For example, a drill head or anchor used at another site with *Caulerpa* should be thoroughly cleaned of plant propagules and sediment before being used at another location. Fragments of *Caulerpa* can remain viable for up to three days out of the water. Best hygiene practices are outlined in the NSW Control Plan for the Noxious Marine Alga *Caulerpa taxifolia* (NSW I&I 2009).

© ECO LOGICAL AUSTRALIA PTY LTD

- Although large marine mammals are not expected to occur, gentle start-up hammering is recommended to allow undetected aquatic fauna to leave the area and avoid hearing damage. Work should be stopped if large fauna is observed nearby.

- Avoid piling or minor excavation works in intertidal zones at low tide, to reduce the risk of exposing ASSs. A silt-curtain should be used to contain sediment plumes. Refer to the Acid Sulphate Soil Management Plan developed by JBS&G for further mitigation measures.

- Submersible pump heads should be covered in a filter to prevent fauna being sucked into the pump. Pumps must also be of a suitable size and capacity with a slow enough velocity to allow fish to escape during any dewatering process.

- Develop an aquatic biodiversity management plan (ABMP). This should be developed by a suitably qualified aquatic ecologist during the detailed design phase of the project and address the on-going management of the aquatic biodiversity in Blackwattle Bay.

- Monitor water quality at the frequencies recommended in the FWQA. If trigger values are exceeded then works should cease, and water treated prior to works continuing.

5.7 Habitat opportunities (increase biodiversity value)

This section identifies habitat improvement opportunities presented by construction of the new fish markets. It is recommended that an ABMP be prepared during the detailed design phase of the building. Examples of habitat enhancement ideas are provided in **Appendix C**. The Plan should have monitoring for a period of five years to determine the extent to which the habitat enhancement has been successful – and therefore provide lessons for future harbour infrastructure.

Seawalls – The current seawall is a mix of vertical and sloped concrete and sandstone surfaces. Naturally, the intertidal zone is a slow transition from subtidal to terrestrial consisting of microhabitats which support flora (macroalgae) and fauna (sponges and molluscs). These species provide food for higher order species including crustaceans and fish. The seawall steepens this transition, reducing the habitat complexity in this area. Where the vertical seawall would be retained, its habitat complexity can be increased by adding artificial habitat features including pots, crevices or panels. This adds texture, water retaining features and crevices which allows flora and fauna to establish. As additional structures on the seawall may create shade, it is important not to shade any existing vegetation and position pot plants in areas of least sensitivity to disturbance (type 3 KFH). A trial study in Blackwattle Bay retrofitted complex ridged tiles and flowerpots to mono-textured seawalls to increase surface area and introduce microhabitats (Strain et al 2017). An increase in settlement was recorded on the textured tiles. There was an 80% increase in biodiversity of the seawall, with the use of flowerpots. Starfish, fish and sponges were some of the fauna using the pots as habitat. Although these features were retrofitted, it is suggested that water-retaining features are better to be incorporated into a seawall or pile at the planning stage. A seawall, at McMahons Point, Sydney Harbour is an example of this. The sandstone seawall was purposely built to include pools for structural habitat and features rock boulders at its toe for additional transitioning habitat.

Where the seawall would be replaced, creating a sloping transition from the water to the land would increase the surface area that is tidally inundated. Rock revetments provide large tidal surface areas and trap water during the low tide to create microhabitats. The inclusion of flat areas within the rock revetment can create additional habitat and allow the accumulation of sediment and establishment of natural vegetation (mangroves and saltmarsh). There are current examples of this onsite, with three mangrove

seedlings growing in an artificial area located in front of the vertical seawall. Materials including coir or timber logs can be used as a barrier to wash while the mangrove seedlings establish. These logs would decompose slowly, and offer additional habitat and nutrient cycling in the process. A naturally vegetated shoreline has benefits to the aquatic environment including supplying food and habitat for fish and trapping contaminants/nutrients/gross pollution from the land before they enter the water.

Wharves, piles and pontoons – Pontoons can create habitat by creating texture in the intertidal and subtidal zones. Complex panels fitted to the wetted side of the pontoon would increase habitat complexity and provide a greater surface area for flora and fauna to colonise. Installing textured piles, as opposed to piles with smooth surfaces, would also increase habitat availability. Wharves are preferable to pontoons, as the use of a solid structure means that light penetrating materials can be used. Mesh decking, Perspex or glass can all be used to reducing shading on the benthic habitat below. Increased light allows for the establishment of vegetation, eg macroalgae, which are primary producers and an important food source for secondary produces, eg invertebrates. This habitat opportunity also allows pedestrians of these structures to observe the aquatic biodiversity below the structure. Increasing the height of the structure above the water also maximises light availability under the structure. Artificial hanging structures, similar in shape to milk crates, can be hung below wharves or pontoons at varying depths to create another habitat opportunity.

Subtidal sand – Subtidal sand can be enhanced by installing features such as artificial reefs. Artificial structures are designed to deflect currents and create nutrient upwellings around them. This, in turn, attracts fish. The hard structures also allow for encrusting organisms to establish. The reef structure must be made of environmentally friendly material, and free of all noxious substances that may leech into the water. They must not become navigational hazards.

Planting of native macroalgae on rubble amongst subtidal sand that is less than 2 m deep would also improve that habitat on site. Transplanting habitat-forming species such as *Ecklonia radiata*, that is native to the region, has previously been successful within Sydney Harbour.

These habitat opportunities aim to emulate the natural environment, creating habitats for native species and providing natural dissipation of wash and waves. An increase in colonisation of native species reduces the resources and opportunity for invasive species to establish. See **Appendix C** for examples of where these habitat opportunities can be incorporated into the new Sydney Fish Market design.

© ECO LOGICAL AUSTRALIA PTY LTD

6 Conclusion

There is not likely to be a direct or indirect impact on threatened aquatic species, populations, ecological communities or their habitats. Therefore, the proposed footprint does not trigger a Species Impact Statement (SIS) or Referral. Impacts on marine vegetation are not likely if no-go zones are established in a CEMP and followed.

Regarding DPI Fisheries Policy and Guidelines for Fish Habitat Conservation and Management (2013 update), there is expected to be a total loss of 40,658 m^2 of type 3 KFH, <1 m^2 of type 2 KFH (three mangrove seedlings) and a total gain of 3994 m^2 hard substrate (type 3 KFH). Therefore, there would be a 'net loss' of KFH in the subject site. However, this habitat has a low biodiversity value, and does not support threatened species, populations or ecological communities.

Habitat opportunities should be considered and implemented as part of the new Sydney Fish Market to increase the habitat complexity and biodiversity within Blackwattle Bay. These would be best incorporated during the design phase, with retro-fitted structural habitat being less desirable.

© ECO LOGICAL AUSTRALIA PTY LTD

7 References

Bugnot, A.B., Mayer-Pinto, M., Johnson, E.L Coleman, R.A., Morris, R.L. Dafforn, K.A., 2016. *Baseline assessment of ecological structure and environmental condition in Bays Precinct: Final report*. Report prepared for UrbanGrowth NSW. University of New South Wales, Sydney.

Creese, R.G., Glasby, T.M., West, G. and Galen, C. 2009. *Mapping the habitats of NSW estuaries. Industry & Investment NSW Fisheries Final Report Series 113.* Port Stephens, NSW, Australia.

Dafforn, K.A., Mayer-Pinto, M., Bugnot, A.B., Coleman, R.A., Morris, R.L. and Johnston, E.L. 2016. *Guiding principles for marine foreshore developments*. Prepared for UrbanGrowth NSW. University of New South Wales, Sydney.

Fairfull, S. 2013. *Fisheries NSW Policy and Guidelines for Fish Habitat Conservation and Management (2013 update).* NSW Department of Primary Industries.

Glasby, T.M. and Connell, S.D. 2001. Orientation and position of substrata have large effects on epibiotic assemblages. In *Marine Ecology Progress Series*. Volume 214: 127-135.

Mayer-Pinto, M., Johnston, E.L., Hutchings, P.A., Marzinelli, E.M., Ahyong, S.T., Birch, G., Booth, D.J., Creese, R.G., Doblin, M.A., Figueira, W. and Gribben, P.E., 2015. *Sydney Harbour: a review of anthropogenic impacts on the biodiversity and ecosystem function of one of the world's largest natural harbours*. Marine and Freshwater Research, 66(12), pp.1088-1105.

NSW I&I 2009. *NSW Control Plan for the Noxious Marine Alga Caulerpa taxifolia*. NSW Industry and Investment.

Strain, E., Morris, R. and Bishop, M. 2017. *Sydney Harbour–enhancing seawall sustainability.* Case Study. Sydney Institute of Marine Science

© ECO LOGICAL AUSTRALIA PTY LTD

Appendix A: Threatened species likelihood of occurrence and impact

If a species has suitable habitat present on site **AND** is likely to use this habitat **AND** the species or its habitat would be directly or indirectly impacted, **THEN** an Assessment of Significance is required. Such species, if any, are highlighted in the table below. This list excludes terrestrial species that do not use estuarine/marine water or tidal foreshores.

Type	Species name	Common name	BC/FM Act Status	EPBC Status	Use of site	Is an impact assessment required?
Fish	*Epinephelus daemelii*	Black Rockcod	V	V	No suitable habitat present, eg rock overhangs, crevices or caves	No
	Hippocampus whitei	White's Seahorse	E – proposed		Nearby habitat present but would not be impacted	No
	Macquaria australasica	Macquarie Perch	E1	E	No records in catchment	No
	Prototroctes maraena	Australian Grayling	E	V		No
Shark	*Carcharias taurus*	Grey Nurse Shark	E4A	CE	Unlikely close to shore	No
	Carcharodon carcharias	Great White Shark	V	V		No
	Lamna nasus	Porbeagle, Mackerel Shark		Bonn		No
	Rhincodon typus	Whale Shark		V,Bonn		No
Ray	*Manta alfredi*	Reef Manta Ray		Bonn	May opportunistically pass through but would be deterred during construction	No
	Manta birostris	Giant Manta Ray		Bonn		No
	Pristis zijsron	Green Sawfish	E4	V	Presumed extinct in NSW	No
Turtle	*Caretta caretta*	Loggerhead Turtle	E1	E	Unlikely, may briefly explore area	No
	Chelonia mydas	Green Turtle	V	V		No
	Dermochelys coriacea	Leatherback Turtle	E1	E		No
	Eretmochelys imbricata	Hawksbill Turtle		V,Bonn		No
	Natator depressus	Flatback Turtle		V,Bonn		No
Whale	*Balaenoptera bonaerensis*	Antarctic Minke Whale		Bonn	Unlikely to enter site through narrow channel into Blackwattle Bay.	No
	Balaenoptera edeni	Bryde's Whale		Bonn		No
	Balaenoptera musculus	Blue Whale	E1	E		No
	Caperea marginata	Pygmy Right Whale		Bonn		No
	Eubalaena australis	Southern Right Whale	E1	E		No

© ECO LOGICAL AUSTRALIA PTY LTD

Type	Species name	Common name	BC/FM Act Status	EPBC Status	Use of site	Is an impact assessment required?
	Megaptera novaeangliae	Humpback Whale	V	V		No
	Physeter macrocephalus	Sperm Whale	V			No
Dolphin	*Lagenorhynchus obscurus*	Dusky Dolphin		Bonn	Unlikely to enter site through narrow channel into Blackwattle Bay.	No
	Orcinus orca	Killer Whale, Orca		Bonn		No
	Sousa chinensis	Indo-Pacific Humpback Dolphin		Bonn		No
Marine mammal	*Dugong dugon*	Dugong	E1	Bonn	Unlikely, no seagrass	No
Seal	*Arctocephalus forsteri*	New Zealand Fur-seal	V		Unlikely, may briefly explore area	No
	Arctocephalus pusillus doriferus	Australian Fur-seal	V			No
Frog	*Litoria aurea*	Green and Golden Bell Frog	E1	V	No habitat	No
Bird	*Actitis hypoleucos*	Common Sandpiper		C,J,K	Some species only occur offshore. Site is exposed to human activity, which would be avoided by these species. Larger, better habitat in region. These birds are unlikely to use the area of proposed works.	No
	Anseranas semipalmata	Magpie Goose	V			No
	Apus pacificus	Fork-tailed Swift		C,J,K		No
	Arenaria interpres	Ruddy Turnstone		C,J,K		No
	Botaurus poiciloptilus	Australasian Bittern	E1	E		No
	Calidris acuminata	Sharp-tailed Sandpiper		C,J,K		No
	Calidris alba	Sanderling	V	C,J,K		No
	Calidris canutus	Red Knot		C,J,K		No
	Calidris ferruginea	Curlew Sandpiper	E1	CE,C,J,K		No
	Calidris melanotos	Pectoral Sandpiper		J,K		No
	Calidris ruficollis	Red-necked Stint		C,J,K		No
	Calidris subminuta	Long-toed Stint		C,J,K		No
	Calidris tenuirostris	Great Knot	V	C,J,K		No
	Calonectris leucomelas	Streaked Shearwater		C,J,K		No
	Charadrius bicinctus	Double-banded Plover		Bonn		No
	Charadrius leschenaultii	Greater Sand-plover	V	C,J,K		No
	Charadrius mongolus	Lesser Sand-plover	V	C,J,K		No
	Charadrius veredus	Oriental Plover		J,K		No
	Diomedea antipodensis	Antipodean Albatross	V	V		No

© ECO LOGICAL AUSTRALIA PTY LTD

Type	Species name	Common name	BC/FM Act Status	EPBC Status	Use of site	Is an impact assessment required?
	Diomedea dabbenena	Tristan Albatross		Bonn		No
	Diomedea exulans	Wandering Albatross	E1	V,J		No
	Diomedea gibsoni	Gibson's Albatross	V	V		No
	Diomedea sanfordi	Northern Royal Albatross		E,Bonn		No
	Ephippiorhynchus asiaticus	Black-necked Stork	E1			No
	Epthianura albifrons	White-fronted Chat	E2,V			No
	Esacus magnirostris	Beach Stone-curlew	E4A			No
	Eudyptula minor	Little Penguin in the Manly Point Area	E2			No
	Fregetta grallaria grallaria	White-bellied Storm-Petrel		V		No
	Gallinago hardwickii	Latham's Snipe		C,J,K		No
	Gallinago megala	Swinhoe's Snipe		Bonn,C		No
	Gallinago stenura	Pin-tailed Snipe		Bonn,C		No
	Gygis alba	White Tern	V			No
	Haematopus fuliginosus	Sooty Oystercatcher	V			No
	Haematopus longirostris	Pied Oystercatcher	E1			No
	Heteroscelus brevipes	Grey-tailed Tattler		J		No
	Heteroscelus incanus	Wandering Tattler		J		No
	Hirundapus caudacutus	White-throated Needletail		C,J,K		No
	Ixobrychus flavicollis	Black Bittern	V			No
	Limicola falcinellus	Broad-billed Sandpiper	V	C,J,K		No
	Limosa lapponica	Bar-tailed Godwit		C,J,K		No
	Limosa limosa	Black-tailed Godwit	V	C,J,K		No
	Macronectes giganteus	Southern Giant Petrel	E1	E		No
	Macronectes halli	Northern Giant-Petrel	V	V		No
	Monarcha melanopsis	Black-faced Monarch		Bonn		No
	Monarcha trivirgatus	Spectacled Monarch		Bonn		No
	Numenius madagascariensis	Eastern Curlew		CE,C,J,K		No
	Numenius minutus	Little Curlew		C,J,K		No

© ECO LOGICAL AUSTRALIA PTY LTD

Type	Species name	Common name	BC/FM Act Status	EPBC Status	Use of site	Is an impact assessment required?
	Numenius phaeopus	Whimbrel		C,J,K		No
	Onychoprion fuscata	Sooty Tern	V			No
	Pachyptila turtur subantarctica	Fairy Prion (southern)		V		No
	Pandion cristatus	Eastern Osprey	V			No
	Pandion haliaetus	Eastern Osprey		Bonn		No
	Philomachus pugnax	Ruff		C,J,K		No
	Phoebetria fusca	Sooty Albatross	V	V		No
	Pluvialis fulva	Pacific Golden Plover		C,J,K		No
	Pluvialis squatarola	Grey Plover		C,J,K		No
	Pterodroma leucoptera leucoptera	Gould's Petrel	V	E		No
	Pterodroma neglecta neglecta	Kermadec Petrel	V	V		No
	Pterodroma solandri	Providence Petrel	V	J		No
	Puffinus carneipes	Flesh-footed Shearwater		J,K		No
	Rostratula australis	Australian Painted Snipe	E1	E		No
	Sternula albifrons	Little Tern	E1	Bonn,C,J,K		No
	Sternula nereis nereis	Australian Fairy Tern		V		No
	Thalassarche bulleri	Buller's Albatross		V,Bonn		No
	Thalassarche cauta	Shy Albatross	V	V		No
	Thalassarche cauta steadi	White-capped Albatross		V		No
	Thalassarche eremita	Chatham Albatross		E,Bonn		No
	Thalassarche impavida	Campbell Albatross		E,Bonn		No
	Thalassarche melanophris	Black-browed Albatross	V	V		No
	Thalassarche salvini	Salvin's Albatross		V,Bonn		No
	Tringa nebularia	Common Greenshank		C,J,K		No
	Tringa stagnatilis	Marsh Sandpiper		C,J,K		No
	Xenus cinereus	Terek Sandpiper	V	C,J,K		No
Seagrass	Posidonia australis - Port Hacking, Botany Bay, Sydney Harbour, Pittwater, Brisbane Waters and Lake Macquarie populations	Posidonia australis	E2		No plants observed	No

© ECO LOGICAL AUSTRALIA PTY LTD

Type	Species name	Common name	BC/FM Act Status	EPBC Status	Use of site	Is an impact assessment required?
	Posidonia australis seagrass meadows of the Manning-Hawkesbury ecoregion	Posidonia australis		E		No
Saltmarsh	Subtropical and Temperate Coastal Saltmarsh	Coastal Saltmarsh	E1	V	No plants observed or available habitat	No
	Wilsonia backhousei	Narrow-leafed Wilsonia	V		No plants observed	No

BC Act: E1 = Endangered, E2 = Endangered Population, E4 = Extinct, E4A = Critically Endangered, V = Vulnerable
FM Act: E1 = Endangered, E2 = Endangered Population, E4 = Extinct, E4A = Critically Endangered, V = Vulnerable
EPBC Act: Bonn = Listed migratory species under Bonn Convention, CD = Conservation Dependent, CE = Critically Endangered, E = Endangered, V = Vulnerable, X = Extinct

© ECO LOGICAL AUSTRALIA PTY LTD

Appendix B: Key fish habitat types

NSW key fish habitat types and associated sensitivity classification (from Fairfull 2013).

TYPE 1 - Highly sensitive key fish habitat:

- *Posidonia australis* (strapweed)
- *Zostera, Heterozostera, Halophila and Ruppia* species of seagrass beds >5m^2 in area
- Coastal saltmarsh >5m^2 in area
- Coral communities
- Coastal lakes and lagoons that have a natural opening and closing regime (i.e. are not permanently open or artificially opened or are subject to one off unauthorised openings)
- Marine park, an aquatic reserve or intertidal protected area
- SEPP 14 coastal wetlands, wetlands recognised under international agreements (e.g. Ramsar, JAMBA, CAMBA, ROKAMBA wetlands), wetlands listed in the Directory of Important Wetlands of Australia[2]
- Freshwater habitats that contain in-stream gravel beds, rocks greater than 500 mm in two dimensions, snags greater than 300 mm in diameter or 3 metres in length, or native aquatic plants
- Any known or expected protected or threatened species habitat or area of declared 'critical habitat' under the FM Act
- Mound springs

TYPE 2 – Moderately sensitive key fish habitat:

- *Zostera*, *Heterozostera, Halophila* and *Ruppia* species of seagrass beds <5m^2 in area
- Mangroves
- Coastal saltmarsh <5m^2 in area
- Marine macroalgae such as *Ecklonia* and *Sargassum* species
- Estuarine and marine rocky reefs
- Coastal lakes and lagoons that are permanently open or subject to artificial opening via agreed management arrangements (e.g. managed in line with an entrance management plan)
- Aquatic habitat within 100 m of a marine park, an aquatic reserve or intertidal protected area
- Stable intertidal sand/mud flats, coastal and estuarine sandy beaches with large populations of in-fauna
- Freshwater habitats and brackish wetlands, lakes and lagoons other than those defined in TYPE 1
- Weir pools and dams up to full supply level where the weir or dam is across a natural waterway

TYPE 3 – Minimally sensitive key fish habitat may include:

- Unstable or unvegetated sand or mud substrate, coastal and estuarine sandy beaches with minimal or no in-fauna
- Coastal and freshwater habitats not included in TYPES 1 or 2
- Ephemeral aquatic habitat not supporting native aquatic or wetland vegetation

© ECO LOGICAL AUSTRALIA PTY LTD

Appendix C: Habitat opportunities

Area of new Fish Market (**Figure 9** shows corresponding numbers)	Indicative area of the new Sydney Fish Market (pictures taken from Concept Proposal)	Habitat improvement opportunity	Example habitat improvement
1. Subtidal sand (1-2 m depth)		Plant/transplant native macroalgae (eg *Ecklonia radata, Horomisa banksia* or *Sargassum linearfolium*) using transplant mats in sandy subtidal zones	
2. Subtidal sand (>2 m depth)		Deploy hard structures (oyster reefs) onto soft sediment to create an artificial reef. Need to consider other uses of the waterway (boat thoroughfare).	

© ECO LOGICAL AUSTRALIA PTY LTD

3. Vertical smooth wall		Textured tiles, or features including crevices to increase habitat complexity. These are best incorporated in the design stage but can be retrofitted.	
4. Suspended slab		Hanging structures can suspend from slab to create additional habitat. These can act as fish aggregation devices.	
5. Sloped stepped surfaces		Design should consider ways to allow light to penetrate, eg integrated glass panels or metal grills	

© ECO LOGICAL AUSTRALIA PTY LTD

6. Piles		Improvements could include water-retaining features in the intertidal zone eg flowerpots	
7. Wharf		Design should consider ways to allow light to penetrate, eg integrated glass panels or metal grills	

© ECO LOGICAL AUSTRALIA PTY LTD

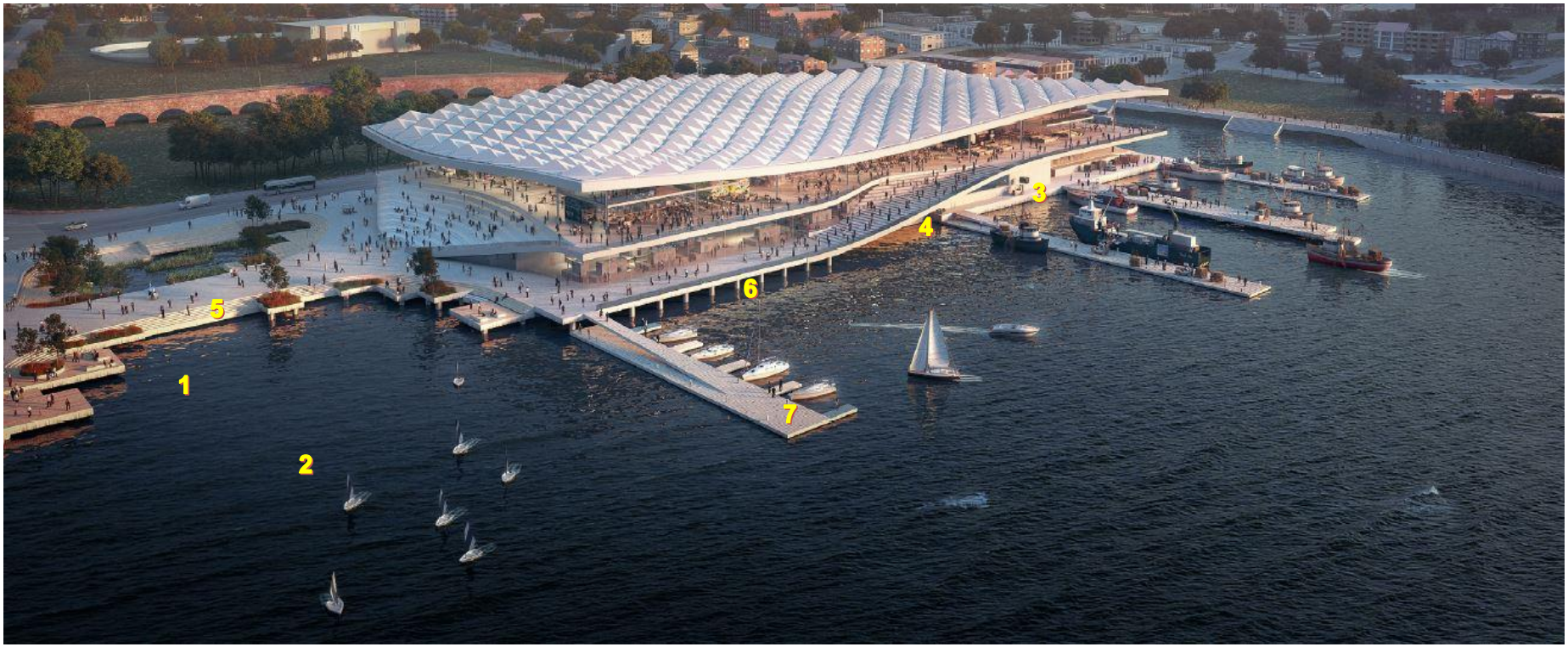
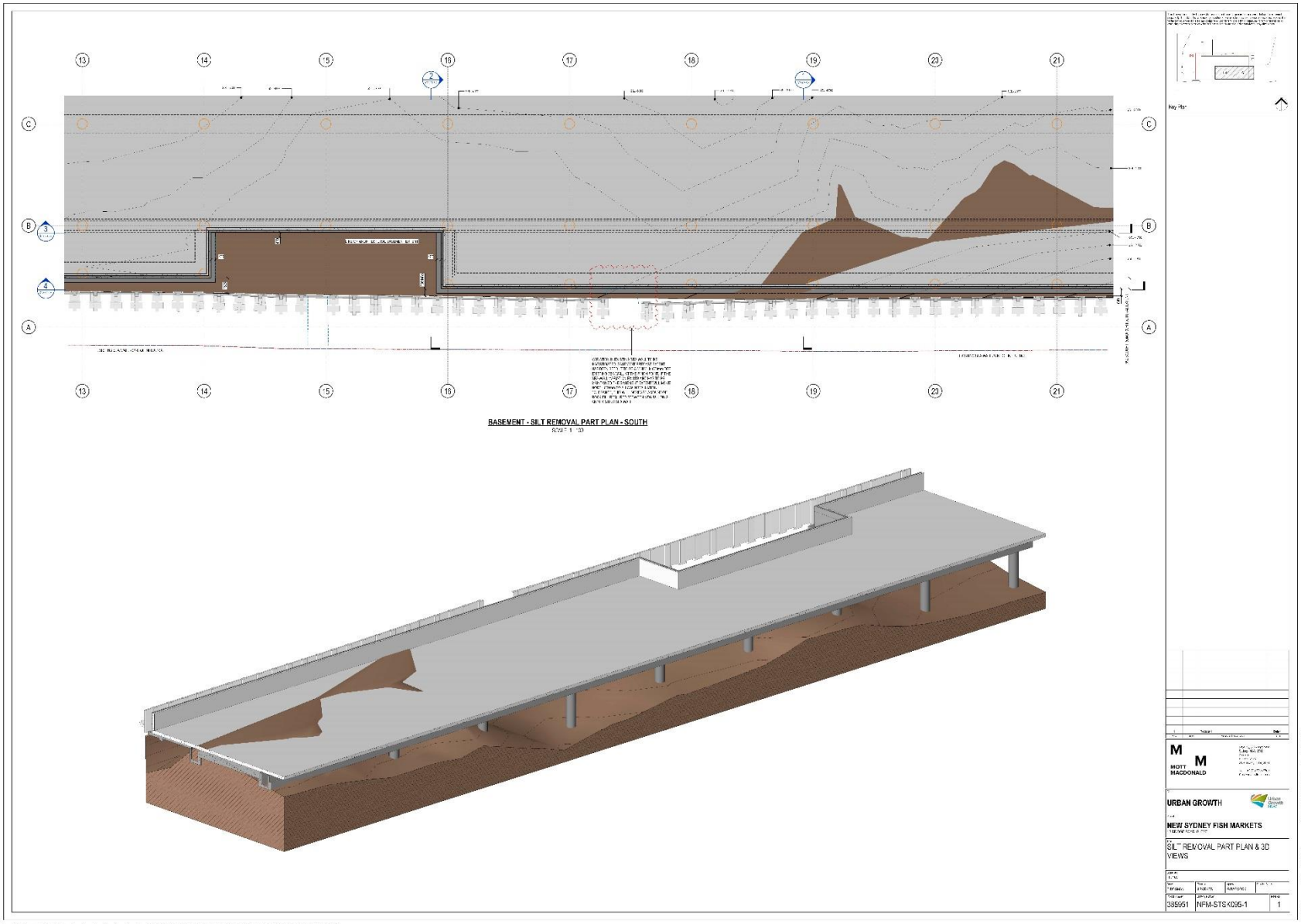


Figure 9: Example habitat opportunity areas on the new Sydney Fish Market (Image taken from SSD-DA Package: Stage 1 Concept Proposal – 3XN)

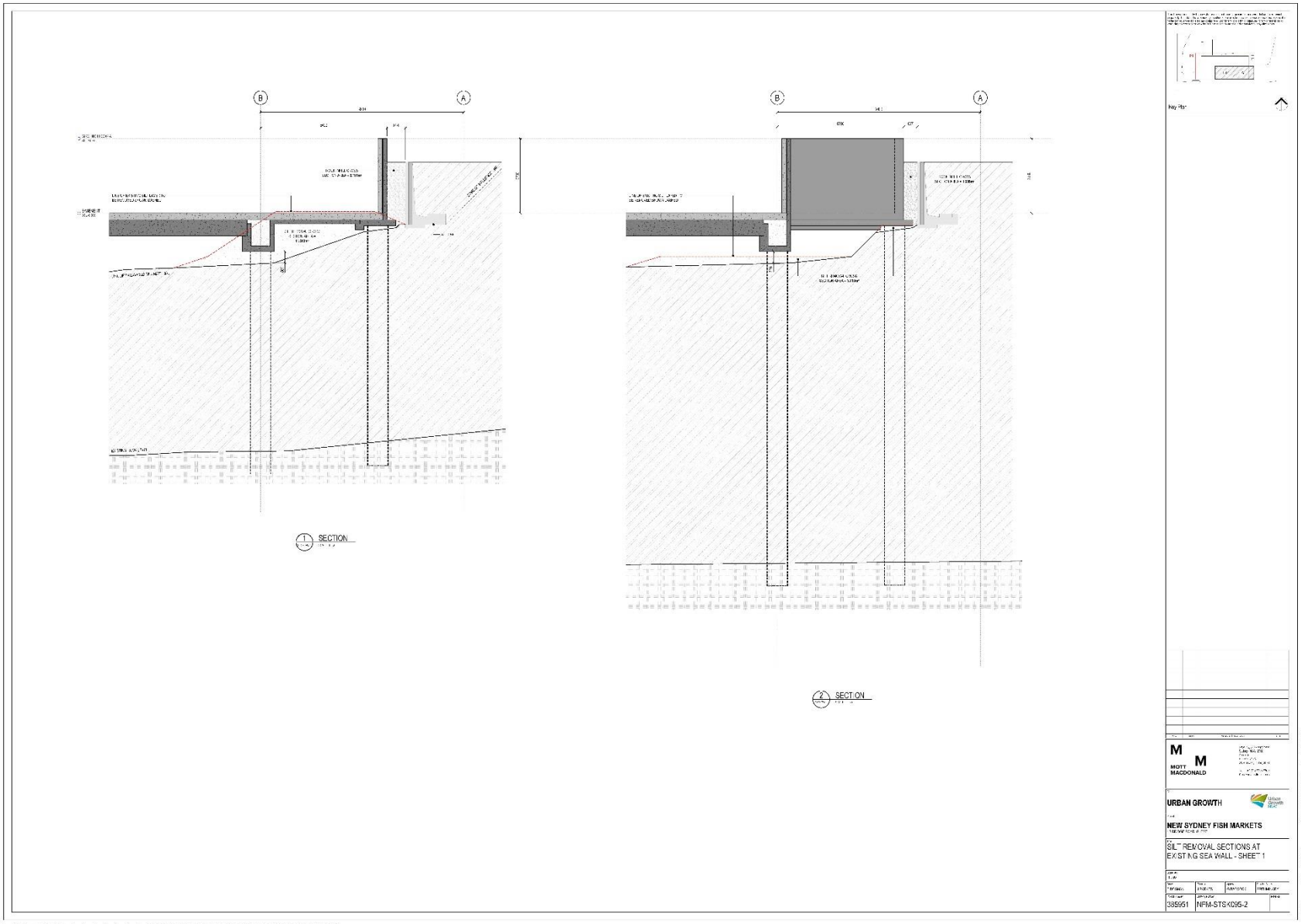
© ECO LOGICAL AUSTRALIA PTY LTD

Appendix D: Sediment Reprofiling

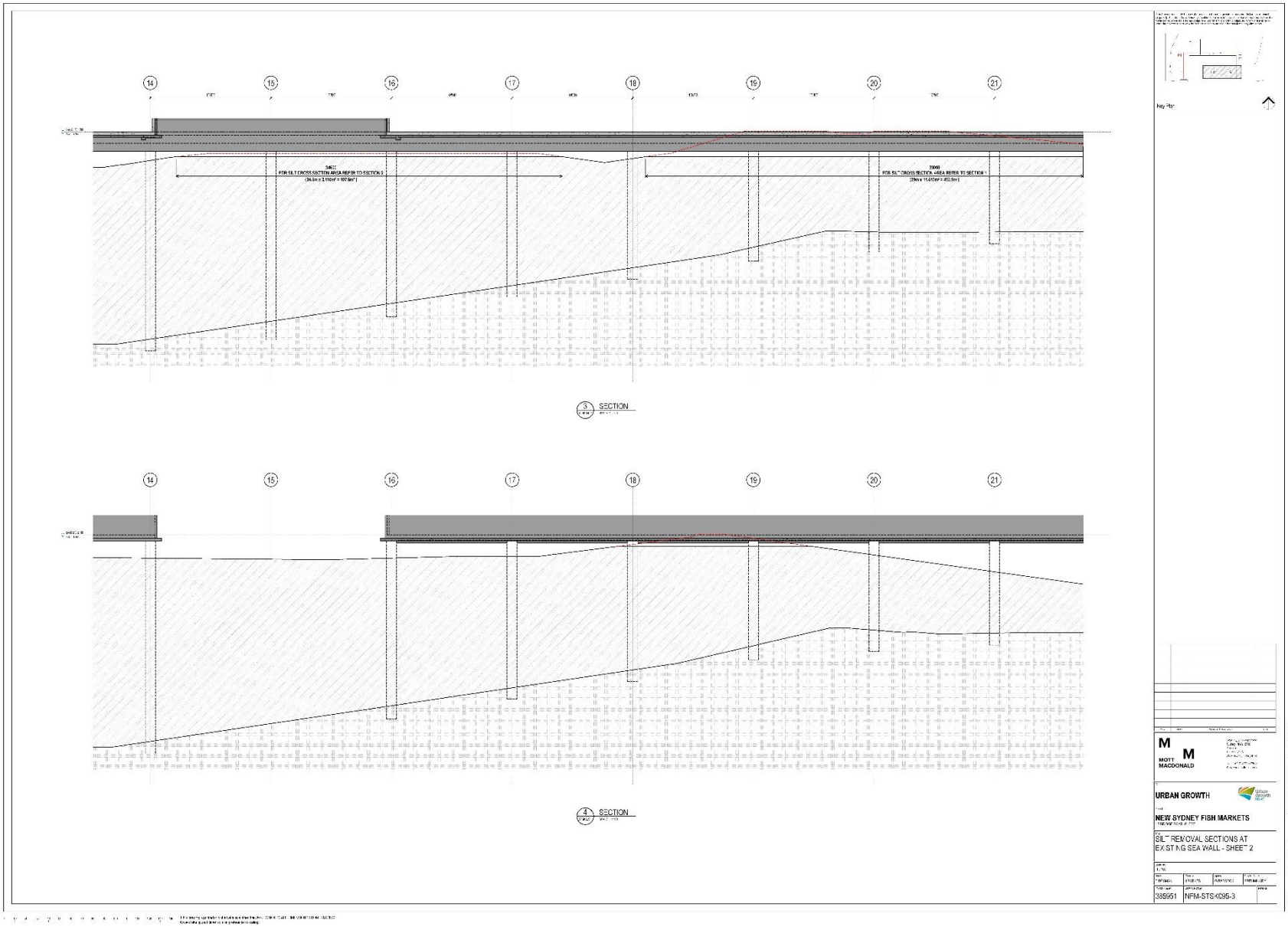
© ECO LOGICAL AUSTRALIA PTY LTD



© ECO LOGICAL AUSTRALIA PTY LTD



© ECO LOGICAL AUSTRALIA PTY LTD


14
15
16
17
18
19
20
21
SECTION
SECTION
Key Plan
MOTT MACDONALD
URBAN GROWTH
NEW SYDNEY FISH MARKETS
SILT REMOVAL SECTIONS AT EXISTING SEA WALL - SHEET 2
395991
NFM-STS-K095-3

Appendix E: MOD 8 Assessment (January 2022)

This appendix was prepared for a MOD 8 submission under SSD-8925. The modification relates to placement of compacted crushed rock (clean sandstone) on top of the natural marine substrate for the full extent of the basement footprint, plus a buffer that will likely reach the temporary cofferdam. The approved development did not include crushed rock. The purpose of the crushed rock is to provide a stable surface for construction staff and mechanisms, such as formwork, scaffolding and temporary support structures. Once the basement is built, the crushed rock will remain in place and become part of the marine environment.

A previous modification *SSD-8925-MOD 3 Basement Re-design and Sediment Redistribution* addressed a smaller basement footprint and an increased volume of sediment requiring redistribution beneath the basement area. Assessment of MOD 3 by the author concluded that:

> *Although minor, the modification of the basement would benefit the marine ecology by increasing the amount of water that can freely pass beneath the main structure due to a reduction in basement area. The increase in sediment redistribution is insignificant because the basement would be elevated directly over that sediment, regardless of how much is moved around. Mitigation measures in regard to sediment and water quality would be the same, scaled to suit the volume handled. The habitat opportunities presented in Section 5.7 would improve the connectiveness of habitat types around the bay. The nature of the design modification does not prohibit any of those opportunities from occurring. Overall, with respect to the small change relative to the large development footprint, SSD-8925-Mod 3: Basement Re-design and Sediment Redistribution is reasonably consistent with the Marine Ecology Assessment and has minimal environmental impact compared to what has already been assessed.*

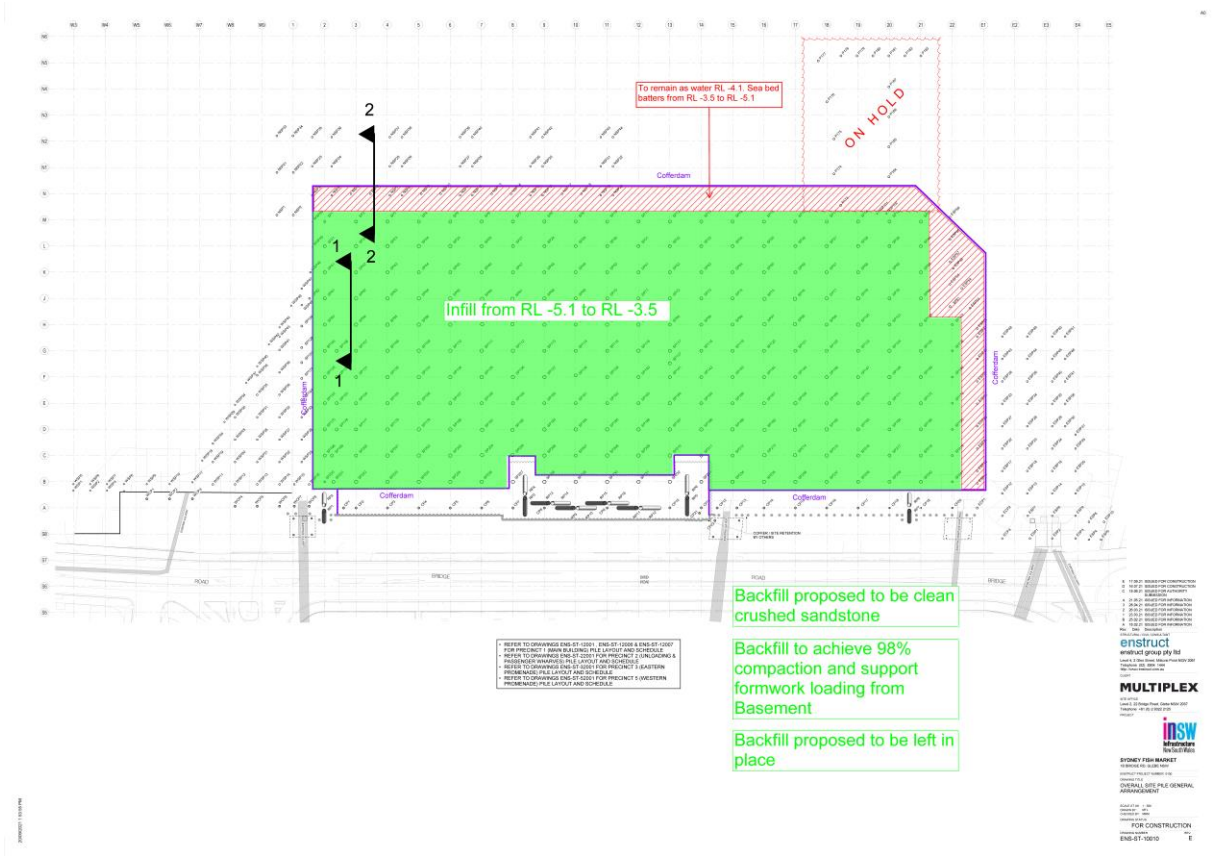
Report item	Paraphrased description approved in SSD-8925	MOD 8 response
Assessment of demolition and construction impact Page 24	The cofferdam would have a gap for barge access during the initial installation of foundations piles. The gap would be sealed off for construction of the superstructure. More detailed demolition methodology is not yet available, therefore, ELA has based this assessment on the CEMP.	The original assessment assumed the entire cofferdam area would retain a full coverage of non-tidal water over the substrate. Under the proposed modification, the placement of crushed rock would be higher than internal water level. This is not an issue in regard to potential exposure of contaminated soils, but it reduces the volume of water inside the cofferdam that may contain fish (see plan and cross sections below). However, the crushed rock would potentially reach the cofferdam (i.e. the entire cofferdam area), therefore, there is likely to be little or no water remaining. Depending on water quantity, quality and type of fish trapping inside, a fish kill may occur. This could be mitigated by sealing the cofferdam door during a low tide (rather than pumping water out), flushing fish towards the door using boats or water jets, and if necessary trapping fish using fyke nets, seine nets or gill nets. The method selected

© ECO LOGICAL AUSTRALIA PTY LTD

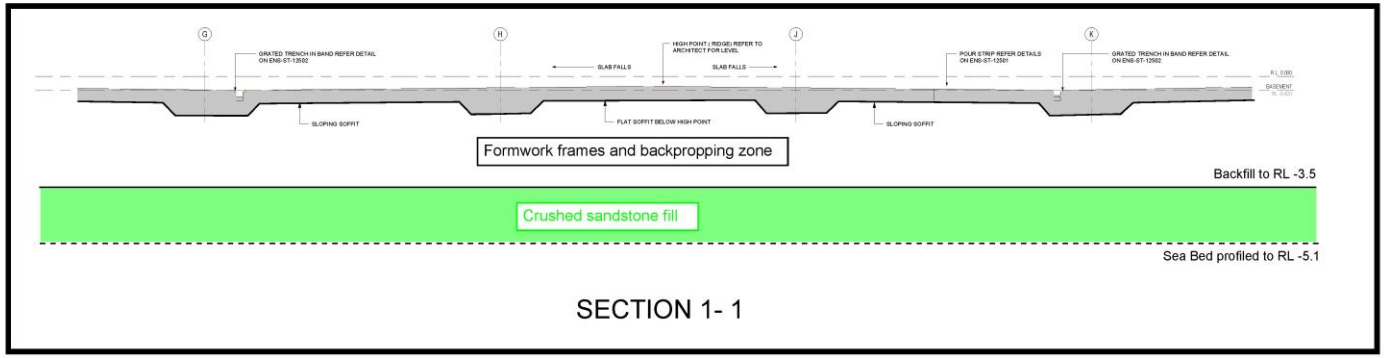
		should be flexible based on the risk of harm to fish and safety of workers. A decision on best methods should be made by the Project Ecologist once the cofferdam is near completion, and the situation monitored during rock placement.
No net loss of key fish habitat Page 28-29	The construction of the submerged basement built on piles would result in absolute shading (no light availability) of 18,034 m^2 of unvegetated substrate (excluding area shaded by existing structures), resulting in a total loss of Type 3 KFH (subtidal sand).	Although absolute shading was calculated and approved as a total and permanent loss of KFH, the soft sediment beneath the basement would have provided some limited habitat for benthic invertebrates and a selection of their predatory fish that are not deterred by narrow dark spaces. The crushed rock would prevent colonisation of benthic infauna, which require soft ground for burrowing, but over time it would provide habitat for sessile invertebrates that require solid substrate for attachment. Therefore, the crushed rock would reduce the amount of habitat for benthic invertebrates and their predators, but given the very low quality of the basement and the abundance of better habitat in Blackwattle Bay, this impact is extremely low. The crushed rock would not provide habitat for macroalgae where it is shaded by the basement, as there would be insufficient light for photosynthesis. Portions of the buffer around the basement may receive some light (partially shaded by the promenade and wharves) which may allow establishment of macroalgae.
Table 1: Impact to key fish habitat (KFH) Page 30	All habitat beneath the basement was calculated as a permanent loss of KFH, as shown in Table 1, row 'Unvegetated subtidal habitat (Type 3) – Absolute shading', with a footnote that the calculation excludes areas that were already shaded by the previous wharf.	The area of 'absolute shading' was considered a complete loss of Type 3 KFH. The shading caused by the previous wharf was excluded from the calculation, but that area would be subject to the same replacement of soft sediment with crushed rock. Overall the development was approved to have a net loss of KFH, dominated by Type 3 KFH. MOD 8 does not change the overall loss of KFH and the impact of using crushed rock is extremely low (see discussion in row above).
Appendix C: Habitat Opportunities Pages 44-47	We recommended installation of a variety of marine habitats around the site.	The proposed crushed rock would not impede installation of marine habitat. An Aquatic Biodiversity Management Plan (ABMP) has been prepared to document the various types and locations of new habitats. These include: • 40 hanging fish aggregation devices suspended from the promenade • 45 benthic fish aggregation devices placed on shallow substrate • 80 m^2 of seawall habitat tiles mounted to the basement wall

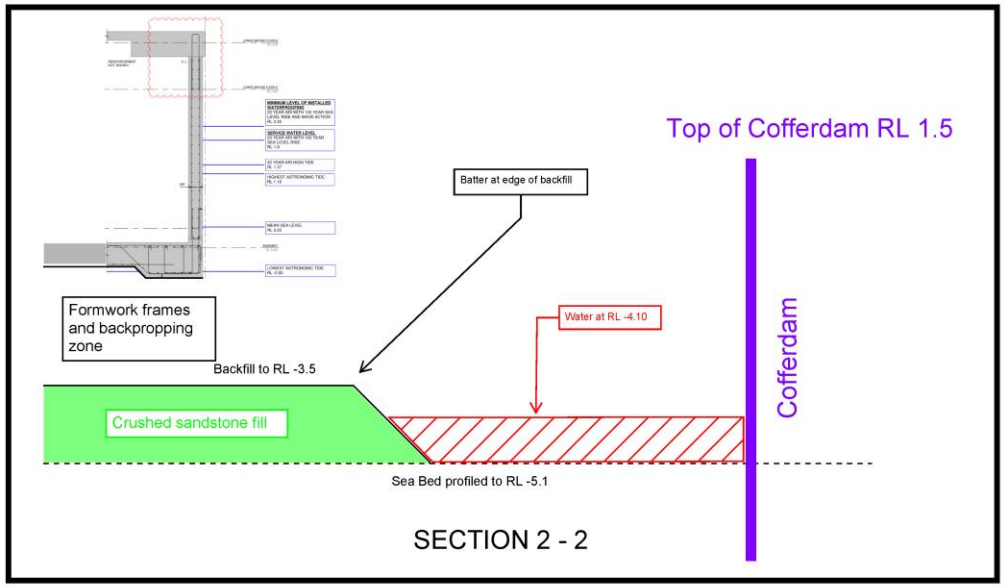
© ECO LOGICAL AUSTRALIA PTY LTD

		• 1500 m^2 of submerged rock rubble reef to connect the western foreshore to the building • Environmentally friendly seawalls using boulders at a gentle gradient. The proposed layout plan from the ABMP is included below.



MOD 8: Plan view of extent of proposed crushed rock (green shading) inside the coffer dam (purple outline)





MOD 8: Cross sections of proposed crushed rock to be permanently submerged after removal of coffer dam

© ECO LOGICAL AUSTRALIA PTY LTD

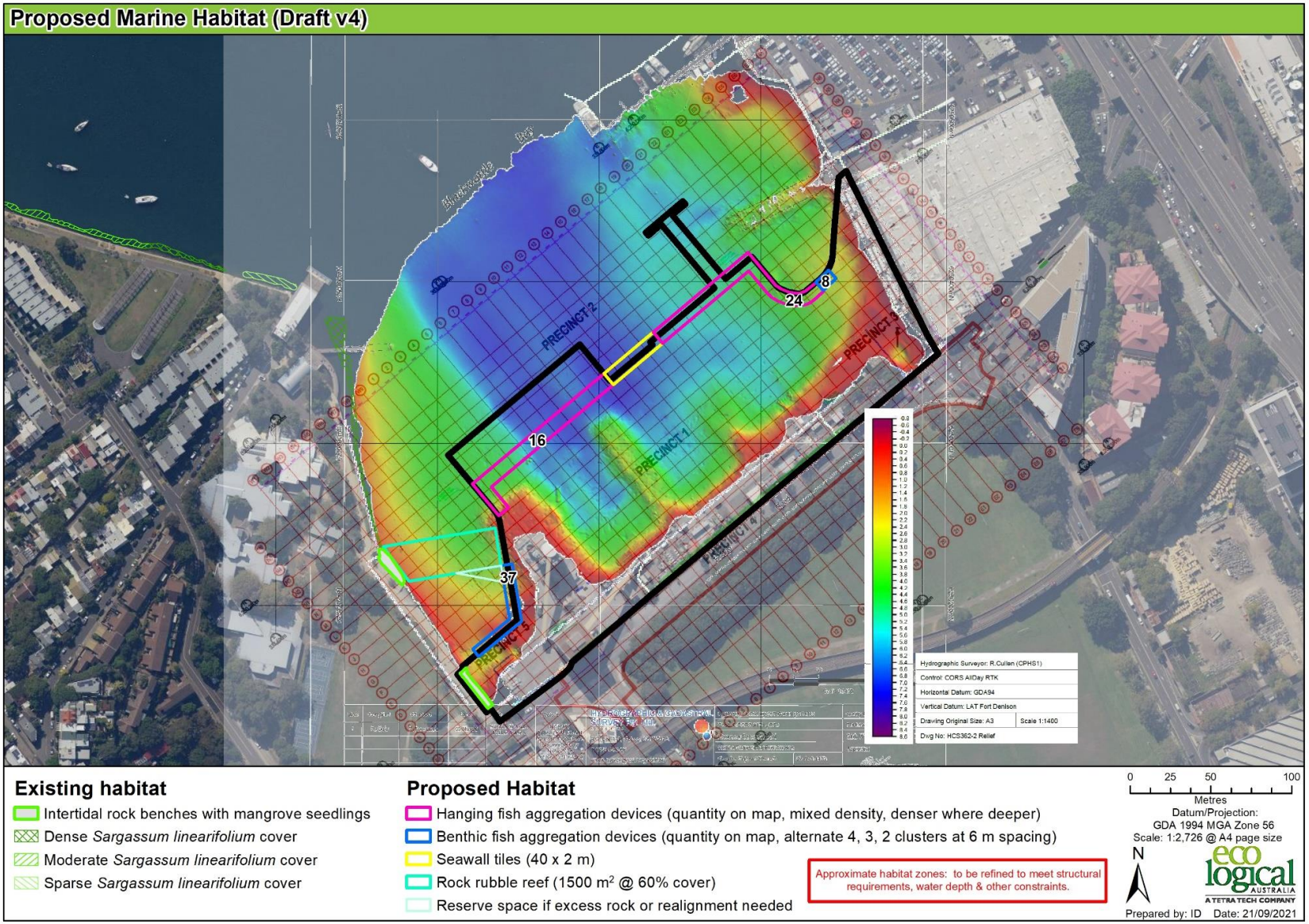


Figure 3 from the ABMP: Draft zones of proposed habitat installation (depth relative to LAT)

© ECO LOGICAL AUSTRALIA PTY LTD

ecological AUSTRALIA







HEAD OFFICE
Suite 2, Level 3
668-672 Old Princes Highway
Sutherland NSW 2232
T 02 8536 8600
F 02 9542 5622

CANBERRA
Level 2
11 London Circuit
Canberra ACT 2601
T 02 6103 0145
F 02 9542 5622

COFFS HARBOUR
35 Orlando Street
Coffs Harbour Jetty NSW 2450
T 02 6651 5484
F 02 6651 6890

PERTH
Suite 1 & 2
49 Ord Street
West Perth WA 6005
T 08 9227 1070
F 02 9542 5622

DARWIN
16/56 Marina Boulevard
Cullen Bay NT 0820
T 08 8989 5601
F 08 8941 1220

SYDNEY
Suite 1, Level 1
101 Sussex Street
Sydney NSW 2000
T 02 8536 8650
F 02 9542 5622

NEWCASTLE
Suites 28 & 29, Level 7
19 Bolton Street
Newcastle NSW 2300
T 02 4910 0125
F 02 9542 5622

ARMIDALE
92 Taylor Street
Armidale NSW 2350
T 02 8081 2685
F 02 9542 5622

WOLLONGONG
Suite 204, Level 2
62 Moore Street
Austinmer NSW 2515
T 02 4201 2200
F 02 9542 5622

BRISBANE
Suite 1, Level 3
471 Adelaide Street
Brisbane QLD 4000
T 07 3503 7192
F 07 3854 0310

HUSKISSON
Unit 1, 51 Owen Street
Huskisson NSW 2540
T 02 4201 2264
F 02 9542 5622

NAROOMA
5/20 Canty Street
Narooma NSW 2546
T 02 4302 1266
F 02 9542 5622

MUDGEE
Unit 1, Level 1
79 Market Street
Mudgee NSW 2850
T 02 4302 1234
F 02 6372 9230

GOSFORD
Suite 5, Baker One
1-5 Baker Street
Gosford NSW 2250
T 02 4302 1221
F 02 9542 5622

1300 646 131
www.ecoaus.com.au

Appendix 17: Microbat Management Plan

The new Sydney Fish Market: Microbat Management Plan

Infrastructure NSW

ecological AUSTRALIA
A TETRA TECH COMPANY

1300 646 131
www.ecoaus.com.au

DOCUMENT TRACKING

Project Name	The new Sydney Fish Market: Microbat Management Plan
Project Number	17WOL-7553
Project Manager	Ian Dixon
Prepared by	Rachel Brown and Alicia Scanlon
Reviewed by	Frank Lemckert
Approved by	Ian Dixon
Status	Final
Version Number	5 – Addendum 1: revised exclusion process 6 – Addendum 2: seawall exclusion process shown as dotted underlining on pages 1, 29, 31, 35, 36, 50 and Appendix C
Last saved on	15 April 2021

This report should be cited as 'Eco Logical Australia 2020. *The new Sydney Fish Market: Microbat Management Plan – Addendum 2, 15 April 2021*. Prepared for Infrastructure NSW.'

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).

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from Infrastructure NSW.

Disclaimer
This document may only be used for the purpose for which it was commissioned and in accordance with the contract between Eco Logical Australia Pty Ltd and Infrastructure NSW. The scope of services was defined in consultation with Infrastructure NSW, by time and budgetary constraints imposed by the client, and the availability of reports and other data on the subject area. Changes to available information, legislation and schedules are made on an ongoing basis and readers should obtain up to date information. Eco Logical Australia Pty Ltd accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report and its supporting material by any third party. Information provided is not intended to be a substitute for site specific assessment or legal advice in relation to any matter. Unauthorised use of this report in any form is prohibited.

Template 2.8.1

Contents

1. Introduction 1

1.1 Proposal background 1
1.2 Objective and aims 3

2. Summary of microbat survey and roost assessment conducted at the subject site 9

2.1 Aims and objectives 9
2.2 Summary of results of targeted surveys 10

2.2.1 Diurnal structure inspection of buildings 10
2.2.2 Ultrasonic surveys 10
2.2.3 Mapping of microbat habitat 11
2.2.4 Emergence survey 12

2.3 Discussion 15
2.4 Investigation of locations for installation of compensatory habitat 16

2.4.1 Installation of alternative compensatory habitat 18

3. Microbat Management Plan 27

3.1 Approach 27
3.2 Timing 27
3.3 Roost exclusion methodology 28

3.3.1 Exclusion process 28
3.3.2 Exclusion devices 32
3.3.3 Inspection and maintenance of exclusion devices 33

3.4 Actions during demolition 34

3.4.1 Site induction 35
3.4.2 Daily Inspection 36
3.4.3 Pre-works inspections by project ecologist 37

3.5 Permanent replacement habitat 39

4. Contingency measures 42

4.1 Adaptive procedures 42
4.2 Capturing and releasing healthy microbats 42
4.3 Injured or dead microbats 43

5. Risks 44

5.1 Exposure to diseases such as Australian Bat Lyssavirus (ABLV) 44

6. Roles and responsibilities 45
7. Reporting and communication 47
8. Monitoring 51

8.1 Monitoring methodology....52
8.2 Performance measures....52
8.3 Monitoring report....53

9. Potentially occurring microbat species photographs **54**
10. References....**55**
Appendix A Exclusion material product specification sheet 56
Appendix B Microbat habitat replacement....57
Appendix C Seawall potential habitat mapping and photographs (March 2021) 59

List of Figures

Figure 1: Location of the Subject site between Blackwattle Bay and the Pyrmont Peninsula 4
Figure 2: The Subject site and location of the new Sydney Fish Markets, showing location and range of potential microbat habitat on site 5
Figure 3: Marine piles and cross beams provide crevices that have the potential to be microbat roosting habitat 6
Figure 4: Degraded timber and concrete expansion joints that have the potential to be microbat roosting habitat at the Subject site. 6
Figure 5: Degraded timber posts and beams have potential to be roosting habitat for microbats 7
Figure 6: Some cement culverts and drains within the Subject site have potential to be microbat roosting habitat where the tide levels leave a gap of 1 m or more between the upper tidal limit and the top of the culvert 7
Figure 7: The derelict building at the northern end of the Subject site showing multiple potential entry / exit points into cavities within the building that could be used as microbat roosting habitat 8
Figure 8: Map showing the locations within 2 km of the Subject site inspected and assessed for their suitability as receptor sites for compensatory roosting habitat in the form of bat boxes 21
Figure 9: Section of the jetty at Pirrama Park, Johnstons Bay providing an example of a potential receptor site for compensatory bat boxes....22
Figure 10: Section of the jetty at Pirrama Park, Johnstons Bay showing the timber elements which could provide a suitable point of attachment for compensatory bat boxes 22
Figure 11: View of the timber pedestrian jetty encircling Pirrama Park, Johnstons Bay that has been identified as a potential location for installation of compensatory bat boxes. 23
Figure 12: Concrete bridge over White's Creek beneath The Crescent / City West Link, Rozelle Bay that has been identified as a suitable receptor location for compensatory bat box installation. 23
Figure 13: *Miniopterus orianae oceanensis* Large Bent-winged Bats (Vulnerable species under the NSW BC Act). Photo taken by Alicia Scanlon. 54
Figure 14: *Myotis macropus* Southern Myotis roost with unfurred pup in centre of photo (Vulnerable species under the NSW BC Act). Photo taken by Alicia Scanlon. 54
Figure 15: Four chamber microbat box constructed from recycled plastic (Cyplas™) and available from Hollow Log Homes (www.hollowloghomes.com) 57
Figure 16: Microbat roost habitat design for use in the walls of solid structures and suitable for a range of cavity roosting and subterranean roosting microbat species....57
Figure 17: Internal cut away view and design features for the microbat roosting habitat 58

Figure 18: Design specifications for the microbat roosting habitat.....58

List of Tables

Table 1: Results of acoustic microbat surveys at the Subject site (ELA 2020) 11
Table 2: Ecology and life history characteristics of six threatened microbat species known to occur or with the potential to roost within the subject site and likelihood of impacts.....13
Table 3: Results of a diurnal land and water-based survey of five potential sites for installation of compensatory habitat within 2 km of the Subject site (see Figure 8 for locations) 24
Table 4: Action log summary table to be included in the final report for exclusion over 5 days (scalable for exclusions over 3 days).....47

Abbreviations

Abbreviation	Description
ABLV	Australian Bat Lyssavirus
BC Act	*Biodiversity Conservation Act 2016*
EES	Environment, Energy and Science division of the Department of Planning, Industry and Environment
ELA	Eco Logical Australia Pty Ltd
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
MMP	Microbat Management Plan

1. Introduction

This Microbat Management Plan (MMP) has been updated since its lodgement with the development application for the new Sydney Fish Market (MMP – Version 2 dated 6 May 2020). The current version has been prepared to include an addendum to summarise exclusion activity to date and present revisions to the recommended actions required during demolition and construction.

The reason for this addendum MMP is that during the tender process for the wharf demolition works, which commenced after the exclusion process had begun, the actions required during demolition were identified as being unsafe to perform. Once the demolition process has commenced and the wharf structures are fractured by machinery, all areas of the wharf are unsafe for personnel. Therefore, previous recommendations of replacing the exclusion curtain nightly across the active demolition face, and monitoring bat activity are not possible. This addendum MMP identifies that those actions previously committed by Infrastructure NSW cannot be undertaken. Once the demolition contractor takes control of the site, inspection and monitoring of any remaining bats beneath the wharf will not occur. During physical destruction of the site, the exclusion curtain will be severed and not repaired, potentially allowing bats to enter beneath the wharf undetected. To minimise the risk of microbats being harmed during demolition, the original exclusion processes was extended from the end of May to mid-August 2020. As of 31 July, no bat activity had been recorded beneath the wharf since 22 July.

In addition, actions to secure a second site for box installation were ongoing at the initiation of the MMP and additional detail has been provided in Section 2.4.

Key amendments are marked in this version as either underlined (additional wording) or struck through (removed from the MMP). Unless stated otherwise, the remainder of the relevant MMP sections remain the same as version 2. Once endorsed by Environment, Energy and Science Group (EES) of the Department of Planning Industry and Energy, this addendum MMP (version 5) will supersede actions outlined in Section 3.4 of the MMP (version 2) and constitute the MMP required as a sub-environmental management plan (sub-plan) of the Construction Environmental Management Plans (CEMPs) under the development consents for State significant developments SSD 8924 and SSD 8925.

Following demolition of the wharf, the exposed seawall was visually inspected in March 2021 for potential microbat roosting habitat. That survey found numerous openings and cavities inside the seawall where microbats could enter and potentially roost. A second addendum to the MMP (version 6) has been prepared to include exclusion activities required to prevent microbats from inhabiting the seawall prior to its demolition and/or repair. Key amendments to this second MMP revision are marked with dashed underlining.

1.1 Proposal background

Eco Logical Australia (ELA) have been engaged by Infrastructure NSW to prepare a Microbat Management Plan (MMP) for the construction of a new Sydney Fish Market at Blackwattle Bay (the subject site).

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

© ECO LOGICAL AUSTRALIA PTY LTD

The subject site comprises of a range of marine piles, wharves and jetties constructed from a mixture of materials including timber, concrete and steel. As such, the subject site includes structures both above and below the mean high-water mark. There are also several disused buildings located on the structure that are in variable condition, with some derelict and inaccessible and others relatively uncompromised. Drainage networks are present under the wharf and a culvert is located underneath the wharf at the western end of the subject site. Overall, the subject site covers an area of approximately 36,800 m² (Figure 1).

Infrastructure NSW are proposing to demolish all existing land and water-based structures on the subject site. The demolition works will include the removal of marine piles, wharves and jetties. Repairs to the existing sea wall will also be undertaken. This can include a revetment or partial demolition of the seawall which would remove all potential microbat habitat. Works include the relocation of all services and the construction of a new Sydney Fish Market including multiple land and water-based structures.

A range of targeted microbat surveys were carried out at the subject site by ELA between February and April 2020, following a requirement by EES to assess the wharves and old buildings as potential habitat at the site and for possible impacts (as 'prescribed impacts' under the Biodiversity Assessment Methodology, OEH 2017. These surveys included two separate ultrasonic detector surveys, diurnal visual inspection of the structures above and below the wharf structures, a nocturnal emergence survey of the structures from the water combined with ultrasonic recording and thermal imaging cameras, and searches for alternative microbat roosting habitat within a 2 km radius of the subject site.

The results of these surveys indicated that there is potential microbat roosting habitat present on site both within a derelict building and beneath the wharf structures (Figure 2– Figure 7). A small colony of *Myotis macropus* (Southern Myotis) and individuals or small numbers of *Miniopterus orianae oceanensis* (Large Bent-winged Bats) are likely to be roosting within the wharf structures, although the exact location of any roosts could not be determined due to the challenging access and complexity of the wharf structure. Access to the potential microbat roosting sites beneath the wharf structures is by boat and is restricted by the depth of water and the large number of densely positioned piles and cabling, pipes, cross supports and other structures.

This MMP sets out the measures required to manage risks to microbats prior to, during and post construction works. The proposed demolition and construction works have the potential to impact microbats in the following ways:

- Death / injury of individual bats during works – roosting bats can be easily overlooked during daylight when they are in torpor and will often remain in a roost when threatened during daylight hours rather than risk predation by leaving roosts during daylight.
- Loss of roosting habitat – a reduction in the amount of suitable roosting habitat locally available, may lead to increased competition or an overcrowding of remaining roosting resources.
- Disruption of reproductive behaviour – microbats may be susceptible to reduced breeding success if they are unable to locate a suitable alternative breeding roost.
- Disturbance during works – excessive noise (especially high pitched), dust and vibrations above the general background levels may cause bats to arouse more often during daylight hours. Microbats are nocturnal and any activity when they would normally be resting has potential to reduce energy reserves and ultimately lead to starvation and possibly eventually death.

1.2 Objective and aims

The overarching objective of this MMP is to minimise impacts to threatened microbat populations as a result of the proposed demolition of land and water-based structures within the subject site and the subsequent construction of a new Sydney Fish Market. To achieve this the MMP:

- Identifies threatened microbat species listed under the NSW *Biodiversity Conservation Act 2016* (BC Act) or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), known or likely to occur on site and listed in the BDAR prepared by ELA that may be potentially impacted by works.
- Reduces the potential for death or injury to microbat species as a result of the proposed works by excluding microbats from the subject site prior to works, and planning exclusion works for the least sensitive time of year for the species present or likely to be present.
- Provides details of microbat exclusion procedures and other management measures required to minimise any potential impacts to microbats for the duration of the works.
- Provides advice and design specifications for the installation of alternative microbat roosting habitat and the replacement of microbat roosting habitat within the new Sydney Fish Market or as close as possible to the subject site within Blackwattle Bay.
- Identifies the risks to construction personnel working in close proximity to microbat roosts.
- Outlines procedures for mitigating risks to construction personnel and provides agreed procedures for managing unexpected microbat finds during proposed works.
- Identifies monitoring and reporting requirements and/or responsibilities with respect to the actions outlined in this MMP.

© ECO LOGICAL AUSTRALIA PTY LTD

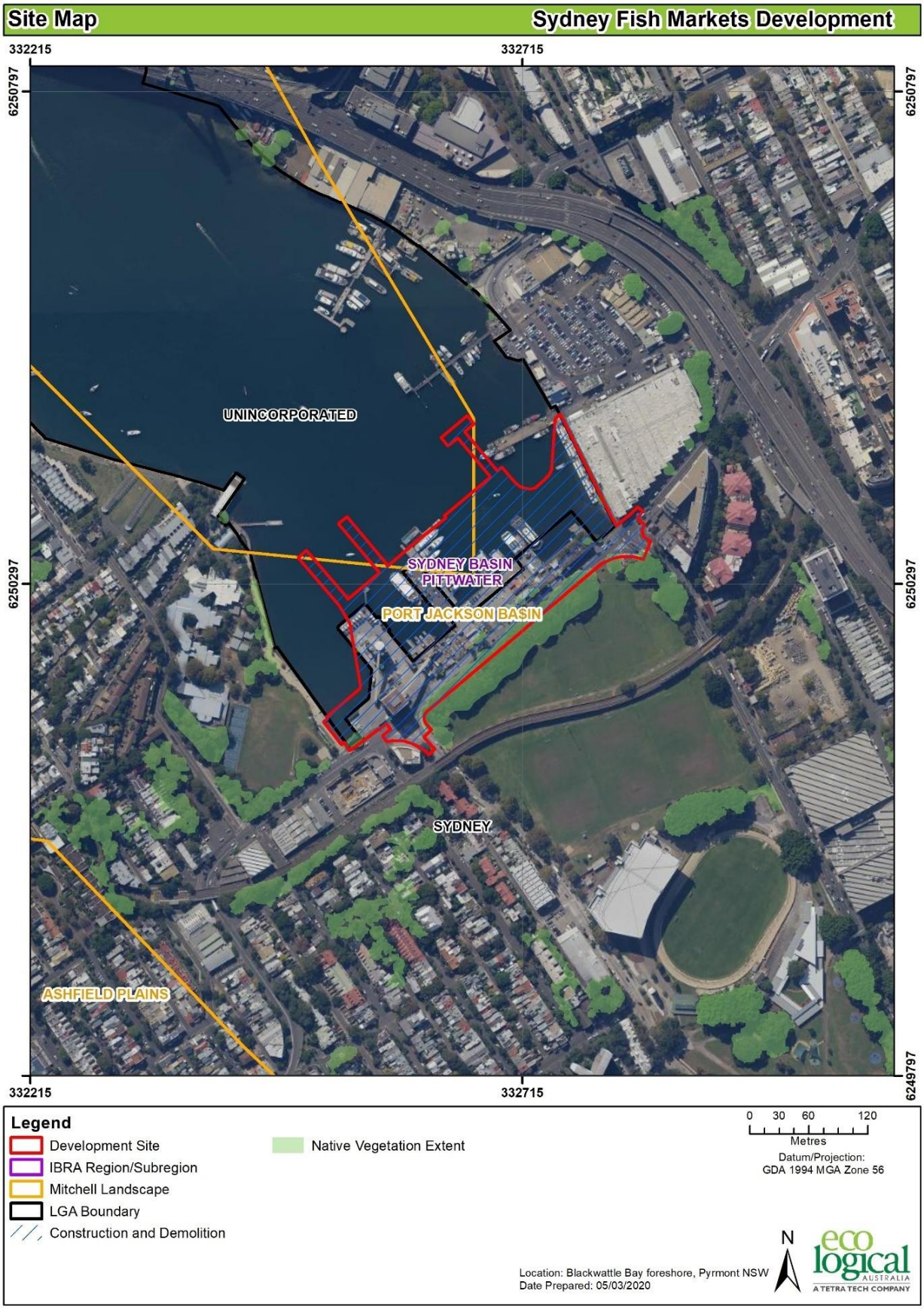


Figure 1: Location of the Subject site between Blackwattle Bay and the Pyrmont Peninsula



Figure 2: The Subject site and location of the new Sydney Fish Markets, showing location and range of potential microbat habitat on site

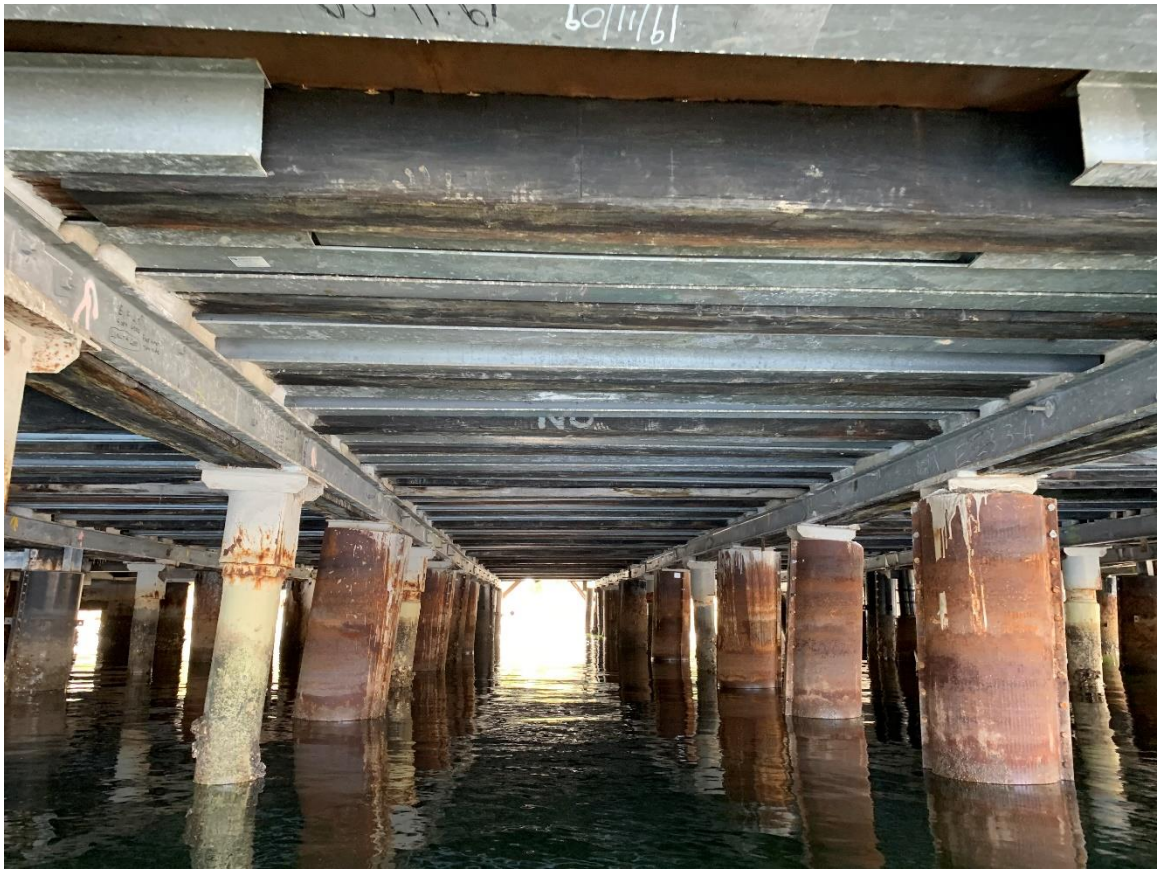


Figure 3: Marine piles and cross beams provide crevices that have the potential to be microbat roosting habitat



Figure 4: Degraded timber and concrete expansion joints that have the potential to be microbat roosting habitat at the Subject site.



Figure 5: Degraded timber posts and beams have potential to be roosting habitat for microbats



Figure 6: Some cement culverts and drains within the Subject site have potential to be microbat roosting habitat where the tide levels leave a gap of 1 m or more between the upper tidal limit and the top of the culvert



Figure 7: The derelict building at the northern end of the Subject site showing multiple potential entry / exit points into cavities within the building that could be used as microbat roosting habitat

2. Summary of microbat survey and roost assessment conducted at the subject site

2.1 Aims and objectives

During early 2020, ELA undertook several targeted surveys of the subject site in order to assess the potential for it to contain microbat roosting or breeding habitat as part of the assessment for the BDAR and to inform the preparation of this MMP. Due to the absence of Plant Community Types (PCTs) within the development site, no ecosystem credit or species credit species were predicted to occur. To determine the Likelihood of Occurrence of threatened species, a 10 km search of BioNet records of threatened species under the BC Act, and 10 km Protected Matters search for threatened species under the EPBC Act, was conducted.

These data base searches, and the advice provided by EES produced a list of six potentially affected microbat species:

- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat)
- *Miniopterus australis* (Little Bent-winged Bat)
- *Miniopterus orianae oceanensis* (Large Bent-winged Bat)
- *Myotis macropus* (Southern Myotis)
- *Scoteanax rueppellii* (Greater Broad-nosed Bat).

Southern Myotis is listed as a species credit species with breeding habitat (i.e. wharf, culverts and buildings) and foraging habitat (waterbodies) considered present within the development site. The two Bent-winged Bats are dual species, however, suitable breeding habitat (i.e. caves) are not present in the development site. The remaining species are listed as ecosystem species and do not require targeted surveys consistent with BAM. However, targeted surveys for all microbats and microbat roosting habitat were conducted under the wharf structures and at one of the buildings and assessed as part of assessment of Prescribed Impacts.

Targeted microbat surveys were undertaken in accordance with the '*Species credit' threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Methodology* (OEH 2018).

Targeted microbat surveys at the subject site included:

- diurnal external structure inspection of the buildings on 14 February 2020 for a total of 2 person hours
- 55 nights of acoustic recording across the site in two separate survey periods, between 17 and 20 February and between 27 and 30 March 2020
- diurnal external structure inspection by boat beneath the wharves on 27 March 2020 which categorised the microbat habitat present beneath the structure into high, medium and low value and searched for evidence of microbats or their roosts for a total of 8 person hours (Figure 2)
- diurnal inspection from the land (24 April 2020) and water (31 March 2020) of surrounding structures and potential microbat habitat (wharves, jetties, piles, culverts, bridges) within 2 km of the subject site for a total effort of 4 person hours

- emergence survey of the southern wharf at dusk from the water using three acoustic detectors and three thermal imaging cameras conducted by three ecologists on 8 April 2020 for a total survey effort of 4.5 person hours.

The aim of the targeted microbat surveys was to determine whether microbats are present within the subject site, determine which microbat species are present, and if they are likely to be roosting within the structures and buildings present within the subject site.

2.2 Summary of results of targeted surveys

2.2.1 Diurnal structure inspection of buildings

Visual surveys of the external surfaces of the buildings were conducted from the wharf to determine if the wharf or buildings within the development site contain potential openings into sheltered crevices that could be utilised by microbats as roosting habitat. The building structure at the northern end of the wharf is a derelict brick building that has been mostly boarded up but still has several obvious small entrances that could be used by microbats as roosting habitat. This survey found that potential microbat roosting and foraging habitat exists at the development site in the form of numerous gaps, cracks and crevices within the structure of the wharf and within one of the buildings on site.

2.2.2 Ultrasonic surveys

Analysis of the ultrasonic call profiles indicated that at least seven (7) and up to thirteen (13) different species of microbat were recorded ultrasonically at the Subject site (ELA 2020). This included up to four threatened species listed as vulnerable under the BC Act, *Miniopterus orianae oceanensis* (Large Bent-winged Bat), *Myotis macropus* (Southern Myotis), *Saccolaimus flaviventris* (Yellow-bellied Sheath-tailed Bat) and *Vespadelus troughtoni* (Eastern Cave Bat).

Based on the call profiles, *Miniopterus orianae oceanensis* (Large Bent-winged Bat) and *Myotis macropus* (Southern Myotis) both listed as Vulnerable under the BC Act were deemed to definitely be present within the study area. *Vespadelus troughtoni* (Eastern Cave Bat) and *Saccolaimus flaviventris* (Yellow-bellied Sheath-tailed Bat), which are also listed as Vulnerable under the BC Act, are potentially present within the study area. Three other non -threatened microbat species were also deemed to be definitely present within the study area and may also roost in the structures present on site; *Chalinolobus gouldii* (Gould's Wattled Bat), *Chalinolobus morio* (Chocolate Wattled Bat) and *Ozimops ridei* (Ride's Free-tailed Bat).

The calls of *Vespadelus troughtoni* (Eastern Cave Bat) overlap with those of other more common and non-threatened *Vespadelus* species known to occur in the Sydney Basin and could not be separated based upon the single call recorded at the south western end of the subject site. This species is known to roost in caves and mines and cliff lines. The development site does not support potential roosting or breeding habitat for this species.

The calls of *Saccolaimus flaviventris* (Yellow-bellied Sheath-tailed Bat) overlap with those of the more common and non-threatened *Austronomus australis* (White-striped Free-tailed Bat) and could not be separated based on the recorded call characteristics.

Southern Myotis is known to roost/breed and forage over water. Due to the time calls from Southern Myotis were recorded (prior to sunset and within 1 hour of sunset and sunrise), it is assumed that this species is roosting within the wharf structure. There is potential that the wharf may also provide

maternity roosting habitat. There were approximately 24 Southern Myotis calls per night recorded during the February 2020 surveys. It should be noted that the calls were recorded in relatively low frequency suggesting only small numbers of Southern Myotis are present. From comparison with long term monitoring data gathered by ELA at a range of known Southern Myotis roosts varying in size from 10 to over 200 bats, it is estimated that between 10 and 30 bats are currently roosting at the development site.

There were a small number (<10) of Large-Bent-winged Bat calls recorded in the ultrasonic data between 27 and 30 March. Calls from Large Bent-winged Bats were recorded both outside the building and beneath the wharf. The timing of one of those calls recorded beneath the wharf coincides with the return to roost period in the 2 hours before sunrise. It is therefore possible that an individual or small number of Large Bent-winged Bats (<10) may use the building and wharf as roosting habitat over winter or throughout the year as non-breeding roosting habitat.

The results of the ultrasonic survey are presented in Table 1. Species for which call profiles were definitive are labelled as definitely present (D) and those where there was some level of uncertainty are labelled as potentially present (P). Table 2 describes the ecology and habitat preferences for all six threatened species which have the potential to occur within the subject site, as well as an assessment of whether each of those species would potentially be affected by the proposed works.

Table 1: Results of acoustic microbat surveys at the Subject site (ELA 2020)

Scientific Name	Common Name	Presence
Austronomus australis	White-striped Free-tailed Bat	P
Chalinolobus gouldii	Gould's Wattled Bat	D
Chalinolobus morio	Chocolate Wattled Bat	D
*Miniopterus orianae oceanensis**	Large Bent-winged Bat	D
*Myotis macropus**	Southern Myotis	D
Nyctophilus geoffroyi	Lesser Long-eared Bat	P
Nyctophilus gouldii	Gould's Long-eared Bat	P
Ozimops ridei	Ride's Free-tailed Bat	D
Rhinolophus megaphyllus	Eastern Horseshoe Bat	P
*Saccolaimus flaviventris**	Yellow-bellied Sheath-tailed Bat	P
Vespadelus pumilus	Eastern Forest Bat	P
*Vespadelus troughtoni**	Eastern Cave Bat	P
Vespadelus vulturnus	Little Forest Bat	P

D = definitely present, P = potentially present (ultrasonic call profile overlaps with other species), *listed as Vulnerable under the BC Act.

2.2.3 Mapping of microbat habitat

On 27 March 2020 an inspection of the wharf structures conducted via boat mapped the microbat habitat across the site (Figure 2). This survey identified that the high conservation value microbat roosting habitat is primarily located within the western section of the site, beneath the largest wharf

currently occupied by Hanson. This wharf is approximately 100 m long and 50 m wide. It is constructed of concrete, timber and steel elements reflecting the history or additions and repairs made to the wharf over time. As a result, there are numerous cracks, gaps and crevices created by joins between materials and sections constructed at different times that provides roosting habitat for microbats. In addition, some of the timber elements are degraded and have split, contain fissures or hollowed cores. Some of the concrete elements have also started to delaminate, are peeling, cracked and have broken edges creating more potential microbat roosting habitat.

In contrast the remainder of the wharf structure to the north of the largest jetty is constructed largely of concrete with minimal joints and is generally of low value as microbat roosting habitat. Although there are several jetties projecting into Blackwattle Bay from this section, one of which is also approximately 100 m long and 20 m wide, potential microbat roosting locations are much fewer and less well developed.

2.2.4 Emergence survey

The emergence survey conducted on 8 April 2020 by three ecologists from the water targeted the largest wharf and associated drainage features that were identified in the mapping exercise as being of high conservation value as roosting habitat. Visual observations combined with ultrasonic recording and thermal imaging surveys were undertaken from outside a large culvert and along the edges of the wharf during a 1.5 hour period at dusk. A single microbat was observed flying from beneath the wharf at a time when the ultrasonic detector recorded the calls of Southern Myotis. These results further support the assumption that Southern Myotis are roosting beneath the wharf.

Table 2: Ecology and life history characteristics of six threatened microbat species known to occur or with the potential to roost within the subject site and likelihood of impacts.

Scientific Name	Common Name	BC Act	Distribution	Habitat requirements	Definitely present / Potentially present	Roost preference	Affected species assessment
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	Eastern NSW, from SE Qld to Tasmania	Most often recorded in tall and wet forests with tall trees greater than 20m in height (Churchill 2008; Law et al. 2008). Females are pregnant in late spring to early summer (Churchill 2008; Law et al. 2008).	Potential	Hollow / Subterranean and buildings on occasion	Not an affected species. Not recorded ultrasonically. The buildings on site do not provide significant roosting or breeding habitat for this species.
Miniopterus australis	Little Bent-winged Bat			Prefers well-timbered areas including rainforest, wet and dry sclerophyll forests, Melaleuca swamps and coastal forests (Churchill 2008).	Potential	Subterranean / Hollow on occasion	Not an affected species. Not recorded ultrasonically during surveys for this report. May forage over the site and use land and water-based structures for roosting occasionally.
Miniopterus orianae oceanensis	Large Bent-winged Bat	V	In NSW it occurs predominately east of the Great Dividing Range.	Rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, paperbark forests and open grassland.	Definitely	Subterranean	Affected species. Definitely recorded ultrasonically during surveys for this report and likely to roost and forage within the study area. May use land and water-based structures for roosting.

Scientific Name	Common Name	BC Act	Distribution	Habitat requirements	Definitely present / Potentially present	Roost preference	Affected species assessment
Myotis macropus	Southern Myotis	V	In NSW, found in the coastal band. It is rarely found more than 100 km inland, except along major rivers.	Foraging habitat is waterbodies (including streams, or lakes or reservoirs) and fringing areas of vegetation up to 20m.	Definitely	Subterranean / Hollow	Affected species. Definitely recorded ultrasonically during surveys for this report and assumed to roost, forage and potentially breed within the land and water-based structures of the subject site.
Saccolaimus flaviventris	Yellow-bellied Sheath-tailed Bat	V	Wide-ranging distribution across Australia. A summer migrant to southern states, including NSW from January - April.	Almost all habitat types.	Potential	Hollow	Not an affected species. Potentially recorded ultrasonically during surveys for this report and likely to forage over the study area. May roost in tree hollows near the subject site.
Scoteanax rueppellii	Greater Broad-nosed Bat	V	In NSW found along the east coast spreading further inland to the Northern Tablelands.	Associated with moist gullies in mature coastal forest, or rainforest, east of the Great Dividing Range (Churchill 2008), tending to be more frequently located in more productive forests (Hoye & Richards 2008).	Potential	Hollow / buildings	Not an affected species. Not recorded ultrasonically. The buildings on site do not provide significant roosting or breeding habitat for this species.

2.3 Discussion

The results of the targeted microbat survey and impact assessment undertaken by ELA (2020) at the subject site indicate that:

- The site contains multiple potential microbat roost locations within the wharf structures and within the derelict building that could be used throughout the year by a range of microbat species (Figure 2)
- The exact location of any microbat roosts have not been able to be identified at the subject site
- Access to the underside of the wharf structure is by boat and is limited by shallow water and the close proximity of supporting piles. This, combined with the sheer number of potential microbat roosting locations prevents a complete visual assessment of all potential microbat roosting habitat at the subject site
- The derelict building and wharf structures on site represent microbat roosting habitat (Figure 2 – Figure 7) for at least two threatened subterranean roosting microbat species recorded on site during surveys:
    - Large Bent-winged Bat
    - Southern Myotis.
- It is estimated that between 10 and 30 Southern Myotis roost at the subject site with the most likely location assumed to be towards the landward end of the largest wharf at the western end of the site
- The wharf structures and to a lesser extent the derelict building at the subject site also represent potential breeding habitat for Southern Myotis which is known to occur on site and commonly roosts and breeds in similar structures.
- It is estimated that less than 10 Large-Bent-winged Bats may use the site as a non-breeding roost throughout the year or as winter roosting habitat
- From the number of potential roosting spaces available at the site, it is estimated that a colony of approximately 150 Southern Myotis could be accommodated, assuming that the colony would utilise several different roosting locations within the wharf structures (but primarily within the largest wharf at the western end of the site).
- Several other threatened microbat species have the potential to roost in the building or wharf structures on site but were not recorded during surveys and are unlikely to be impacted by proposed works:
    - Eastern Coastal Free-tailed Bat
    - Eastern False Pipistrelle
    - Greater Broad-nosed Bat
    - Little Bent-winged Bat.
- There were several non-threatened microbat species recorded on site that also have the potential to roost within the derelict building or wharf structures:
    - Chocolate Wattled Bat
    - Gould's Wattled Bat
    - Ride's Free-tailed Bat

Large Bent-winged Bats are subterranean roosting species known to occur within the subject site. Large Bent-winged Bats congregate in large numbers at a few known and often shared maternity caves over spring and summer to breed and raise young and disperse to winter hibernation roosts in autumn

(Churchill, 2008). Large Bent-winged Bat winter hibernation roosts can be up to 300 km away from maternity roosts. A known Large Bent-winged Bat winter roost is found in Summer Hill, 5km from the subject site.

Large Bent-winged Bats were confirmed as occurring at the subject site and one call was recorded within the 2 hours preceding sunrise indicating that an individual or small number (<10) of this species could be roosting on site but there was no roosting location confirmed (ELA 2020). This species is likely to forage over the subject site and individuals or small numbers of bats may roost within either the land or water-based structures on site. The concrete structures, building and culvert do represent potential roosting habitat for Large Bent-winged Bats. These features are unlikely to constitute significant breeding habitat because of the limited capacity to accommodate the large numbers of Bent-winged Bats required to generate enough heat in the maternity roosts for the development of young.

Southern Myotis roost in subterranean habitats such as bridges, stormwater culverts, tunnels, bunkers, mines and drains. This species has a strong association with permanent waterways and consistently roost in close proximity to water (Churchill, 2008; Campbell, 2009). This species forages exclusively over water, trawling the surface for small insects and aquatic species such as fish and crustaceans (Barclay & Harder 2003).

Southern Myotis were confirmed as occurring at the subject site and from the timing of the recorded calls and observations made during emergence surveys, this species is known to be roosting beneath the wharf but the exact location of the roost was unable to be confirmed (ELA 2020). This species is known to forage over the waters of Sydney Harbour, with a maternity roost and the nearest foraging 'hot spot' located in the western harbour approximately 4 km from the subject site (Gonsalves and Law 2017).

Gonsalves and Law (2017) found that the waters of the southern bays of the western harbour precinct (Rozelle Bay, Blackwattle Bay and Pirrama Park and surrounding Goat Island) recorded much lower Southern Myotis activity and foraging levels than those recorded at the nearby maternity roost. Activity levels of Southern Myotis in the studies completed for this assessment in Blackwattle Bay were in the order of 24 calls per night which is significantly higher than activity levels recorded in Blackwattle Bay by Gonsalves and Law (0 – 1.2 calls per night) during their study conducted in 2015. Activity levels at the known maternity roost (containing approximately 50 Southern Myotis) as reported by Gonsalves and Law (2017) were in the order of 234 – 312 calls per night.

Given the cessation of marine activities and some of the land-based industries at the subject site over the past couple of years, it is possible Southern Myotis activity at the site has increased in response to the decreased disturbance levels. As the population size of the Southern Myotis maternity roost 4 km from the site increases, the likelihood of splinter roosts associated with the maternity colony being created within nightly foraging range (4 – 12 km) also increases where suitable roosting and foraging habitat is present. The concrete structures, culverts and timber marine piles at the subject site do represent potential roosting and maternity habitat for Southern Myotis.

2.4 Investigation of locations for installation of compensatory habitat

Prior to enacting an exclusion, alternative roosting habitat for microbats that will be displaced by the exclusion must be installed or located. It is important to note that many species of microbat change roosts regularly and depend upon a series of roosts within nightly foraging range for their survival. It is

assumed that all species of microbat will have knowledge of at least one other alternative roost site within nightly foraging range of the known roost location.

Recent studies have shown that Southern Myotis roosts in particular can be permanently inhabited with little or no movement away from the maternity roost throughout the year (Gonsalves and Law 2017, Gorecki 2019, in prep). Some Southern Myotis roosts can also be historically inhabited over many generations and in such cases, individuals can be very reluctant to roost elsewhere (Alicia Scanlon, pers comm.).

Compensatory habitat for Southern Myotis often takes the form of bat boxes installed beneath suitable structures. It is critical to carefully consider the location for installation of bat boxes in order for them to provide suitable alternative habitat for the target species. Important considerations relating to the selection of a suitable location for installation include:

- insulation from rain, wind, light and extremes of temperature
- directly over water (a requirement specifically for Southern Myotis roosting habitat)
- free from human disturbance
- provide some protection from predators
- the ability to view the interior of the bat box to allow for ease of monitoring, and
- tenure of the structure to which the bat boxes will be attached.

During April 2020, ELA inspected five sites located within 2 km of the Subject site to determine their suitability for the installation of compensatory bat boxes (Table 3 and Figure 8). A range of features of each site were inspected and recorded to provide an assessment of how suitable they would likely be as locations for compensatory bat roosting boxes. Two potential locations were identified with the closest most suitable locations determined to be:

- a timber wharf extending around Pirrama Park at Johnston's Bay (Figure 9 – Figure 11)
- a concrete bridge over White's Creek under The Crescent / City West Link at the head of Rozelle Bay (Figure 12).

Both of these locations are approximately 1.5 km from the Subject site and no suitable locations were found any closer to the Subject site.

The wharf at Johnston's Bay provides protection from the weather and predators, is relatively free from human disturbance, is directly over water, and has multiple suitable locations for the installation of bat boxes (Figure 9 – Figure 11). The site encircles Pirrama Park and has options for placing boxes on a northerly, easterly and westerly outlook. Light levels in the afternoon need to be examined before boxes are installed at this location.

The timber wharf near the pontoon area of Pirrama Park has wooden beams approximately 1-2 meters above the mean high-water mark providing enough space for boxes to be installed and allowing enough free air space for bats to drop out and fly before contacting the water (Figure 10). Brackets for the boxes could be drilled into the timber beams. In addition, underneath the pedestrian area on the landward side of some remnant wooden piers, the wooden beams and metal joins underneath the wharf provide another potential location for the installation of bat boxes. There are also sections of steel beam which have a gap between each beam large enough to accommodate bat boxes. Installation and inspection of bat boxes would need to be conducted by boat.

The concrete bridge over White's Creek under The Crescent / City West Link at the head of Rozelle Bay provides good protection from the weather and predators, is relatively free from human disturbance, is directly over water, and has multiple suitable locations for the installation of bat boxes (Figure 12). Installation and inspection of bat boxes would need to be conducted by boat.

2.4.1 Installation of alternative compensatory habitat

Alternative compensatory habitat should be installed at either or both of the suitable identified locations within 2 km of the subject site least one week, but preferably one month prior to any exclusion or construction activities commencing at the subject site. However, this timing could not be met due to challenges with securing permission at suitable sites and to meet the initial exclusion schedule by the end of May 2020 (see timing of box installation in Table 3). Roost selection by microbats is poorly understood in Australia and there is evidence to suggest that a range of factors including very subtle microclimatic variables influence the selection process. For this reason, there is no guarantee that a bat box will be inhabited by microbats displaced from existing roosts despite careful selection of an alternative location for bat box placement. It is therefore recommended that several alternative roosting options be provided.

A ratio of 1 loss of habitat to 4 alternative compensatory bat boxes placed at more than one location is recommended in this situation. Based upon the estimated number of between 10 and 30 Southern Myotis roosting within the subject site and the large number of potential roosting locations present, four x four-chamber microbat roosting boxes (estimated capacity of 30-50 microbats each) should be installed in at least two separate locations within 2 km of the existing roosts prior to the commencement of exclusion process. This will provide a range of roosting options similar to that available within the subject site but allow microbats to select the most suitable alternative roosting locations for their needs and will also allow for movement of the colony between bat boxes / locations. Provision of bat boxes in close proximity to the existing roosts ensures that any bats attempting to return to the existing structures later in the morning following the nocturnal exclusion are not caught short and have a safe location in which to roost during the day light hours.

Appendix B provides detail of four chambered microbat roosting boxes available from Hollow Log Homes (Figure 15). It is preferable for any bat boxes to be installed on brackets so that they can be temporarily moved when maintenance or repairs to the host structure are required and to allow for future management of the roosting habitat.

All bat boxes installed must have a unique identifier and the following data recorded for future monitoring and reporting:

- Date installed
- Unique ID number or code
- Easting and northing
- Name of drainage line, or closest drainage line
- Box type
- Aspect
- Box height above ground
- Distance to water
- Structure type

- Structure size
- Structure composition (concrete / timber).

It will be important to monitor the compensatory habitat to determine whether the bat boxes have been successful and are being utilised by microbats on an ongoing basis for a range of life cycle functions. Details of the required monitoring are provided in Section 8.

Addendum 1

White's Creek / The Crescent was ruled out as a potential bat box receptor site in discussions with Transport for NSW because of future redevelopment plans for this location.

During May 2020, the search for a second suitable location for installation of bat boxes was expanded to include the neighbouring bays of Balmain, Leichardt, Iron Cove and Dobroyd Point as well as some Sydney Harbour islands. Table 3 below has been updated to include all locations that have been considered as potential bat box receptor sites.

The Glebe Rowing Club footbridge and Sydney University Canoe Club boatshed, plus the entire foreshore of Blackwattle Bay, Rozelle Bay, Jones Bay, Johnstons Bay and Whites Bay were rapidly assessed via boat prior to the more detailed foot inspection outlined in the MMP. Most wharves in this area are concrete commercial wharves with regular boat activity that would limit routine inspections and provide high levels of disturbance during the day.

Timber structures are preferred over narrow concrete wharves. Tide height was considered, with the aim to find structures with enough clearance below any boxes for a clear and unobstructed flight path. Public access and vandalism was considered, with sites accessible to people walking the intertidal area ruled out.

Excessive light and exposure to the elements was considered, ruling out many narrow jetties and boardwalks. The Sydney University Canoe Club boatshed and Glebe Rowing Club footbridge queried by The City of Sydney were excluded because the footbridge is exposed to high light levels, is too narrow and publicly accessible at low tide. Sites beneath the boatshed are limited by low clearance between the mean high water mark and any installed boxes, being at the limit of what is considered safe for bats but was pursued as a potential receptor site because of proximity to the existing roosts.

The resultant searches and enquiries seeking approval to install boxes progressed at four locations, Goat Island (NPWS), Sydney University Canoe Club (Sydney University), Poulos Bros Seafoods building (Poulos Bros Seafoods) and Mort Bay Park (Inner West City Council). Goat Island was removed from the list of potential locations because termite treatment was occurring in the vicinity of the potential receptor site. Chemicals used as part of the termite treatment process are poisonous to microbats. Both Poulos Bros Seafoods and Sydney University Canoe Club were approached for permission to install bat boxes. Both entities declined permission. Mort Bay Reserve was approved as a receptor site for bat box install, with three hardwood boxes installed on 16 June 2020.

During the licence application process, EES suggested that a number of the bat boxes installed could be constructed from hardwood (not only plywood and Cyplas) to ensure longevity when exposed to the maritime climate. Although there is evidence that Southern Myotis use the Cyplas boxes, long term usage has not been documented because this material is new to the market. The lifespan of a Cyplas box is estimated to be at least 30 years and potentially much more than that, providing obvious benefits

over plywood and hardwood timber boxes in the longer term. The lifespan of a timber box is very dependent upon prevailing weather conditions. Boxes for Myotis placed under bridges and in culverts can last longer than those placed in trees because they are better protected from the elements. Boxes constructed from a range of materials will be installed.



Figure 8: Map showing the locations within 2 km of the Subject site inspected and assessed for their suitability as receptor sites for compensatory roosting habitat in the form of bat boxes



Figure 9: Section of the jetty at Pirrama Park, Johnstons Bay providing an example of a potential receptor site for compensatory bat boxes.



Figure 10: Section of the jetty at Pirrama Park, Johnstons Bay showing the timber elements which could provide a suitable point of attachment for compensatory bat boxes



Figure 11: View of the timber pedestrian jetty encircling Pirrama Park, Johnstons Bay that has been identified as a potential location for installation of compensatory bat boxes.



Figure 12: Concrete bridge over White's Creek beneath The Crescent / City West Link, Rozelle Bay that has been identified as a suitable receptor location for compensatory bat box installation.

Table 3: Results of a diurnal land and water-based survey of five potential sites for installation of compensatory habitat within 2 km of the Subject site (see Figure 8 for locations)

Location	Summary of habitat available at site	Suitable/Unsuitable
Pirrama Park – Johnstons Bay	Timber and concrete wharf and jetty structure. Multiple potential receptor locations. The timber wharf near the pontoon area has some wooden beams approx. 1-2m above the water. Boxes could be drilled into the wood here. Underneath the pedestrian area on landward side of remnant wooden piers there are some wooden beams and metal joins underneath the wharf the whole way along which may be appropriate to install boxes. Sections of steel beam which had a gap – boxes could be installed here either by attachment around the gap or putting a box within the gap. Locations on the water side of the old derelict pontoon are fairly exposed to light and weather as the pontoon covers a small surface area (<16 m^2). All areas under the wharf could be investigated further as potential box locations. Pirrama Park wharf has a horizontal depth of about 10 m and is low enough to provide shade (north and west facing area), including consideration of a low westerly sunset and reflection off the water. Large cross beams provide additional shelter from the elements. Box positioning is best at the rear of the wharf, whilst considering boat access and obstacles to flight. The easterly aspect of the wharf was considered too exposed to light and cross-winds because the wharf here does not connect with land (NE point). The owners of the site are TfNSW however Place Management NSW (PMNSW) has a long-term lease over the site. The potential bat box locations were discussed with PMNSW so the boxes can be placed in areas that are unlikely to be disturbed.	Suitable – approval granted by Pace Management NSW (PMNSW). Four four-chambered microbat boxes constructed from recycled plastic (CyplasTM) were installed as part of this MMP on 19 May 2020, two days prior to the first exclusion door being closed at the wharf.
Whites Creek – The Crescent	Concrete bridge spanning White's Creek with approximately 1 m clearance from mean high-water level.	Suitable – but ruled out because of future redevelopment
Whites Creek – Train Tunnel	Brick arch bridge with graffiti at base on either side of arch. Site prone to human disturbance and higher than desirable light levels.	Unsuitable
Whites Creek – Brenan Street	Concrete bridge with a lot of graffiti. Water level very low. High potential for disturbance and vandalism.	Unsuitable
Johnstons Creek – The Crescent	Concrete bridge with lots of graffiti, however less prone to disturbance and vandalism due to a fence.	Unsuitable
Johnstons Creek – The Crescent	Concrete bridge with lots of graffiti, however less prone to disturbance and vandalism due to a fence.	Unsuitable
Rozelle Bay	Inspected by boat, no suitable structures observed, continuous seawall on eastern side of bay, commercial	Unsuitable

Location	Summary of habitat available at site	Suitable/Unsuitable
	wharves on western side of bay will be disturbed by large boat traffic.	
Johnstons Bay	Inspected by boat and kayak, no suitable structures observed other than Pirrama Park wharf. Continuous seawall on eastern side of bay, commercial wharves on western side of bay will be disturbed by large boat traffic.	Unsuitable
Glebe Island Bridge	Steel structure inspected by boat and kayak, very large clearance above water level (>10 m) and exposed to wind and high light levels. High bird usage. Several locations where bat boxes could be installed on eastern bridge span if no other suitable locations secured.	Unsuitable
Goat Island	Several suitable structures including the public pontoon on the south-western end of the island and a number of large trees overhanging the water on the western side of the island. Public pontoon inspected by kayak, timber piles and girders with concrete deck. Numerous potential locations for installation of boxes beneath public pontoon with clearance above mean high water mark of approx. 1 m. Termite damage and treatment occurring – chemicals used for termite treatment are poisonous to microbats. Also, high wash zone from passing ferries with risk that boxes could receive splashback during high tides.	Unsuitable
Ewenton Park – Balmain East	No suitable structures, continuous seawall, restricted access to this bay due to Water Police depot.	Unsuitable
Iron Cove Bridge	Assessed from land, large clearance above water level (>15 m) and exposed to wind and high light levels.	Unsuitable
Rodd Park	No suitable structures, ultrasonic and visual survey conducted around entire foreshore, no Myotis recorded.	Unsuitable
Dobroyd Point foreshore	Several locations where the mangrove community is developing around Henley Marine Drive but is generally not more than a couple of trees wide. High light levels surrounding southern and western edges of this bay. Bat boxes could be installed on mangrove trees. Boxes would be accessible by people fishing from the shore and by boat. Limited evidence of Myotis presence in this bay.	Unsuitable
Leichardt Park – Callan Park	No suitable structures located, continuous seawall. Low light levels on this side of the bay as a result of Leichardt Park and Callan Park woodlands and parklands. Ultrasonic and visual survey conducted along this foreshore with Myotis recorded foraging in the adjacent bay.	Unsuitable
Bridgewater Park – Balmain	No suitable structures, continuous seawall.	Unsuitable
Balmain Cove Park	No suitable structures, continuous seawall.	Unsuitable
Balmain Sailing Club – Water Street Reserve	Large timber wharf with adequate clearance above high water level and several potential sites for box installation. Some elevated light levels as a result of gaps between single layer of timber decking. Fairly quiet location, wharf not regularly utilised by boats due to adjacent marina.	Suitable – no further investigations made

Location	Summary of habitat available at site	Suitable/Unsuitable
Dawn Fraser Baths – Elkington Park	Timber wharf surrounding public baths, clearance above mean high water mark is not high enough for successful box placement.	Unsuitable
Mort Bay Park – Balmain	Large concrete wharf with adequate clearance above mean high water (>1 m) and ample potential locations for installation of bat boxes. Wharf extends seaward >10 m creating ideal dark and protected sites beneath for bat box install. Concrete composition provides excellent insulating properties. Wharf is not used for commercial purposes and will have very limited external disturbances. Surveyed from abutment beneath the wharf and ultrasonically with Myotis calls detected. Ideal location for Myotis bat boxes.	Suitable – approval granted by Inner West City Council. Three hardwood boxes were installed at Mort Bay on 16 June 2020 (2 x single chambered, 1 x multichambered)
Poulos Bros – Blackwattle Bay	Concrete wharf extending <5 m from land. Clearance above mean high water approx. 1m. Wharf appears to be unused, as there are deteriorating elements that would make regular use by commercial boats unlikely. Several potential locations for bat box install. Close to existing roosts. Long-term prospects uncertain as this site forms part of the Master Plan area of Blackwattle Bay earmarked for future redevelopment.	Suitable – but ruled out because of future redevelopment
University of Sydney Canoe Club Boatshed – Blackwattle Bay	Timber wharf extending >15 m from land, but fairly narrow (<8 m wide) and low clearance above mean high water 50 cm – 1 m. Dark, sheltered location very close to existing roosts. Potentially susceptible to disturbance as can be accessed from land at low tide.	Partially suitable – but ruled out due to undisclosed issues with the site
Glebe Island Rowing Club footbridge	Timber wharf, very narrow and exposed to high levels of light pollution. Also, readily accessible by humans from below at low tide.	Unsuitable

3. Microbat Management Plan

3.1 Approach

The exclusion of microbats from the subject site is required because of the risk of injury and death to microbats from the proposed removal of land and water-based structures. The exclusion should be undertaken using methods considered to be best practice by leading bat experts. Given the large number of potential roost spaces and the difficulties of accessing and inspecting them it is unlikely that the supervising ecologist could be certain that the potential roosting habitat is bat free based upon diurnal visual inspection. For this reason, the exclusion must be undertaken gradually and in a staged manner, with sections of the land and water-based structures incrementally excluded to bats over a multi-night period.

Key actions outlined in the MMP involve the following main tasks:

- A project ecologist should be appointed by Infrastructure NSW to ensure the MMP is delivered according to specifications. An ecologist is considered to be an individual with a minimum of five years extensive experience in microbat ecology and management and will have undertaken at least three successful roost exclusions previous to this work. They will hold a NPWS Scientific Licence and Animal Care and Ethics Committee approval as well as current Australian Bat Lyssavirus (ABLV) vaccination (immunity levels tested and acceptable within the last 2 years).
- The exclusion of bats from roosting habitat at the subject site must be planned to avoid periods of time when the species of bats present at the site are most sensitive to disturbance. During the maternity season, disturbance may result in the abandonment or death of juvenile bats. During the extended torpor season over winter, microbats are vulnerable to loss of energy reserves if they are roused from torpor on a too regular basis.
- Installation of alternative compensatory bat roosting habitat in the form of bat boxes.
- A requirement to re-instate or create permanent microbat roosts within the newly built structure so that it contains roosting spaces for 180 Southern Myotis which is the estimated Southern Myotis roosting capacity of the existing structure with an additional 15% buffer.
- Staff environmental inductions which advise contractors of the biodiversity values present onsite, risks to human health and safeguards for dealing with unexpected finds.
- Adaptive management techniques involving close communication between the project ecologist, contractors and client, monitoring and corrective actions. Adaptive management requires flexibility specifically where monitoring determines that microbats are not responding to interventions in an expected manner and additional mitigation actions may be required.

3.2 Timing

The proposed exclusion works must be undertaken and completed outside the breeding season for Large Bent-winged Bats and Southern Myotis (early – mid September to March) or over wintering period (June to August). Exclusion works may therefore only occur from late-March – end of May, providing any juvenile Southern Myotis present are flying independently; or very early in September before microbats have established maternity roosts, providing that temperatures have warmed enough to allow for nightly microbat foraging. Once the exclusion is in place and the land and water-based structures on site have been cleared of bats, works can be undertaken at any time of year.

The potential for injury and death to microbats would be much higher during the breeding period due to the presence of dependant young and/or juveniles. There is a high risk that attempts to remove juveniles from the roost are more likely to result in death or injury due to stress. At the end of the breeding season and before winter, non-breeding males disperse to alternate roost sites and food availability is still relatively high, allowing microbats to build up fat stores for the coming winter.

Microbat exclusions will be planned for a period of mild temperatures (warmer evenings, little or no wind, no rain) with a view to providing ideal foraging conditions for microbats. Microbats can remain in a roost and in torpor for more than 2 weeks during winter and up to 5 days during summer (Geiser and Kortner 2010) but are likely to emerge to forage every night or every few nights when the weather conditions are favourable. The staged exclusion proposed for the subject site will be undertaken over a minimum three-night period for Stage 1 (if required) and minimum five night period for Stage 2 when bats are likely to be foraging, as outlined in Section 3.3.1. This is to allow any bats in torpor to wake naturally and exit the roost before it is excluded to them.

Roost exclusion would not occur during forecast periods of heavy rain (>20 mm in 24 hours according to the Bureau of Meteorology).

Exclusion devices should be installed at least 1 week prior to commencement of works to ensure microbats are not continuing to try to return to the roosts within the subject site.

Addendum 1

Roost exclusion actions will continue into July 2020 or mid-August until the demolition contractor takes control of the site. This was required because unsuitable weather conditions experienced in the latter part of May and throughout June prevented the exclusion being completed by 1 June 2020 as per the MMP. This situation required amendments to the Threatened Species Licence (C0005923) conditions under which the MMP was approved and justification for extensions to the licence were discussed and agreed to by EES. Also, increasing the duration of exclusion attempts was viewed as less detrimental to the fate of microbats if any were still enclosed beneath the wharf during demolition.

3.3 Roost exclusion methodology

The following exclusion process would be applied to the land and water-based structures within the subject site. Exclusion aims to remove microbat access to the potential roost habitat on site. The objective of controlled roost habitat exclusion is to prevent injury or mortality to roosting microbats and avoid impacts to maternity or overwintering colonies of microbats.

3.3.1 Exclusion process

Roost exclusion of such a large and complex site with challenging site access can best be achieved in stages. At this time, the only means of accessing the potential roosts so that they can be inspected is by boat. Even with a boat not all potential roost spaces are able to be safely accessed due to the configuration of piles beneath the wharf structures and the shallow depth of the water. A procedure to safely access any roosts in this manner and to install exclusion devices will need to be developed by the engaged ecologist.

The exclusion methodology developed for this MMP relies heavily on the assumption that progressively reducing microbat access to potential roosting locations under conditions when they should be active encourages them to leave the site to find suitable roosts elsewhere of their own accord. Without the

ability to visually inspect every potential roost site and be certain that an excluded space is bat free, adequate time has been allowed to minimise the risk that a microbat in torpor would be trapped inside the structure. Equipment that provides additional information on microbat activity to supplement the minimal visual information obtainable by the ecologists conducting the exclusion at the subject site will be invaluable in implementing this MMP. Devices that allow for real time viewing of ultrasonic recordings (e.g. Echo Meter Touch) and detection of microbats through the use of thermal imaging cameras, along with standard inspection tools such as torches, burrow scopes and digital cameras would assist in quantifying microbat activity during the exclusion process.

The wharf structures will be excluded by erecting curtains along all sides of each of the wharf structures which will prevent entry by any microbat. It will be impractical to attempt to individually exclude bats from every potential roosting location beneath the wharves because of the difficulties in safely accessing the site and the large number of potential roosting locations present. Exclusion of the derelict building will be undertaken by installing one-way valves over all potential entrances and leaving them in place for a minimum of three nights, following which each entry point will be permanently sealed.

The subject site can be divided into surface features (the derelict building) and below deck features (everything underneath the deck of the wharves and jetties). The below deck features can be further divided into an eastern and western section, with the highest value microbat roosting habitat present in the western section of the site (Figure 2). Each section will be excluded separately over multiple nights with the exclusion of the eastern and lower value roosting habitat (Stage 1) undertaken before exclusion of the western section (Stage 2) and finally exclusion of the derelict building (Stage 3). Addendum 2 – seawall habitat exclusion is discussed below as Stage 4.

Stage 1 (eastern section of subject site) and Stage 2 (western section of subject site)

Exclusion of both the eastern and western sections of the subject site will commence during daylight hours when the curtain can be installed on all sides of the wharf structures. It is expected that the exclusion of the eastern section of the subject site will be undertaken over three consecutive nights and mornings before exclusion is conducted on the western section. A curtain must also extend from the edge of the wharf structures to the seawall running along the southern edge of the site, screening off the eastern section from the western section of the site.

It is expected that the exclusion of the western section will be undertaken over five consecutive nights and mornings owing to the greater amount of potential bat roosting habitat present.

As the curtain is being installed it will be possible to undertake a cursory visual inspection of the under surface of the wharf structures for microbats and document any findings. It is noted that it will not be possible owing to time and tide constraints and access issues to visually inspect all potential roost spaces. A gap in the curtain 2 m wide will be left open (with curtain material rolled up on the deck of the wharf) every 20 -30 metres. These gaps will allow any microbats roosting within the structures being excluded to exit. The gaps will also allow observers to enter the excluded space beneath the wharf and inspect it for the presence of microbats following emergence surveys conducted in conjunction with installation of exclusion devices.

Following installation of the curtains, an emergence survey including ultrasonic recording must be undertaken outside each of the gaps remaining in the curtain each night for three nights until on the final night following the emergence survey, the curtains will be completely drawn leaving no gaps. The

emergence survey should commence 30 minutes prior to sunset and continue until the ecologist is satisfied that all bats have emerged from the roost, or until there has been a period of sustained inactivity (generally within 60-90 minutes of sunset). The number of microbats recorded exiting the site will be documented.

A follow-up inspection of the excluded space beneath the wharf structures would then be undertaken at the conclusion of the emergence survey to determine whether any microbats remain roosting within the excluded space. Use of a thermal imaging camera will enable a more accurate emergence surveys to be undertaken and assist in conducting post emergence inspections. The exclusion will be undertaken gradually and in a staged manner with the gaps in the curtain progressively blocked off each night over a three-night period for the eastern section and a five-night period for the western section. This process encourages bats to find roosts elsewhere, limiting the number of bats left without a roost once the curtains are fully drawn around the entire structure enclosing all gaps.

Pre-dawn surveys should be made at the site by the ecologists each morning following an evening emergence survey and curtaining event. The pre-dawn surveys will occur over a 1.5-hour period prior to sunrise to determine whether any microbats have returned, rescue any microbats roosting in unsafe places, and to assess the integrity of the exclusion devices. Any microbats roosting in unsafe places will be captured by hand, held in a calico bag (containing no more than a single microbat of the same species) in a cool, dark, quiet place for the day until they can be released at the site after dark. Any breaches of the exclusion devices will be noted and marked for repair later that evening.

This process will be repeated each evening of the three night (Stage 1) or five night schedule (Stage 2). On the final evening once the ecologist is satisfied that all bats have left the roost or 1.5 hours have passed since observations began, and a post emergence survey inspection is completed within the excluded space resulting in no microbat detections, the curtains can be fully drawn over all the gaps. Pre-dawn observations are required on all mornings following an evening change to exclusion devices with the final morning check to ensure that that no microbats obviously remain within the excluded space and to check the integrity of the curtains on the final morning.

The curtains will remain in place until the day that demolition works commence. The ecologist will need to conduct periodic diurnal inspections of the curtains to ensure the exclusion devices continue to function as intended and the structures remain free of microbats. The time frame for inspection of exclusion devices is one week after the completion of the exclusion, then once every four week after that prior to commencement of works. Inspection of the exclusion devices should also occur immediately following any periods of extreme weather (rainfall of > 50 mm in a 24-hour period, wind speeds of greater than 40 km / hr). Inspection of the exclusion devices should then occur on the day demolition of the structure is to commence.

If the final early morning inspection records microbats within the structures, the process described above will be repeated and actions taken to rectify the breach after emergence of the microbats. Any evening changes made to the exclusion devices will always be followed by a morning inspection as outlined above.

It is important to note that additional time may be required to complete the exclusion if the ecologist is not satisfied that the wharf structures are free of bats following the three night (Stage 1) and five night (Stage 2) schedules described above as discussed in the Adaptive Procedures Section 4.1. If microbat activity is not reducing at the Subject site as the exclusion is progressing, additional diurnal and nocturnal

survey effort may be required to try and locate specific roosting locations or dissuade microbats from roosting within the structures.

If specific roosting locations can be located during these additional surveys, it will allow one-way valves to be installed which will ensure that bats can exit from but not return to a roost and the exclusion can proceed for a further three nights before being completed following the installation of one-way valves. If roosting locations cannot be located because they are inaccessible, alternative mitigation measures that discourage bats from roosting beneath the wharf structures may be required alongside continued progressive exclusion until microbat activity levels have reduced to levels that the ecologist considers acceptable for completing the exclusion. Alternative mitigation measures may include 24 hour illumination of the underside of the wharf structures with day makers or similar lights and / or installing a constant spray of water over the underside of the wharf structures or along the edge of the wharf structures.

Stage 3 Derelict building

The process of exclusion for the derelict building relies upon installation of one-way valves over all potential entry points for a period of two to three nights that will allow bats to exit but not re-enter the building followed by installation of barriers that will completely seal up all entry points.

In a similar manner to the process described above for exclusion of the below deck features, one-way valves made from heavy duty plastic sheeting will be installed over all entry points on the derelict building during daylight. Following this an emergence survey including ultrasonic recording should be undertaken outside each of the one-way valves each night for three nights. If no bats are recorded exiting the building on the final night, the entry points can be permanently sealed on the following morning. The emergence survey should commence 30 minutes prior to sunset and continue until the ecologist is satisfied that all bats have emerged from the roost, or until there has been a period of sustained inactivity (generally within 60-90 minutes of sunset). The number of microbats recorded exiting each entry point will be documented each night.

If bats are recorded exiting an entry point via a one-way valve on the third evening, the one-way valve will be left in place and emergence surveys carried out until no bats are observed emerging from the entry point. A one-way valve may only be permanently sealed on the morning following an emergence survey where no bats have been observed exiting the entry point and if the one-way valve has been in place for a minimum of three nights.

Stage 4 Seawall

There are eighteen openings in the seawall considered potential microbat habitat (Appendix C). These have been numbered with blue spray paint on the seawall. Several openings may be interconnected via cavities behind the seawall, especially where the Hanson cement batching plant once stood, and may require a larger curtain to span all access points but with one-way valves only installed at each end where the largest openings are (Appendix C).

The exclusion process for potential microbat roosting habitat in the seawall follows a similar method to that discussed above for Stage 3 (derelict building) with the addition of an emergence survey to be conducted on the evening prior to installation of one way valves and a diurnal inspection of all potential roosting sites immediately prior to installation of one-way valves. The exclusion should be planned for

a period of sustained mild weather conditions and be completed before winter conditions trigger periods of torpor. Emergence surveys should only be conducted during weather conditions suitable for microbat foraging activity, limited to nights with mild temperatures, little or no wind and light or no rain.

An emergence survey including ultrasonic recording of all potential roosting sites should be undertaken the evening prior to installation of one-way valves. The emergence survey will commence 30 minutes prior to sunset and continue until the ecologist is satisfied that all bats have emerged from the roost, or until there has been a period of sustained inactivity (generally within 60-90 minutes of sunset). The number and location of microbats recorded exiting the seawall will be documented. During emergence surveys, several openings can be viewed by one ecologist, either from the water or from above on the seawall (if safe).

The day following the emergence survey all potential roost sites will be visually inspected by boat using burrow scopes, spotlights and cameras. Sites with no evidence of microbat occupation from the emergence survey and diurnal visual inspection will have one-way valves installed. Any potential roost sites with evidence of microbat occupation will have one-way valves installed at night after the conclusion of the second emergence survey.

An emergence survey including ultrasonic recording should be undertaken outside each of the one-way valves each night for three nights. If no bats are recorded exiting the one-way valves on the final night, the site can be permanently sealed on the following morning. The emergence survey should commence 30 minutes prior to sunset and continue until the ecologist is satisfied that all bats have emerged from the roost, or until there has been a period of sustained inactivity (generally within 60-90 minutes of sunset). The number and location of microbats recorded exiting the seawall will be documented each night.

If bats are recorded exiting the seawall via a one-way valve on the third evening, the one-way valve will be left in place and emergence surveys carried out until no bats are observed emerging from that site. A one-way valve may only be permanently sealed on the morning following an emergence survey where no bats have been observed exiting the entry point and if the one-way valve has been in place for a minimum of three nights.

3.3.2 Exclusion devices

There are a number of materials that can be used to exclude microbats from a roost. The choice of a reinforced heavy duty polyethylene sheeting which is tear resistant and 240 GSM for use on the below deck features is dictated by the need for a permanent, waterproof barrier that will remain in place through tidal fluctuations, will not degrade in sunlight or with exposure to seawater, is durable and flexible enough to withstand the range of weather conditions expected at the Subject site, is able to be cut and shaped according to need, is manoeuvrable enough to be handled without heavy plant or mechanical assistance, and is cost effective.

In the case of the below deck features of the Subject site, the exclusion is temporary and will remain in place until all structures are demolished during construction works. The exclusion device will effectively be a curtain hanging from the top of the wharf structures down into the water creating a barrier which prevents microbats from entering the space beneath the wharves and gaining access to any roosting habitat contained therein. The curtain will be weighted so that it remains permanently submerged at the base and will be held together at any joins so that no gaps large enough to allow microbat entry are present. Appendix A provides product data and supplier details for the exclusion material appropriate

for use at the Subject site. This heavy-duty plastic sheeting has been used successfully on numerous microbat exclusions.

Heavy duty black plastic sheeting commonly used by builders is recommended for any one-way valves that are required to be installed. The one-way valves only need to remain in place for a short period of time (3- 5 days), following which they will be replaced by a more permanent barrier. The materials used to create a permanent barrier can range from expanding foam to sections of timber affixed over the entry point.

3.3.3 Inspection and maintenance of exclusion devices

An email is to be sent to the project engineer / site supervisor following completion of the exclusion process confirming that the exclusion is complete and providing photos and descriptions of the exclusion devices that have been installed. An action log will be kept during the exclusion process and for any monitoring inspections conducted between the exclusion and commencement of works. This log will be submitted to the project engineer / site supervisor upon completion of the project as part of the reporting requirements. The exclusion log will contain the following information:

- Action undertaken
- Date
- Personnel involved
- Results / outcomes against performance measures
- Effort / time on site
- Adaptive / alternative procedures required / recommended.

Exclusion devices installed on the below deck features would need to be monitored one week after installation, and then monthly by the project ecologist prior to works to ensure they remain effective in excluding bats, as well as following any high rainfall, high wind or flood events (> 50 mm in 24 hours and wind speeds > 40 km / hr).

Exclusion devices installed on the derelict building should be monitored by the site supervisor and checked immediately prior to commencement of works as it should be obvious whether the permanent barrier has remained intact. These exclusion devices will only need inspection by the ecologist if any breaches have been identified.

It will be critical that contractors ensure the all exclusion devices remain secure and in place until the removal of the land and water-based structures is undertaken.

Addendum 1

Exclusion works to date (3 August 2020) have included:

- Sealing of all potential roost entry points in the derelict building following installation and monitoring of one-way valves over a three night period
- Curtaining of the entire wharf perimeter, including the installation of 10 doors, dividing the underside of the wharf area into three compartments

- Evening and pre-dawn emergence / return surveys (for up to 3 hours post sunset) and progressive closure of all doors around the wharves following evening emergence of roosting bats
- Before, during and after (ongoing) static ultrasonic recordings beneath each of the three wharf compartments and active nocturnal and diurnal searches (ongoing) for roosting microbats with torches, recorders and a thermal imaging camera
- Static ultrasonic monitoring and emergence surveys at a known Southern Myotis reference site within Sydney Harbour to provide context on activity levels of the species
- Ongoing release attempts of trapped microbats through a single door from sunset on evenings when suitable weather conditions are experienced as per the licence conditions (ongoing)
- Installation of three single one-way exit hatches on the Hanson wharf near the last known exit point and near to other suspected roost sites for the bats to allow bats to exit but not re-enter the excluded are beneath the wharf
- Diurnal release of birds roosting under the wharves
- Maintenance of the curtain damaged by wind, pontoon movement and demolition work at the Hanson plant
- Installation of alternative compensatory habitat boxes at:
    - Pirrama Park (four x four-chambered recycled plastic bat boxes)
    - Mort Bay Park (three x multi-chambered hardwood bat boxes)
- Operation under a Threatened Species Licence (C0005923) and ongoing consultation with EES for renewal or variations to the licence conditions. The licence included conditions stipulating that exclusion activities could only occur if the daytime temperature reached at least 18°C. From 30th June, the 18°C restriction was lifted to allow five exclusion attempts per 15 day period until demolition commences, or until at least six consecutive nights of no recorded bat activity had occurred beneath the wharf, whichever was sooner.

3.4 Actions during demolition

The primary change to this section is that surveillance of bat activity or inspections under, on top or near the wharf during demolition will not be undertaken as previously committed to by Infrastructure NSW as it is unsafe for any personnel, and as such, revised monitoring requirements are stated below. Additionally, reinstating the bat exclusion curtain along the active demolition face prior to sunset each day is unsafe for the contractors. Therefore, the best-effort response is to maintain the curtain as much as practical and incrementally dismantle it as the demolition progresses. It is recognised this open face may allow bats to enter undetected. The expectation is that only parts of the curtain along the demolition face, immediate connections and any areas needing emergency access would be removed, and all other parts of the curtain awaiting demolition would be maintained.

No works should commence if roosting bats are seen or heard within a work area and all works should stop if bats are observed flying from a roost or around the works site during daylight. Finds of microbats or signs of microbats must be reported immediately to onsite environmental staff, site supervisor and the supervising ecologist who will advise the best course of action. In the first instance, photographs, if possible and practical, should be taken and then sent to the project ecologist to identify the microbats and to determine what actions are required.

Once the wharves are demolished, the existing seawall and culverts will be repaired and potentially rebuilt to allow for concurrent construction of the new building (initially high-density piling and sediment reshaping). There may be a window of opportunity for microbats to return to the site and utilise crevices and culvert openings along the wall. Tidal movement would provide a natural barrier to passage, especially at 1.8 - 2 m tides where the culvert openings are fully submerged. Barnacle growth observed on the ceiling of largest box culvert indicates the tides are regularly high enough to allow colonisation of marine biota. However, this culvert travels upslope beneath Wentworth Park and other surface drain openings may allow bats to emerge during high tide.

It is unknown what the condition of the walls and culverts will be following demolition. Project engineers have advised that access to the exposed wall would be unsafe within 2 m, and the demolition contractor would control site safety. There may be scope to observe the wall and culvert openings from a distance, depending on safe access, but close inspection of crevices is highly unlikely. Ultrasonic recorders may be used to observe emergence activity from the culvert/s if placed strategically to determine if the bats are flying out of or flying past the culvert/wall. Further discussion with the demolition team is required once the status of the culvert/wall and overlap with construction is known.

Addendum 2 – seawall inspection

Following demolition of the wharves, two ecologists conducted a visual inspection of the exposed seawall via kayaks. Due to safety concerns of the wall's instability, the survey was conducted using a video camera mounted to a pole. Eighteen openings and crevices in the seawall were marked as having structural elements suited to microbat roosting. Other openings occurred but were not suitable for habitat, so no markings were made for non-habitat elements. The demolition works had opened up several new cavities in the seawall where connecting beams had been removed. Other potential habitat occurred where a second seawall appeared to be constructed behind the visible seawall, creating a void with several openings. Features not considered as potential habitat included shallow crevices, smooth pipes and intertidal culverts. All culverts within the works area are not considered potential microbat habitat because they become fully submerged during the highest tides. There is marine biota (barnacles) growing on the ceiling of the largest box culvert and a 'scum line' of filamentous algae on the adjacent seawall around other culverts. Ecologists have also observed complete inundation during other site inspections. Some of these culverts were thought to be of habitat value during the original survey when the wharf was standing. However, now the culverts are more accessible for inspection, they are no long considered habitat withing the works area. Nonetheless, the culverts are adjacent to the habitats identified in Appendix C and they will form part of the area targeted in emergence surveys.

3.4.1 Site induction

All staff and contractors undertaking construction works at the subject site should be made aware of the environmental sensitivity of the site and the potential presence of threatened microbat species prior to commencing work. An environmental induction led by the site supervisor should be undertaken as part of pre-start meetings. Pictures of microbats (provided by the project ecologist) should be placed in the crib room as a reference and the location of potential microbat roosts (culverts, drains, wooden cross beams and pylons) marked on site maps / design drawings displayed on site. Staff should be briefed on what to do in the event of an unexpected find of microbats. Some microbats carry diseases that can be lethal to humans if untreated, and inexperienced / unvaccinated people should never handle bats (See Section 4.2. for the unexpected finds procedure).

Microbats or evidence of their presence can manifest in a range of ways and works staff should be made aware of these signs as part of the site induction process. A set of visual aids for use in the induction process is included as part of this MMP. Evidence of microbat occupancy includes the following:

- Visual (diurnal) observations of singles or clusters of roosting microbats hanging from the ceiling or roof space or walls, or lying within horizontal crevices in structures such as bridges, culverts, derelict mines, tunnels, old buildings, chimneys.
- Visual (nocturnal) observations of bats flying from or returning to a structure at dusk and dawn, respectively.
- Audible sounds made by roosting bats include a chattering clicking type noise often heard around dusk and dawn or if bats are disturbed in a roost. Any suspicion of unusual noises within the structures will cause works to stop and must be investigated further by the project ecologist with appropriate equipment to allow identification of the cause of the sound (should include a hand-held ultrasonic call recorder).
- Guano (bat dung / scats) will be present if bats are utilising a roost, even just for a couple of days. Often guano collects immediately under the roost site or sticks to the structure walls under the roost or around the entrances to a roost.
- Staining (urine) may be present where bats frequently access a roost.
- Bat bugs (ectoparasites) or their casings are frequently observed throughout microbat roosts and take the form of tiny tick like or spider like invertebrates.
- Any Welcome Swallow or Fairy Martin nests – mud and earth constructed bird nests are relatively common on bridge and culvert structures and should be investigated as some bat species will utilise disused nests as roost sites.

3.4.2 Daily Inspection

~~A daily check of the exclusion devices at the Subject site is to be undertaken by the site supervisor prior to commencement of works, with each check being recorded. If the exclusion devices are not secure the site supervisor must contact onsite environmental staff, who will contact the project ecologist immediately so that the breach can be inspected and repaired as soon as possible. No works are to commence if the exclusion device(s) are not secure. Works at the subject site can only recommence once the ecologist provides advice that the site is secure and free of roosting microbats.~~

~~If a breach of the exclusion devices has occurred, the exclusion methodology outlined in Section 3.3.2 will be followed by the project ecologist over a single night. The breach will be repaired following conclusion of evening emergence survey and a dawn inspection of the repaired exclusion device(s) will be undertaken.~~

Addendum 1

Once demolition commences it will be unsafe for damaged curtain panels or joins to be repaired or for personnel to access beneath any wharf structure, therefore, no monitoring, surveys or inspection for bats is possible once the contractor takes control of the site and declares the underside of the wharf a no-go zone.

Addendum 2 – seawall

Once make good works of the seawall commences it will be unsafe to repair any damaged exclusion screens/curtains or to conduct any inspections.

3.4.3 Pre-works inspections by project ecologist

~~Given that the details of how the demolition process will be undertaken have not yet been finalised, it is imperative that the project ecologist discusses the approach with Infrastructure NSW and the contractor(s) engaged to complete the works prior to the commencement of works to ensure the site remains free of microbats for the duration of works. Current advice suggests that the demolition will be undertaken over an 8 – 9 month period, commencing in June 2020 and concluding in February 2021.~~

~~The demolition process is likely to involve progressive removal of saw cut sections of the deck of the wharf structures from the seaward end to the landward end using cranes based either on the deck or on barges. Following this, the supporting piles will be removed by excavators on barges or remaining sections of deck. Finally, the remaining section of deck will be cut from the seawall and removed. The seawall is to be retained (if structurally intact) and any repairs to the seawall will be completed prior to construction of the new Sydney Fish Markets.~~

~~Removal of the deck is the part of the demolition with the most risk of harm to microbats, because as sections are removed on a daily basis it exposes potential roost spaces beneath the remaining part of the structure. If access to the newly exposed sections of deck are not sealed off prior to nightfall, there is a risk that microbats will return and roost within any accessible roost spaces during the night.~~

~~A pre-works inspection for microbats within the area due to be demolished during the day would be undertaken by the site ecologist on the first morning that demolition works are to commence. The inspection would include arranging boat access to the site, actively looking for microbats and / or signs of their presence using a torch / burrow scope within the excluded space beneath the wharf structures and will include removing / lifting the exclusion devices over the section of wharf proposed to be worked on during that day to allow works to occur. A return visit by the ecologist will be required in the afternoon prior to the conclusion of works to advise on and assist with how to reposition the exclusion devices on a daily basis in such a way that there will be no access for roosting microbats to the structure for the duration of demolition.~~

~~It is recommended that the project ecologist returns to site the following morning to conduct a pre-works inspection for microbats and to check whether the exclusion devices re-instated after demolition works the previous day have been successful. This process may need to be repeated until the ecologist is satisfied that the works area is being adequately excluded to microbats at the conclusion of each day's work. It is also recommended that the project ecologist repeats this process (afternoon supervision / assistance with exclusion device replacement followed by a morning pre-works inspection) where there will be a major change in the way that the exclusion devices need to be re-positioned because of the shape of the section of wharf being demolished.~~

~~The intention is that construction crews will re-instate exclusion devices at the end of each day for the majority of the demolition process and that this will be documented daily by the site supervisor. Where uncertainty over the placement of exclusion devices exists, advice from the project ecologist is to be sought and a visit to site may be required.~~

~~A pre-works inspection for microbats beneath the section of the largest wharf identified as high conservation value habitat in Figure 2 must be undertaken by the site ecologist on the morning demolition is due to commence in that area.~~

~~If during any of the pre-works inspections microbats are identified roosting beneath the wharf, the ecologist may elect to retrieve isolated bats (if possible) that are alive and healthy from the work area to allow works to continue. The bats will be held in a calico bag (no more than a single microbat to be held in each bag) that will be hung during the day in a cool, dark, well ventilated place and released at the point of capture once the work area is secured and excluded to microbats. This should only be undertaken if microbats can be safely captured and released on the night after they were captured. Bats should not be held for more than 12 hours.~~

~~If it is not possible to capture and remove the bats, an exclusion zone will be set up by the ecologist and no works can occur in that area until approved by the project ecologist. The exclusion methodology outlined in Section 3.3.1 will be followed that evening by the project ecologist over a single night. Any breaches to the exclusion devices will be repaired following conclusion of the evening emergence survey, and a dawn inspection of the repaired exclusion device(s) will be undertaken. Provided the ecologist is satisfied that no microbats can access roosts beneath the wharf and that the repaired exclusion devices are functional approval will be given to re-commence works in that area. This process may need to be repeated until the ecologist is satisfied that the structure remains excluded to microbats and that no microbats are roosting in the works area.~~

~~No works should commence if roosting bats are found or heard within a work area and all works should stop if bats are observed flying from a roost or around the works site during daylight. Unexpected finds of microbats should be reported immediately to onsite environmental staff, site supervisor and the supervising ecologist who will advise the best course of action. In the first instance, photographs, if possible and practical should be taken and then sent to the project ecologist to identify the microbats and to determine what actions are required.~~

Addendum 1

Ultrasonic monitoring will continue beneath the Hanson wharf until the week leading up to commencement of demolition. A final inspection of the underside of the wharf will be undertaken within 5 days prior to commencing demolition to retrieve ultrasonic detectors and search for and rescue (if possible) any roosting bats detected. This visit will need to coincide with a tide height of between 1.5 – 1.8 m to allow safe passage beneath the wharf and to ensure any bats observed can potentially be hand captured for later release.

Once the demolition contractor takes control of the site and declares the underside of the wharf a no-go zone, the project ecologist will not be able to access any part of the wharf structure due to safety concerns, therefore no monitoring, surveys or inspection for bats is proposed. As discussed above, the curtain along the demolition face cannot be reinstated prior to sunset each day. Therefore, progressive demolition and removal of the curtain can occur without pre-works inspections for bats.

Unexpected finds of microbats require works to cease and should be reported immediately to onsite environmental staff, site supervisor and the supervising ecologist who will advise the best course of action.

As discussed above, once the wharves are removed, investigate whether safe access is possible near the exposed wall and culverts to conduct a habitat survey. This may lead to further emergence surveys if practical and safe.

3.5 Permanent replacement habitat

The creation of permanent microbat roosting habitat within or as near as possible to the new Sydney Fish Market is required to replace the loss of roosting habitat for Southern Myotis (also known as 'The Fishing Bat') from the existing wharf structures at Blackwattle Bay. The permanent microbat roosting habitat created should have a minimum carrying capacity 15% greater than that of the original roosts to allow for errors in estimating the roost carrying capacity based upon the inability to conduct a thorough visual assessment because of access issues to the underside of the wharf structures. The current colony size is estimated to be 10-30 bats, with the roost carrying capacity estimated to be up to 150 bats. The permanent roosting habitat should allow for movement between roosting locations. It is recommended that permanent microbat roosting habitat with a capacity of 180 bats is installed at the new Sydney Fish Markets. It is also recommended that this habitat is spread over a number of locations at the new Sydney Fish Market to provide bats with a range of roosting locations similar to the scenario present at the existing development site. In this way, roosting bats can select the location which most suits their needs at different times of the year as each location will have a slightly different microclimatic regime to other locations.

When looking for suitable places to locate Southern Myotis roosting habitat the following is a general guide:

- Darkness and protection from the elements are critical – the cavity / space / bat box needs to ensure that it is not open to the sky and includes shelter space that is out of the wind
- Insulation / thermal mass – wooden and concrete materials are the preferred substrates for a roost because they dampen environmental conditions and provide a relatively stable roost environment
- Minimal access to the cavity / space / bat box by anything other than flying animals - ideally the roost space / cavity / bat box will be located on the obvert (underside) of a culvert / bridge / wharf / jetty / structure such that snakes, rats, cats, foxes etc cannot climb or crawl into the cavity / space / bat box or reach a position immediately in front of the entrance from where predation could occur. This generally means locating it at least 2 m from the edge of any structure particularly where a structure is attached to land and / or > 1.5m directly above the water.
- Bats prefer to be as far from the edges of any structure as possible if they have a choice of where to roost, so select a point equidistant from the edges and from land
- Clear flight lines to / from the entrance of the cavity / space / bat box entrance with at least 1 square metre of free air space surrounding the entrance
- Proximity to foraging habitat –directly over water or within 100 m of it, but no closer than within 1.5 m above mean high water mark – this gives bats space to drop out of a roost and commence flying
- Minimal disturbance by human or boat traffic / movement, lights, vibrations, high-pitched noises – bats can become habituated to a certain amount of background noise (high pitched noises are not well tolerated compared to low pitched noises) and people / boat movements,

but do not like to roost where a light shines directly onto the entrance of a roost or where vehicles / boats / people are moving randomly in their direct line of flight close to a roost.

However, the plans for the new Sydney Fish Markets have been reviewed and found to contain no suitable structural areas that could be used to create 'in situ' habitat that mimics and would replace the roost habitat that is to be removed during the demolition and construction works. The only areas of the new build that will be directly over water are the pedestrian decking and the wharves for the new Ferry Terminal and recreational boats. Neither of the wharves is suitable because the disturbance level will be too high and the wharves too close to mean high water level to allow bat box install.

It is therefore suggested that several bat boxes be installed under the pedestrian decking at the south-western end of the new building at the completion of works. There may also be opportunities to install some boxes under the pedestrian decking at the north-eastern end of the new build, closer to where the existing Sydney Fish Markets are located. Other potential options for box install at the head of Blackwattle Bay include nearby wharves, jetties, bridges and culverts that would need to be inspected and evaluated against the criteria listed above prior to be selected as suitable locations.

In the same way that the compensatory habitat will be installed prior to the exclusion process it is preferable to install boxes on brackets / supporting rails so they can be more easily removed / moved if required for structural maintenance or roost management purposes. In this case there would ideally be several separate locations under the deck / wharf / jetty / structure with supporting rails and boxes installed so that removal or exclusion of bats from a single box would mean that bats still had alternative habitat they are already familiar with in place.

~~The final suite of permanent microbat habitat features incorporated into the newly built structure will be agreed upon by Infrastructure NSW in consultation with the project ecologist(s). Infrastructure NSW, the contractor responsible for building the new Sydney Fish Markets and the project ecologist engaged to implement the MMP will need to discuss and agree upon bat box locations and attachment methodologies prior to commencing the build and continue to communicate throughout the build to ensure the bat boxes are installed at the completion of the build in the most suitable locations.~~

Addendum 1

The only areas of the new build that will be directly over water are the pedestrian decking and the wharves for the new Ferry Terminal and recreational boats. Infrastructure NSW will investigate options to establish four to six bat boxes beneath the pedestrian decking of the new Sydney Fish Markets, with final site selection made by the project ecologist in close consultation with Infrastructure NSW and the contractor to ensure conditions to maximise the likelihood of uptake of the boxes by Myotis. To maximise potential uptake by bats and allow for the possibility that the new build may not provide ideal conditions for bat box installation, Infrastructure NSW will also investigate and advocate options for additional permanent Myotis roosting habitat in Blackwattle Bay through the precinct planning and consultation with future developers of the foreshore. Options for discussion in include:

- Incorporation of Myotis roosting habitat into a purpose built stand-alone floating pontoon or foreshore structure that could double as an art installation / educational installation
- Creation of cavities suitable as Myotis roosting habitat in new structures over water or immediately adjacent to water. More detail needs to be provided by a microbat ecologist on how to achieve this. Several methods can be employed including;

- the creation of Y-shaped cavities in newly built concrete structures (using in situ moulds prepared on site – a method successfully employed on recent Transport for NSW projects),
- the creation of recessed chambers in concrete structures into which bat boxes can be installed,
- ensuring the width between joins in timber and concrete structures is a minimum of 20 mm,
- retaining lift holes or grab holes in pre-fabricated concrete elements and leaving them uncapped.

4. Contingency measures

Wild animals can display unpredicted and unexpected behaviours, therefore this MMP must be flexible in its application so that a range of potential outcomes can be dealt with in accordance with Department of Planning Industry and Environment scientific licencing and Animal Care and Ethics Committee approvals.

4.1 Adaptive procedures

The procedures of this plan may be adapted in response to factors such as microbats remaining in the roosting habitat at the Subject site and not emerging to forage, which would have implications for the length of time it takes to exclude microbats from the land and water-based structures.

The aim is to facilitate the identification of the best course of action for the particular situation, including time and logistical constraints, as well as the biological constraints posed by the microbats. This would require open communication between the work supervisor, project engineer / site supervisor, onsite environmental staff and the project ecologist.

Microbats are wild animals and do not always behave in the ways we expect or predict. Management plans need to be adaptable enough to react to situations as they arise and deal with a range of possible outcomes. Modifications to the procedures outlined in this plan may be undertaken provided there has been consultation with the supervising ecologist. The aim of this clause is to allow for the identification of the best course of action to facilitate construction given time and logistical constraints as well as ecological constraints imposed by the affected microbat species.

4.2 Capturing and releasing healthy microbats

If healthy microbats are discovered during works or observed flying from a roost site or around the works site during daylight, works will be stopped immediately and the site supervisor, onsite environmental staff, project engineer / site supervisor and supervising ecologist all informed. This is the responsibility of all site personnel. Works that are disruptive to microbats include those which create excessive noise (particularly high-pitched), vibration or light and heat sources, or give off smoke or other potentially noxious gases.

~~The supervising ecologist may elect to retrieve isolated bats (if possible) that are alive and healthy from the work area to allow works to continue. The bats will be held in a calico bag (no more than a single microbat to be held in each bag) that will be hung during the day in a cool, dark, well ventilated place and released at the point of capture once the work area is secured and excluded to microbats. This should only be undertaken if microbats can be safely captured and released on the night after they were captured. Bats should not be held for more than 12 hours.~~

~~If it is not possible to capture and remove the bats, a suitable exclusion zone will be set up by the supervising ecologist and no works will be undertaken within that zone until specifically directed by the supervising ecologist. The exclusion methodology outlined in Section 3.3.2 will be followed that evening by the project ecologist over a single night. Any breaches to the exclusion devices will be repaired following conclusion of the evening emergence survey, and a dawn inspection of the repaired exclusion device(s) will be undertaken. Provided the ecologist is satisfied that no microbats can access roosts beneath the wharf and that the repaired exclusion devices are functional approval will be given to re-~~

~~commence works in that area. This process may need to be repeated until the ecologist is satisfied that the structure remains excluded to microbats and that no microbats are roosting in the works area.~~

Bats should not be handled by unvaccinated ((Australian Bat Lyssavirus (ABLV)) and inexperienced persons. Suitable Personal Protective Equipment (PPE) is required to be worn to prevent bats biting or scratching the handler and to avoid contact with excrement from bats. Whilst very rare, some microbats carry diseases that can be lethal to humans if untreated. Photos are the first and best course of action to help identify microbats and should be supplied to onsite environmental staff and the project ecologist. If a non-vaccinated person does get bitten or scratched by a microbat, they must seek immediate medical attention. A post ABLV exposure vaccine is available and, if administered promptly and appropriately, will be effective in preventing the disease from developing.

Any evidence of a roosting microbat should be documented, photographed and actions recorded with onsite works staff and directed to the project ecologist for further action.

Addendum 1

A bat in flight during daylight is at risk of predation, exposure and of injury through demolition works. No works should re-commence until the ecologist is satisfied that the bat(s) have flown away from the work site and are unable to be retrieved.

The supervising ecologist will not be able to retrieve bats from the work area as it will be unsafe to approach the active demolition site. If the bat(s) are roosting on the active demolition face, a suitable no-go zone will be set up by the supervising ecologist and no works will be undertaken within that zone until specifically directed by the supervising ecologist. It is assumed that the bat(s) will fly away at dusk and not return to roost in the same location. If the bat remains in the same location after one night, alternative actions will be discussed with regards to moving the bat from the active demolition area. Once the ecologist is satisfied that no microbats are roosting on the active demolition area, approval will be given to re-commence works in that area.

4.3 Injured or dead microbats

If microbats are found unexpectedly injured or dead in a works area, all works in the immediate area should cease and the site supervisor, onsite environmental staff, project engineer / site supervisor and supervising ecologist must be informed. Any evidence of injured or dead microbats should be documented, photographed and actions recorded with onsite works staff and directed to the project ecologist for further action. A suitable exclusion zone will be set up by the supervising ecologist and no works will be undertaken within that zone until specifically directed by the supervising ecologist.

Injured bats will be removed and taken to a local veterinarian or wildlife carer experienced in the care and handling of microbats by the project ecologist. Taronga Zoo is also an option as they have a fully qualified and experience veterinary team on hand who can properly handle any situation that arises. Options for treatment and future release would be decided and then documented by the supervising ecologist. Costs for treatment would be the responsibility of the contractor. Dead microbats will be collected by the project ecologist (using gloves and a plastic bag) and retained for lodgement with the Australian Museum.

5. Risks

Some of the procedures detailed within the plan pose various risks to human safety. The key risks include:

- contact with microbats
- working along a waterway
- working at night
- working at heights.

These risks are to be addressed by the project ecologist through preparation of a Safe Work Method Statement (SWMS) that outlines control measures required to eliminate or reduce the risks to acceptable levels.

5.1 Exposure to diseases such as Australian Bat Lyssavirus (ABLV)

Some microbats carry diseases that can be lethal to humans if untreated. Bats should not be handled by unvaccinated ((Australian Bat Lyssavirus (ABLV)) and unexperienced persons. Photos are the first and best course of action to help identify microbats and should be supplied to onsite environmental staff and the project ecologist.

Even if previously vaccinated against ABLV, if a person is bitten or scratched by a bat anywhere, they should:

- immediately wash the wound thoroughly with soap and water for at least five minutes - proper cleansing of the wound reduces the risk of infection
- apply an antiseptic with anti-virus action such as povidone-iodine, iodine tincture, aqueous iodine solution or alcohol (ethanol) after washing
- seek medical attention as soon as possible to care for the wound and to assess the risk of infection.

Anyone determined to be at risk of infection, regardless of vaccination status, would require treatment consisting of a combination of rabies immunoglobulin and rabies vaccine. Unvaccinated people will require an injection of rabies immunoglobulin as soon as possible and a series of either four or five rabies vaccine injections over one month. Fully vaccinated people usually require two further doses of the ABLV vaccine, but this will be dependent on exposure and current antibody counts. NSW Public Health Units will assess the risk and, where indicated, arrange for rabies vaccines and immunoglobulin to be delivered to a relevant GP or hospital.

The project ecologist and any other ecologists working on site must be vaccinated against Australian Bat Lyssavirus and wear gloves if handling microbats. The equipment and procedures for dealing with potentially infected persons outlined above must be detailed within the SWMS. Appropriate bat rescue equipment/ PPE must be available on site before works commence (cotton bags, gloves, soap and water to wash hands).

Controls to eliminate or reduce the remaining key risks identified above are commonly encountered on construction projects and should be adequately addressed in the SWMS prepared by the project ecologist.

6. Roles and responsibilities

Changes to this section removes the previous commitment made to have the project ecologist actively monitor or inspect the underside or any part of the wharf during demolition. It also removes the requirement for the contractor site supervisor to undertake daily inspection of exclusion devices and to notify the project ecologist if the exclusion devices are not secure.

The construction personnel, project ecologist, project manager and environmental officer form a team that work together to achieve short-term management of microbats at the subject site through delivery of the MMP.

The project engineer / site supervisor is responsible for:

- notifying the project ecologist if there are any changes to the scope of works or works schedule
- including the actions outlined in the MMP in the Construction Environmental Management Plan (CEMP) or Site Environmental Management Plan (SEMP)
- ensuring the location of potential microbat roosts are marked on site maps or drawings
- notifying the project ecologist of the proposed date for removal of land-based structures
- notifying the project ecologist of the proposed date for removal of water-based structures
- immediately notifying the project ecologist in the event of any unexpected finds of microbats during works (alive and healthy, injured or dead)
- covering the costs associated with rehabilitation and release of any microbat injured during the course of works
- ensuring monitoring of any new microbat habitat is undertaken (if required) and reported.

The project ecologist is responsible for:

- providing basic information and pictures of microbats to be included in the environmental induction and to be kept in the crib room and available to all site personnel
- preparing a SWMS and undertaking daily Toolbox Talks for the implementation of the MMP
- ~~procuring exclusion material~~
- maintaining an action log in relation to activities related to the implementation of the MMP
- ~~monitoring and installing exclusion devices (may require assistance from construction personnel to conduct the permanent exclusion)~~
- ~~conducting a pre-works inspection of the land and water-based structures being removed~~
- ~~conducting daily pre-works inspections of the land and water-based structures being removed if removal works will be undertaken over multiple days and the works site could provide potential roosting habitat for microbats~~
- ~~providing regular updates to the project manager and site supervisor on the progress of works~~
- dealing with any unexpected finds of microbats on site, including provision of advice, attendance at site at short notice, rescue, handling, and release of healthy bats, transfer of injured bats to an appropriate wildlife carer and lodgement of dead microbats with the Australian Museum
- reporting on the outcomes of the MMP within one month of completion of works
- undertaking and reporting on monitoring of any new microbat habitat.

The project ecologist is to provide guidance to the project manager such that the aims of the MMP are achieved and impact to microbats are minimised.

The contractor site supervisor is responsible for:

- conducting environmental inductions for all personnel working on site
- providing the relevant materials on site to deal with the immediate care of bites and scratches from microbats
- marking off any sensitive areas to prevent access to all non-essential personnel during works
- ~~conducting daily checks of the exclusion devices during the works period~~
- ~~notifying the project ecologist if the exclusion devices are not secure~~
- notifying the project manager of the proposed dates for removal of land and water-based structures identified as potential microbat habitat within the subject site
- stopping works on site in the event of any unexpected finds of microbats during works (alive and healthy, injured or dead)
- notifying the project manager of any unexpected finds of microbats during works (alive and healthy, injured or dead)
- maintaining a suitable exclusion zone around any unexpected finds on the advice of the project ecologist.

Construction staff and contractors are responsible for:

- attending site inductions including the environmental induction
- avoiding any sensitive areas marked off within the work site
- ~~assisting the project ecologist with installation of a permanent exclusion device (if required)~~
- stopping works immediately and notifying the site supervisor, project manager and environmental officer in the event of any unexpected finds of microbats during works (alive and healthy, injured or dead).

7. Reporting and communication

The project engineer and contractor site supervisor will be kept informed via regular email and phone updates of progress and key milestones throughout the implementation of the MMP by the project ecologist. An action log summarising all site works undertaken will be maintained by the project ecologist. The action log will be a record of the actions taken, personnel responsible, timing, results as measured against performance measures and decisions made regarding adaptive measures (if required) during the installation and monitoring of exclusion devices. The action log will be included in final project report.

A final project report outlining the actions taken in implementing the MMP and the success or otherwise of the MMP in mitigating impacts to microbats, including recommendations for improvements to the process that could be employed on future projects, will be submitted one month following the completion of the exclusion process.

Table 4 below outlines the main actions required in implementing the MMP, this will form the basis of the action log.

Table 4: Action log summary table to be included in the final report for exclusion over 5 days (scalable for exclusions over 3 days).

Management Measures	Details	Timing	Performance Indicators	Responsibility
Site inspection	Project inception	Commencement of project	Completed and documented	Project ecologist, site supervisor, project engineer
Environmental induction	Discussion of risks involved and safety procedures	Commencement of project	All relevant staff inducted	Project ecologist, site supervisor, project engineer, contractors and all site personnel
Action log	Commence logging actions	Commencement of project	Completed and documented	Project ecologist
Procure exclusion materials	Purchase suitable materials	At least two weeks prior to exclusion	Exclusion materials stored at office of project ecologist	Project ecologist
Exclusion – Day 1	First diurnal inspection and installation of exclusion devices	Late March – May or early Sept	Correct time of year	Project ecologist
	Emergence survey	After diurnal inspection	Completed and documented	Project ecologist
	Inspection following emergence survey	After emergence survey	Completed and documented	Project ecologist
	Dawn inspection	Morning of Day 2	Completed and documented	Project ecologist
Exclusion – Days 2 - 4	Second, third and fourth diurnal inspection	Late March – May or early Sept	Correct time of year	Project ecologist

Management Measures	Details	Timing	Performance Indicators	Responsibility
	Emergence survey	After diurnal inspection	Completed and documented	Project ecologist
	Inspection following emergence survey	After emergence survey	Completed and documented	Project ecologist
	Incremental closure of exclusion device	After nocturnal inspection	Completed and documented	Project ecologist
	Dawn inspection	Morning of Day 3, 4 & 5	Completed and documented	Project ecologist
Exclusion – Day 5	Final diurnal inspection	Late March – May or early Sept	Correct time of year	Project ecologist
	Emergence survey	After diurnal inspection	Completed and documented	Project ecologist
	Inspection following emergence survey	After emergence survey	Completed and documented	Project ecologist
	Completion of exclusion device	After nocturnal inspection	Completed and documented	Project ecologist
	Dawn inspection	Morning of Day 6	Completed and documented	Project ecologist
Permanent exclusion (relevant to derelict building only)	Install permanent exclusion device	Morning following completion of exclusion	Completed and documented	Project ecologist
Notification	Email to PM to confirm exclusion complete	Day that exclusion is completed	Completed and documented	Project ecologist
Exclusion monitoring	Inspect exclusion device and email results to project manager	One week following completion of exclusion	Exclusion device secure	Project ecologist
Exclusion monitoring	Inspect exclusion device and email results to project manager	Monthly following completion of exclusion and up to commencement of works Following extreme weather events	Exclusion device secure	Project ecologist
~~Pre-works inspection~~	~~Inspect exclusion devices and email results to project manager~~	~~First day of any land and water-based structure removal prior to works, first day of removal of high conservation value sections of wharf structures prior to works (Figure 2)~~	~~Exclusion device secure and no microbats present at start of daily works~~	~~Project ecologist~~

Management Measures	Details	Timing	Performance Indicators	Responsibility
~~Exclusion device re-instatement on first day of works~~	~~Assist and advise contractors on method for re-instatement of exclusion devices at conclusion of first day of works~~	~~Afternoon on first day of demolition and following morning, may need to be repeated on successive afternoons/mornings until ecologist satisfied that process is being completed successfully; if changes to method of re-instatement of exclusion devices is required; at request of site supervisor if uncertainty exists over re-instatement of exclusion devices~~	~~Exclusion devices secure and no microbats present at start of daily works~~	~~Project ecologist~~
~~Daily works inspection~~	~~Inspect exclusion device and inform project ecologist if action required~~	~~Daily during works on Subject site~~	~~Exclusion device secure~~	~~Site supervisor~~
~~Remove exclusion devices at start of daily works and re-instate at end of daily works~~	~~Remove exclusion device for active works area to allow works, re-instate at end of day~~	~~Immediately prior to commencing removal of sections of the structure, at conclusion of daily works~~	~~Works commence daily without interruption or unexpected finds of microbats~~	~~Site supervisor under advice and direction of Project ecologist~~
On-site ecologist for ~~exclusion device~~ advice ~~/ placement, unexpected finds~~	Advise contractors ~~on exclusion device re-instatement at end of daily works~~ and attend site when required to assist or deal with unexpected finds of microbats	As required	Ecologist responds in a timely manner to any issues	Project ecologist
Reporting	Prepare a report outlining actions undertaken	Within one month following removal of structures on site	Completed and documented	Project ecologist
Monitoring of bat boxes and new structures	Diurnal inspection of bat boxes at Subject site and compensatory sites, plus an overnight survey under those supporting structures using ultrasonic recordings	Once in winter and once in summer during years 1, 3 and 5 post construction	Completed and documented	Project ecologist

Management Measures	Details	Timing	Performance Indicators	Responsibility
Monitoring report of bat boxes ~~(if required)~~	Prepare a report outlining monitoring ~~actions and~~ results	Within one month following completion of monitoring years 1, 3 and 5 post construction	Completed and documented	Project ecologist

Addendum 2 – seawall

The exclusion activity related to the seawall will follow a process similar to that undertaken for the exclusion from the wharves (Table 4). Specific actions to be logged will include:

- April 2021 – Ecologist to work with contractor to design one-way valves for each of the potential microbat roosting sites. Designs will vary depending on size and location, such as small screens over individual holes and top-to-bottom curtains covering larger openings.
- April 2021 – Ecologists to conduct an emergence survey including ultrasonic recording of the seawall and one diurnal search using video camera mounted to a pole the following day, prior to installing one-way valves.
- April 2021 – Contractor to install one-way valves over each opening under supervision of ecologist on the day diurnal inspections are carried out.
- April 2021 – Ecologists to conduct emergence survey of newly installed one-way valves and to supervise contractor during installation of any one-way valves required to be installed after microbats have exited roosts to forage.
- Ecologists to conduct emergence surveys for at least three consecutive nights starting the day one-way valves are installed. If microbats are observed emerging on the third night, then the emergence surveys will continue the following night/s until no bats are observed emerging.
- One-way values to be permanently sealed the following day, and maintained until seawall demolition/repair commences.

These will also be included in a revised final report.

8. Monitoring

Monitoring requirements have the following items removed (strike through) due to unsafe access beneath the wharf. Additional clarification is underlined below. All other monitoring requirements are unchanged.

The objectives of monitoring are to:

- Ensure no microbats are harmed by the construction works.
- Identify the need to adjust the exclusion methodology to minimise impacts to microbats.
- Identify whether the microbat management actions have been implemented and gauge their success.
- Provide further recommendations for consideration on future projects with similar impacts on threatened microbats.

Monitoring of the potential habitat at the subject site, any bat boxes installed as compensatory habitat and exclusion devices would be undertaken by the project ecologist as follows:

- immediately prior to commencing exclusion (bat boxes only)
- daily during the exclusion process (structures, exclusion devices and bat boxes)
- one week following the completion of the exclusion process (structures, exclusion devices and bat boxes)
- once per month until removal of land and water-based structures occurs (structures, exclusion devices and bat boxes)
- ~~once on the first day any land or water-based structures identified as potential microbat habitat are scheduled to be removed (structures, exclusion devices and bat boxes)~~
- ~~once on the first day that high conservation value habitat beneath the largest wharf (Figure 2) is to be removed (structures, exclusion devices and bat boxes)~~
- ultrasonic monitoring beneath the Hanson wharf (B3) to continue until there has been at least six consecutive nights of no activity recorded, or up until the day prior to commencement of demolition or as close as possible to coincide with favourable tidal access, whichever is sooner, with data downloaded and reviewed about every 3-7 days.
- at the request of the site supervisor where uncertainty exists around exclusion device placement or unexpected finds occur (structures only)
- quarterly monitoring of compensatory bat boxes during the construction period (bat boxes only)
- once at the completion of the project to determine whether microbat habitat exists in the newly created structures, and whether microbats have inhabited any of the compensatory bat boxes (structures and bat boxes)
- twice per year in years 1, 3 and 5 following the completion of works (winter and summer) if microbat habitat is present within the new Sydney Fish Market and for any bat boxes installed as compensatory habitat (structures and bat boxes).

8.1 Monitoring methodology

Monitoring during exclusion and post construction involves diurnal and nocturnal visual inspections of the potential habitat on site by a suitably qualified ecologist with experience in microbats using torches, burrow scopes and cameras, as well as emergence surveys, ultrasonic recording and use of thermal imaging cameras during emergence.

In the case where permanent microbat habitat created within the newly built structure proves difficult to monitor visually during the day, it may be necessary to include a nocturnal emergence survey incorporating ultrasonic recording for a period of up to 1.5 hours during each monitoring event. Information to be recorded during each monitoring event includes:

- unique identifier for each structure, bat box or roost feature
- date and time of inspection
- name of surveyor
- number of microbats present
- species of microbats present
- indications of breeding activity
- occurrence of ectoparasites / bat bugs
- evidence of occupation (guano)
- condition of roost feature
- weather conditions
- photographs of roosting microbats.

Details of all monitoring inspections would be recorded in the log of actions and emailed to the project manager following each monitoring inspection. The action log (Table 4) would be appended to the final report compiled by the project ecologist and provided to the project manager within one month upon completion of the project.

8.2 Performance measures

The project would be considered successful if there are no microbats injured or harmed as a result of the exclusion process and construction works. If microbat habitat is present within the new structures on site, post-construction monitoring will document the nature of this habitat and provide information on evidence for use of this habitat by microbats. Uptake of alternative compensatory habitat provided in the surrounding landscape in the form of bat boxes will also be documented. These measures will be deemed successful if there is evidence of sustained use of any newly created microbat roosting habitat in the new structures or within the boxes by Southern Myotis and / or use of the new habitat or boxes as a maternity roost by southern Myotis.

Evidence of ‘Sustained use’ is defined as:

At artificial bat boxes installed at Pirrama Park site and Mort Bay Park site:

a. A maternity colony of Southern Myotis observed in any box at the same site (Pirrama Park, Mort Bay Park) in at least three monitoring events in total, of which at least two are during the 5 years following completion of works, or

b. More than one Southern Myotis recorded at the same site (Pirrama Park, Mort Bay Park) in at least four monitoring events in total, of which at least three are in the in the 5 years following completion of works.

Within the new Sydney Fish Market construction or elsewhere in Blackwattle Bay:

c. A maternity colony of Southern Myotis observed in at least three monitoring events during the 5 years following completion of works, or
d. More than one Southern Myotis recorded in at least four monitoring events in the in the 5 years following completion of works.

Monitoring will occur accordance with the schedule specified in Table 4, with a minimum of six monitoring events, in years 1, 3 and 5 during the 5 year period following completion of works. However, a maximum of two monitoring events, separated seasonally, in any one year may be counted for the purposes of the definition of 'sustained use'.

It is noted that even if potential microbat roosting habitat is present within the new structures on site, there may be no evidence of microbats found during any of the post construction monitoring inspections. It is known that it can take years for microbats to take up newly created roosts or bat boxes.

Condition E33 of development consent for SSD 8925 requires that if at the end of the 5th year following completion of the works , there is no evidence of sustained use by Southern Myotis (Myotis Macropus) as a maternity roost and/or use of the compensatory roost boxes or of the habitat within the new Sydney Fish Market structures, the Applicant must purchase and retire Southern Myotis (Myotis Macropus) biodiversity credits to offset the prescribed impacts for the loss of habitat at the site, to the satisfaction of EESG.

8.3 Monitoring report

An annual monitoring report summarising the results of the post construction monitoring events will be prepared by the project ecologist. This will be completed within one month following the conclusion of each year of monitoring (comprising the two post construction monitoring events conducted in summer and winter during years 1, 3 and 5). The monitoring report would include a brief description of the background to the project, details of the microbat habitat lost, details of compensatory habitat installed and details of any microbat habitat present in the new structures, aims and objectives of the monitoring, monitoring methodology, results of monitoring events and recommendations for future improvements to MMPs. The annual monitoring report will be provided to EES and the results will be incorporated in the Construction Compliance Reports required under Part B of the development consents for SSD 8924 and 8925.

9. Potentially occurring microbat species photographs



Figure 13: *Miniopterus orianae oceanensis* Large Bent-winged Bats (Vulnerable species under the NSW BC Act). Photo taken by Alicia Scanlon.



Figure 14: *Myotis macropus* Southern Myotis roost with unfurred pup in centre of photo (Vulnerable species under the NSW BC Act). Photo taken by Alicia Scanlon.

10. References

Barclay, R. M., & Harder, L. D. (2003). Life histories of bats: life in the slow lane. *Bat ecology*, 209-253.

Campbell, S. (2009). So long as it's near water: variable roosting behaviour of the large-footed myotis (*Myotis macropus*). *Australian Journal of Zoology*, *57*(2), 89-98.

Churchill, S. (2008). *Australian Bats. Second Edition.* Allen and Unwin Sydney.

Eco Logical Australia (2020) *The new Sydney Fish Market: Biodiversity Development Assessment Report*. Prepared for Infrastructure NSW.

Geiser, F. and Kortner, G. (2010) Hibernation and daily torpor in Australian mammals. *Australian Zoologist* 35 (2) 204 - 215

Gonsalves, L. and Law, B. 2017. Distribution and key foraging habitat of the Large-footed Myotis *Myotis macropus* in the highly modified Port Jackson estuary, Sydney, Australia: an overlooked, but vulnerable bat. *Australian Zoologist*: 2017, Vol. 38, No. 4, pp. 629-642.

Gorecki, V. (2019). Roost selection in concrete culverts by the large-footed Myotis (Myotis macropus). A presentation to the Ecological Consultants Association Conference 2019, Hunter Valley NSW.

NSW Office of Environment and Heritage (OEH) 2018. 'Species credit' threatened bats and their habitats - NSW survey guide for the Biodiversity Assessment Methodology.

Appendix A Exclusion material product specification sheet

BURWELL TECHNOLOGIES

Product Data Sheet

Envirogard

Scaffold and Containment Sheeting



Burwell ENVIROGARD is Reinforced Heavy Duty Polyethylene Sheeting used for weatherproofing and containment of Dust, Debris and Blasting Media to protect workers, job sites and the environment in Abrasive Blasting, Painting and Building Construction applications.

Specifications and Technical Data

ENVIROGARD is a Clear, Heavy Duty Polyethylene Sheeting over a tear resistant 1500 denier polypropylene reinforcing grid mesh. Three 50mm wide Reinforcement Bands with pre-punched grommets are fitted lengthwise on each roll for increased strength and security. Only ENVIROGARD has Eyelet Bands with Die-Cut Grommet points spaced every 200mm for super adjustable scaffold attachment.

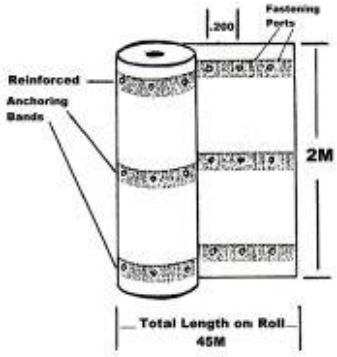
ENVIROGARD adjustable E-Z Ties are designed to pierce through the Die-Cut Grommet and secure the Sheeting to the Scaffold structure.

Panels of ENVIROGARD Scaffold Sheeting can be affixed together to form a single sheet airtight enclosure that meets SSPC Class 1 Containment.

Composition	1500 Denier Polyester yarn encased in low density clear Polyethylene Film.
Temperature Performance	-40ºC to +80ºC
UV Protection	Maximum UV Stabilisers for high durability
Light Transmission	Approximately 80%
Roll Size/Weight	2m Wide x 45m Long @ 240gsm
	4m Wide x 45m Long @ 240gsm
	2m Wide x 45m Long @ 180gsm
Thickness	0.26mm (.010")
Puncture Strength	500N

Exclusive Features

- ENVIROGARD'S three strategically placed reinforcement bands with pre-punched grommets make it the strongest and easiest to erect sheeting on the market.
- Available in FLAME RETARDANT and NON-FLAME RETARDANT styles.
- The unique EZ-TIE is the fastest and easiest way to secure scaffold sheeting directly to any standard scaffold. EZ-TIE is re-useable, adjustable and accessible from the front of the scaffold beam.
- The SCREW LOC connector is the smartest and simplest way to join multiple overlapping panels of ENVIROGARD sheeting.
- ENVIROGARD transparent sheeting provides the ultimate protection for dust and debris containment whilst maximizing light transmittal for an optimum working environment.
- ENVIROGARD containment sheeting is waterproof, tear resistant, impermeable, mildew resistant, UV stabilized, resistant to most chemicals/salts and acids and TOTALLY RE-USEABLE.



Copyright 2018 Burwell Technologies

For more information: **1300 287 935** / mail@burwell.com.au / www.burwell.com.au

Appendix B Microbat habitat replacement



Figure 15: Four chamber microbat box constructed from recycled plastic (Cyplas™) and available from Hollow Log Homes (www.hollowloghomes.com)

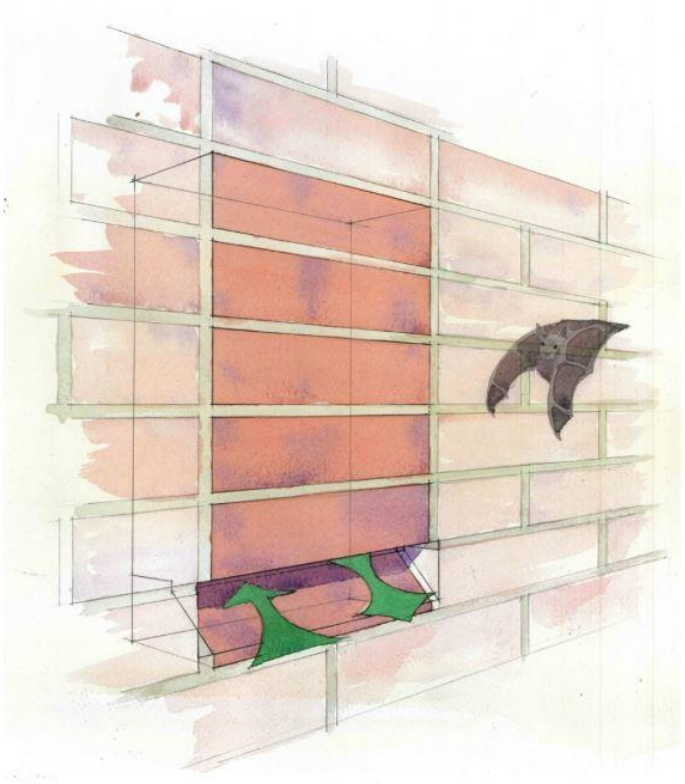


Figure 16: Microbat roost habitat design for use in the walls of solid structures and suitable for a range of cavity roosting and subterranean roosting microbat species

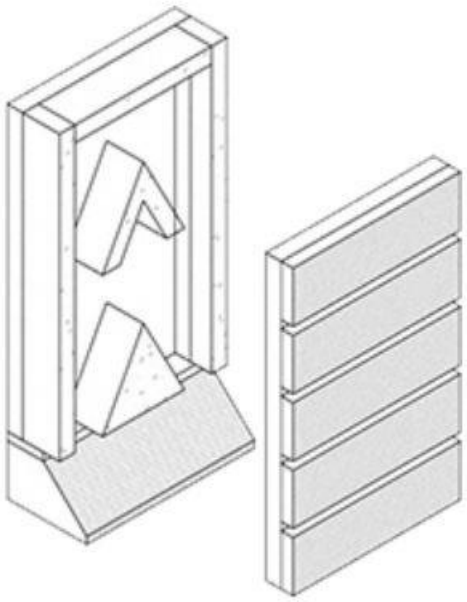


Figure 17: Internal cut away view and design features for the microbat roosting habitat

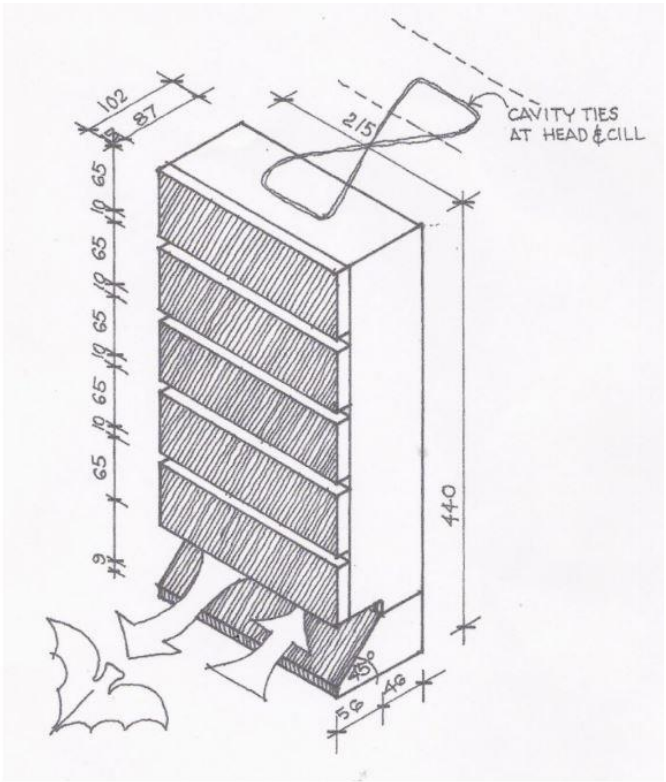


Figure 18: Design specifications for the microbat roosting habitat

Appendix C Seawall potential habitat mapping and photographs (March 2021)





B1



B2



B3



B4



B5



B6



B7



B8



B9



B10



B11



B12



B13



B14



B15



B16



B17



B18



Cavity behind wall



Cavity behind wall



Space between two walls



Space between two walls



Space between two walls



Cavity behind wall

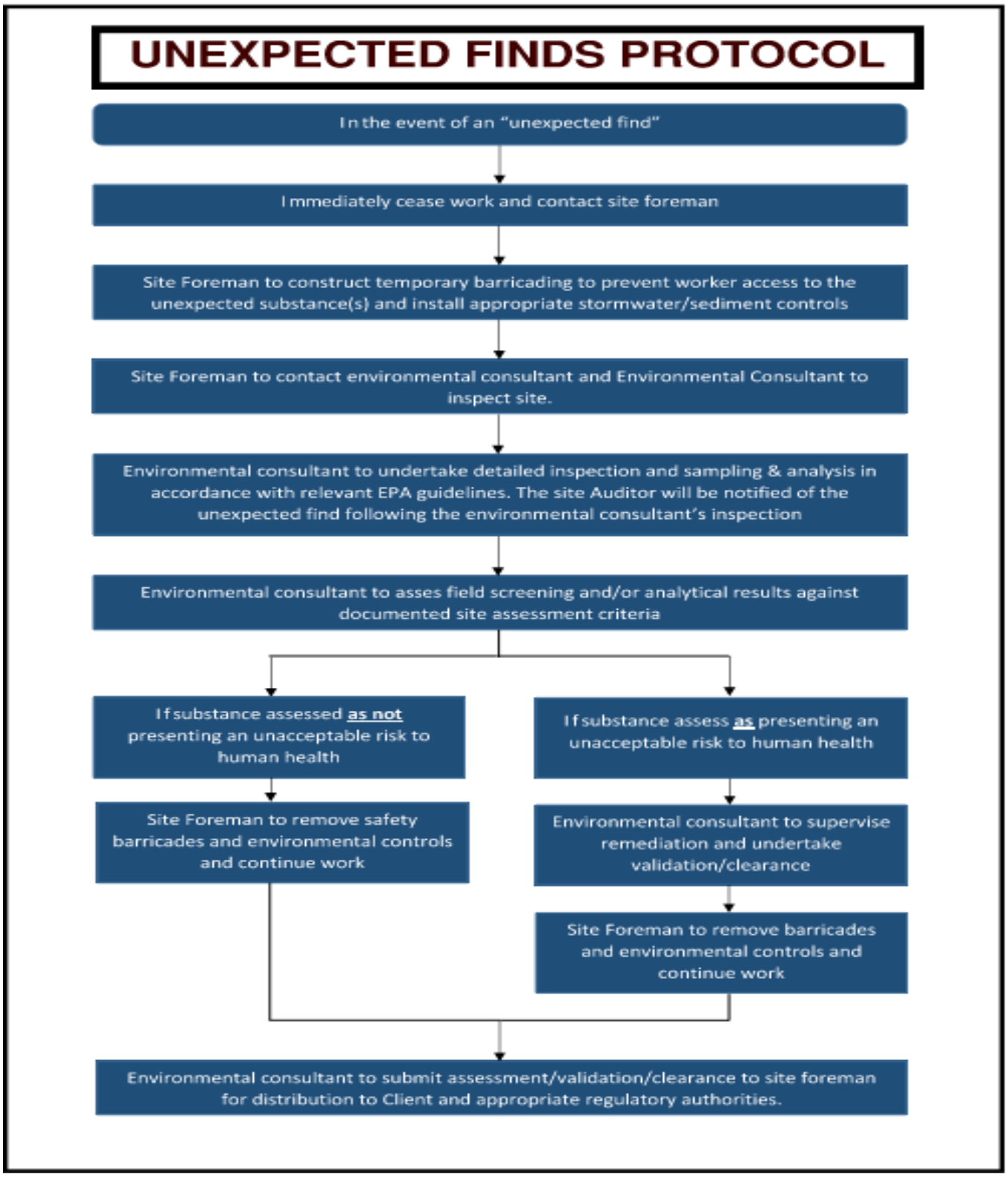


eco logical AUSTRALIA
A TETRA TECH COMPANY

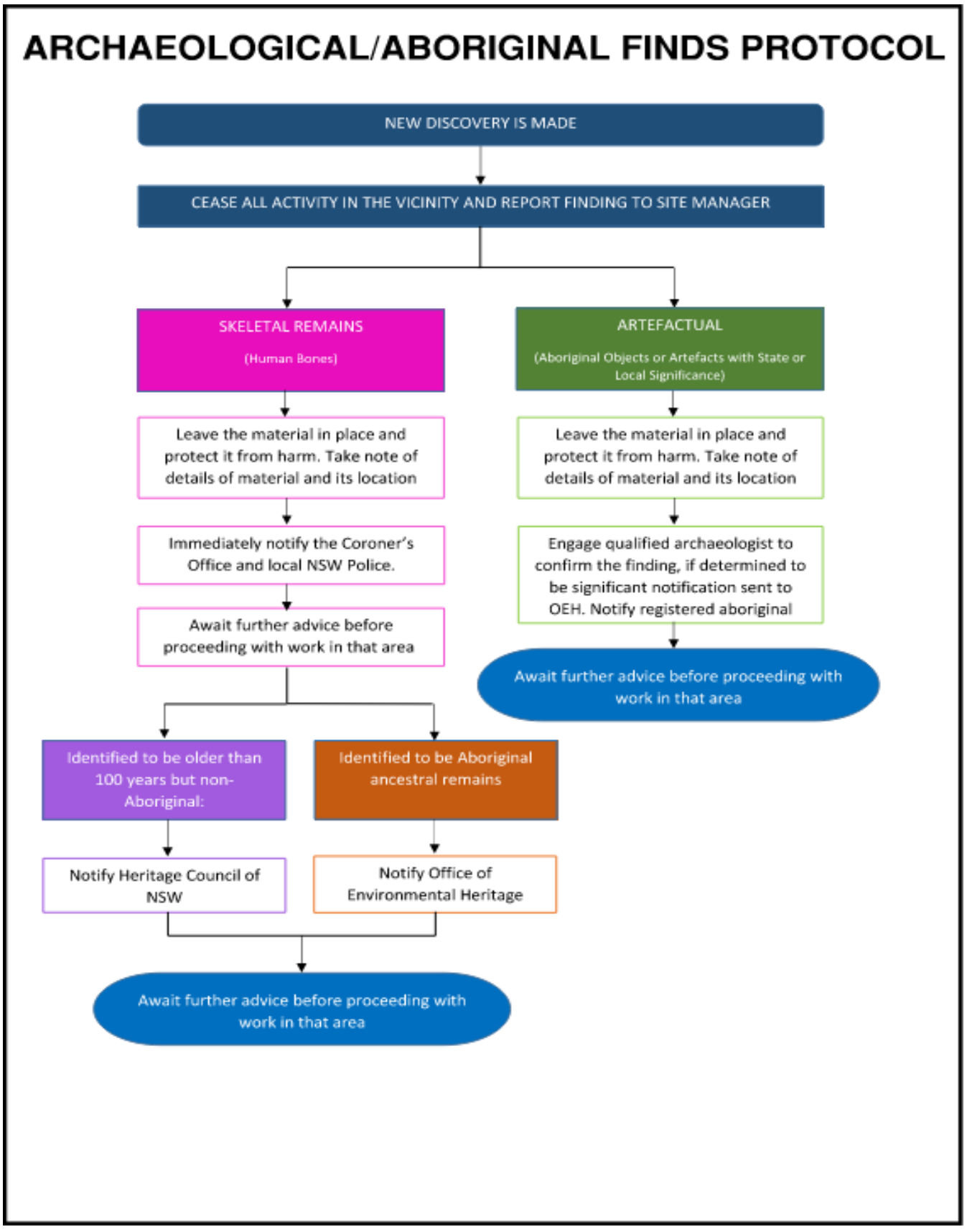
1300 646 131
www.ecoaus.com.au

Appendix 18: Unexpected Finds Protocols

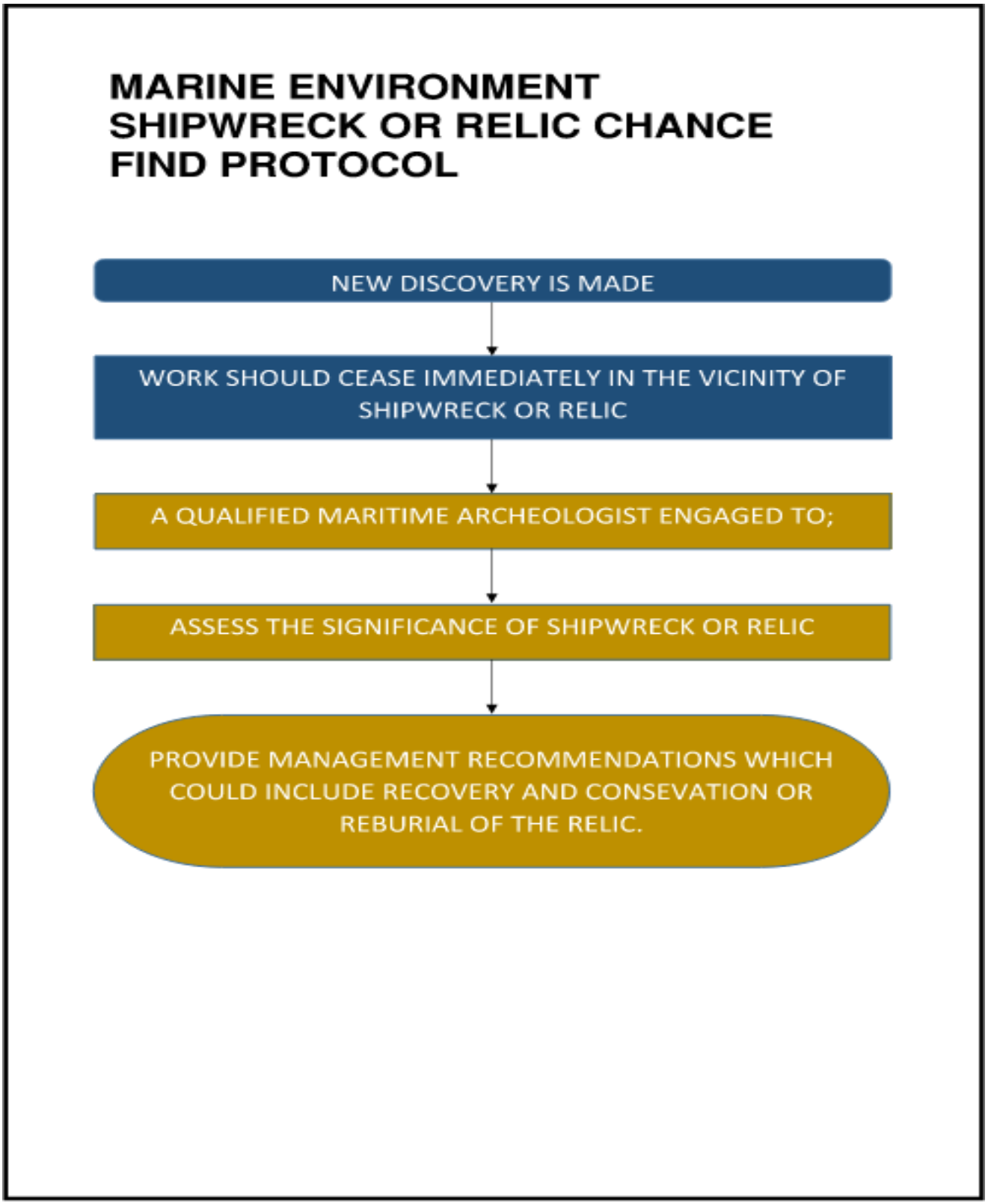
14.18.1 Unexpected Finds Protocol (Contamination)



14.18.2 Unexpected Finds Protocol (Artefacts)



14.18.3 Marine Environment Chance Find Protocol



Appendix 19: Environmental – Pollution Incident Response

MULTIPLEX

4.8 Environmental – Pollution Incident

In the event of a pollution incident (incl. a leak, spill or escape of a substance) on site:

Personnel discovering Pollution Incident

1. Notify a Multiplex Representative or use an Emergency Call Point
2. If safe to do so, remain in the area until the Area Warden has arrived

Trained Subcontractors

1. If it is safe to do so:
   a. Identify the chemical and put on appropriate PPE listed on the SDS
   b. Locate source of pollution and isolate to prevent further discharge or emission.
   c. Erect barriers around the area to prevent it from entering drains and water bodies.
   d. Maintain barriers and use the appropriate containment materials contained in the spill kit
2. Otherwise wait for emergency services

Area Warden

1. Determine if the area is safe to enter and report to the Chief Warden
2. Keep area clear of unauthorised people
3. Take records of events and times

Chief Warden

1. Determine if emergency services are required. Contact emergency services or instruct others to do so if required
2. Allocate personnel to wait at the designated location to direct emergency services
3. Assist emergency services
4. Otherwise attend the area and ensure that the correct process are being followed
5. Organise to dispose the waste / spill in accordance with the SDS or advice from Emergency Services

Additional Requirements

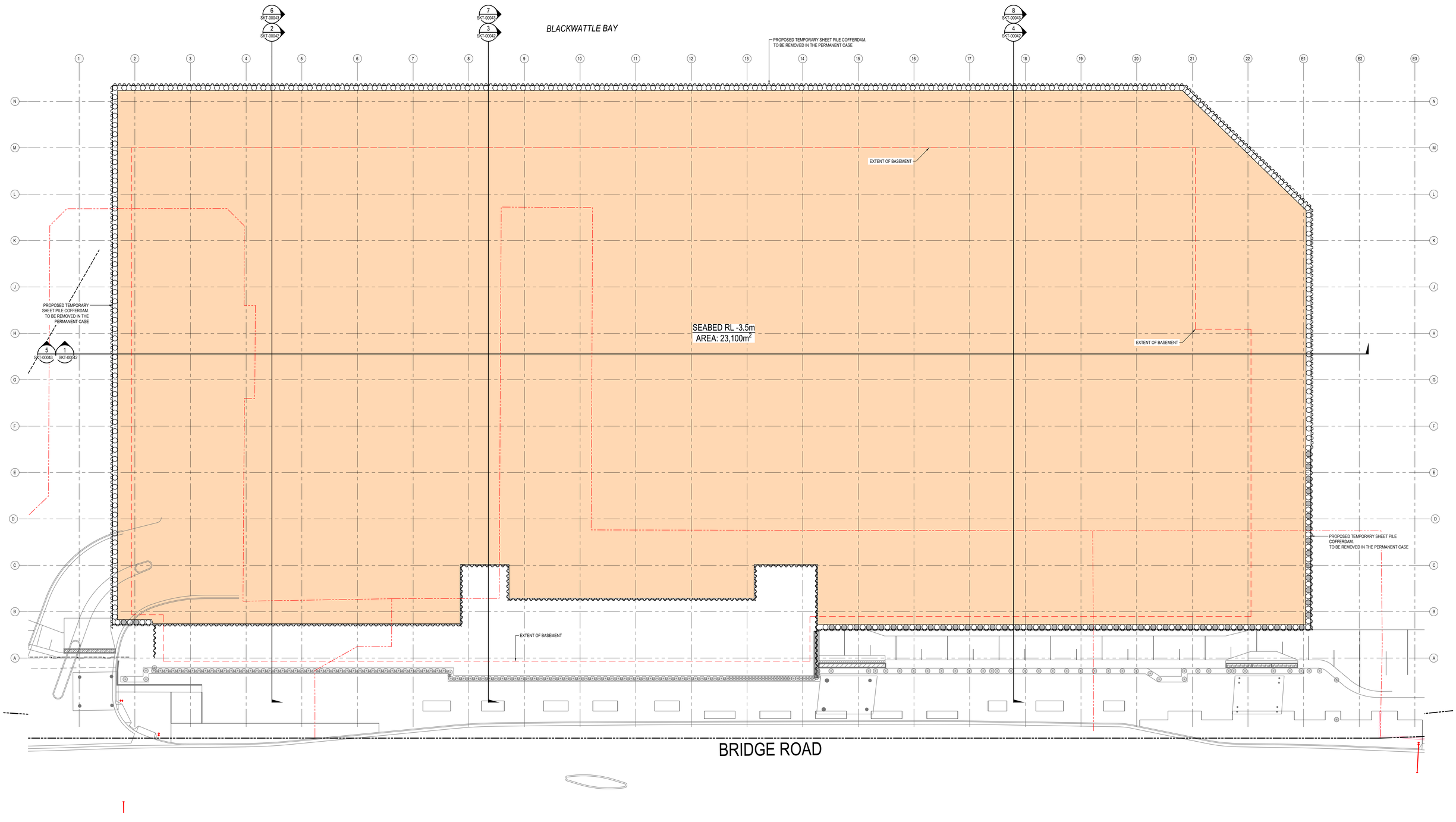
In the case of:

Serious injury refer to **Section 4.2 – Medical Emergency / Serious Injury**

Appendix 20: Civil Engineering Drawings

LEGEND

EXTENT OF AREA TO BE CAPPED



Issue	Description	Date
3	ISSUED FOR INFORMATION	09-02-22
2	ISSUED FOR INFORMATION	24-11-21
1	ISSUED FOR INFORMATION	08-10-21

100mm on Original

Bar Scales

0 5 10 15 20 25m

1 : 250 @ A0

THIS DRAWING CANNOT BE COPIED OR REPRODUCED IN ANY FORM OR USED FOR ANY OTHER PURPOSE OTHER THAN THAT ORIGINALLY INTENDED WITHOUT THE WRITTEN PERMISSION OF AT&L

Client: MULTIPLEX

Scales: 1:250 | Drawn: PDK | Designed | Checked | Approved

Grid: MGA56 (GDA94) | Height Datum: AHD

Project: SYDNEY FISH MARKETS

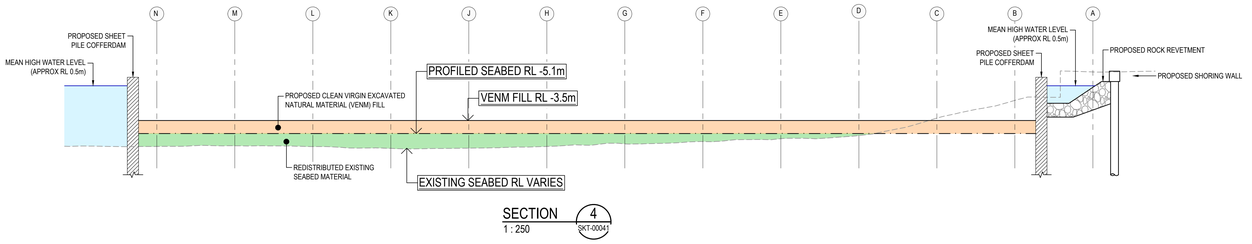
Title: COFFERDAM PROFILING PLAN

Civil Engineers and Project Managers
at&l
Level 7, 153 Walker Street
North Sydney NSW 2060
ABN 96 130 882 405
Tel: 02 9439 1777
Fax: 02 9923 1055
www.atl.net.au
info@atl.net.au

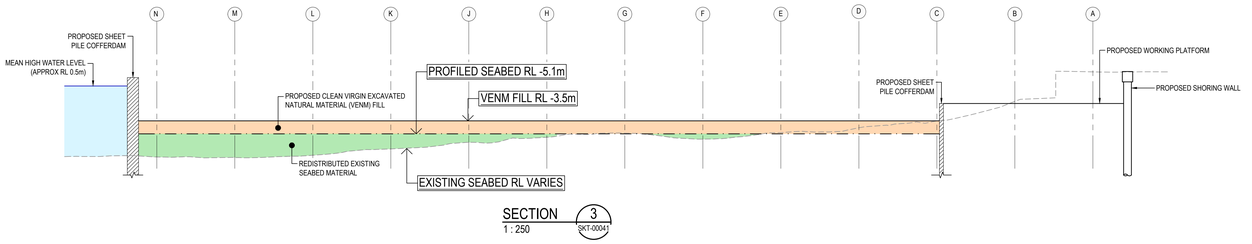
Status: FOR INFORMATION (NOT FOR CONSTRUCTION) | A0

Drawing No.: ATL-CV-SKT-00041 | AT&L Project: 20-819 | Issue: 3

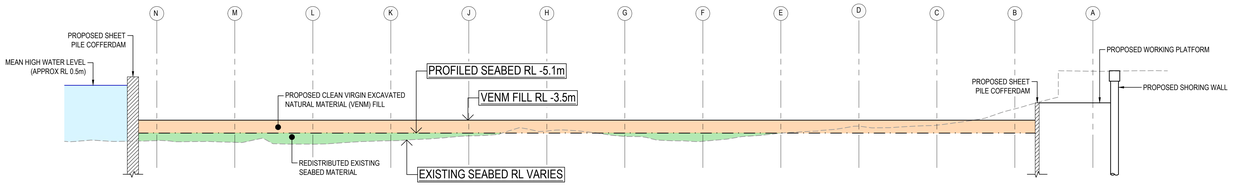
F:\20-819 Fish Markets\6.0 Drgs\Civil\Sketches\ATL-CV-SKT-00041.dwg



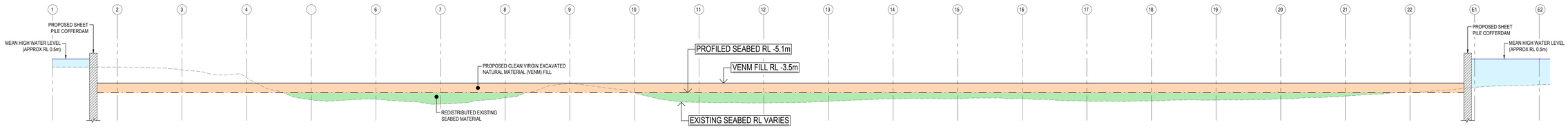
SECTION 4
1 : 250 SKT-00041



SECTION 3
1 : 250 SKT-00041



SECTION 2
1 : 250 SKT-00041



SECTION 1
1 : 250 SKT-00041

Issue	Description	Date
2	ISSUED FOR INFORMATION	24-11-21
1	ISSUED FOR INFORMATION	10-10-21

100mm on Original

Bar Scales

0 5 10 15 20 25m

1 : 250 @ A0

THIS DRAWING CANNOT BE COPIED OR REPRODUCED IN ANY FORM OR USED FOR ANY OTHER PURPOSE OTHER THAN THAT ORIGINALLY INTENDED WITHOUT THE WRITTEN PERMISSION OF AT&L

Client

MULTIPLEX

Scales 1:250

Grid MGA56 (GDA94)

Height Datum AHD

Drawn PDK

Designed

Checked

Approved

Project

SYDNEY FISH MARKETS

Title

TEMPORARY COFFERDAM PROFILING SECTIONS

Civil Engineers and Project Managers

at&l

Level 7, 153 Walker Street
North Sydney NSW 2060
ABN 96 130 882 405
Tel: 02 9439 1777
Fax: 02 9923 1055
www.atl.net.au
info@atl.net.au

Status FOR INFORMATION (NOT FOR CONSTRUCTION)

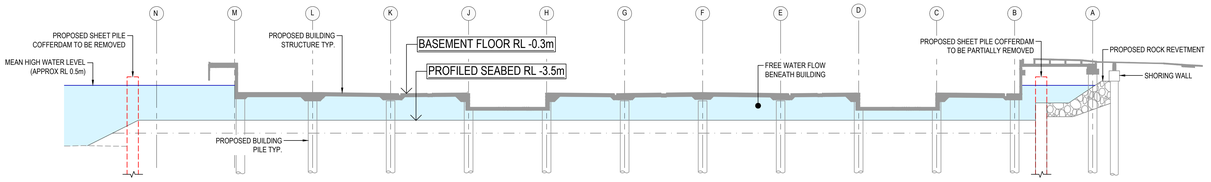
A0

Drawing No. ATL-CV-SKT-00042

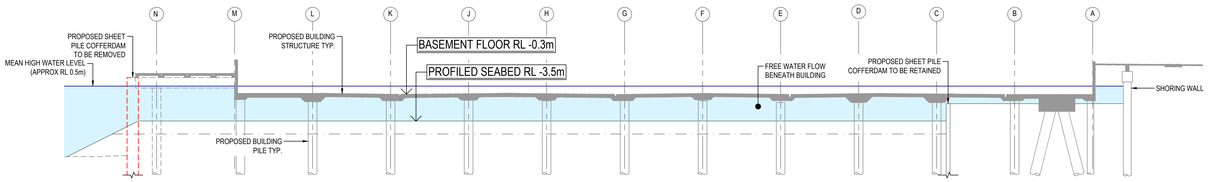
AT&L Project 20-819

Issue 2

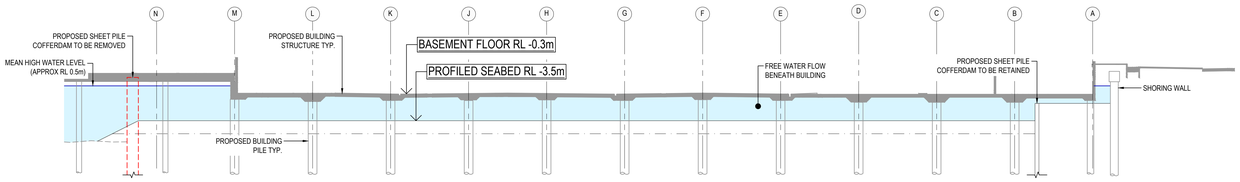
F:\20-819 Fish Markets\6.0 Drgs\Civil\Sketches\ATL-CV-SKT-00042.dwg



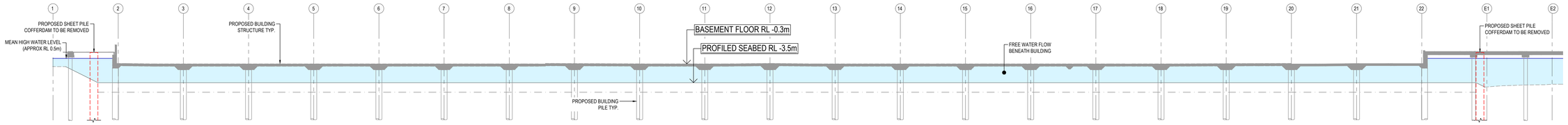
SECTION 8
1 : 250
SKT-00041



SECTION 7
1 : 250
SKT-00041



SECTION 6
1 : 250
SKT-00041



SECTION 5
1 : 250
SKT-00041

Issue	Description	Date
3	ISSUED FOR INFORMATION	09-02-22
2	ISSUED FOR INFORMATION	24-11-21
1	ISSUED FOR INFORMATION	10-10-21

100mm on Original

Bar Scales

0 5 10 15 20 25m

1 : 250 @ A0

THIS DRAWING CANNOT BE COPIED OR REPRODUCED IN ANY FORM OR USED FOR ANY OTHER PURPOSE OTHER THAN THAT ORIGINALLY INTENDED WITHOUT THE WRITTEN PERMISSION OF AT&L

Client

MULTIPLEX

Scales 1:250

Drawn PDK

Designed

Checked

Approved

Grid MGA56 (GDA94)

Height Datum AHD

Project

SYDNEY FISH MARKETS

Title

PERMANENT COFFERDAM PROFILING SECTIONS

Civil Engineers and Project Managers

at&l

Level 7, 153 Walker Street
North Sydney NSW 2060
ABN 96 130 882 405
Tel: 02 9439 1777
Fax: 02 9923 1055
www.atl.net.au
info@atl.net.au

Status FOR INFORMATION (NOT FOR CONSTRUCTION)

A0

Drawing No. ATL-CV-SKT-00043

AT&L Project 20-819

Issue 3

F:\20-819 Fish Markets\6.0 Drgs\Civil\Sketches\ATL-CV-SKT-00043.dwg

Appendix 21: Revised Construction Staging Plan

NEW FISH MARKETS CONSTRUCTION STAGING - MAIN WORKS

STAGE 0 - PRE-COMMENCEMENT WORKS

KEY ACTIVITIES:
- SILT CURTAIN ESTABLISHMENT
- SEDIMENT REDISTRIBUTION

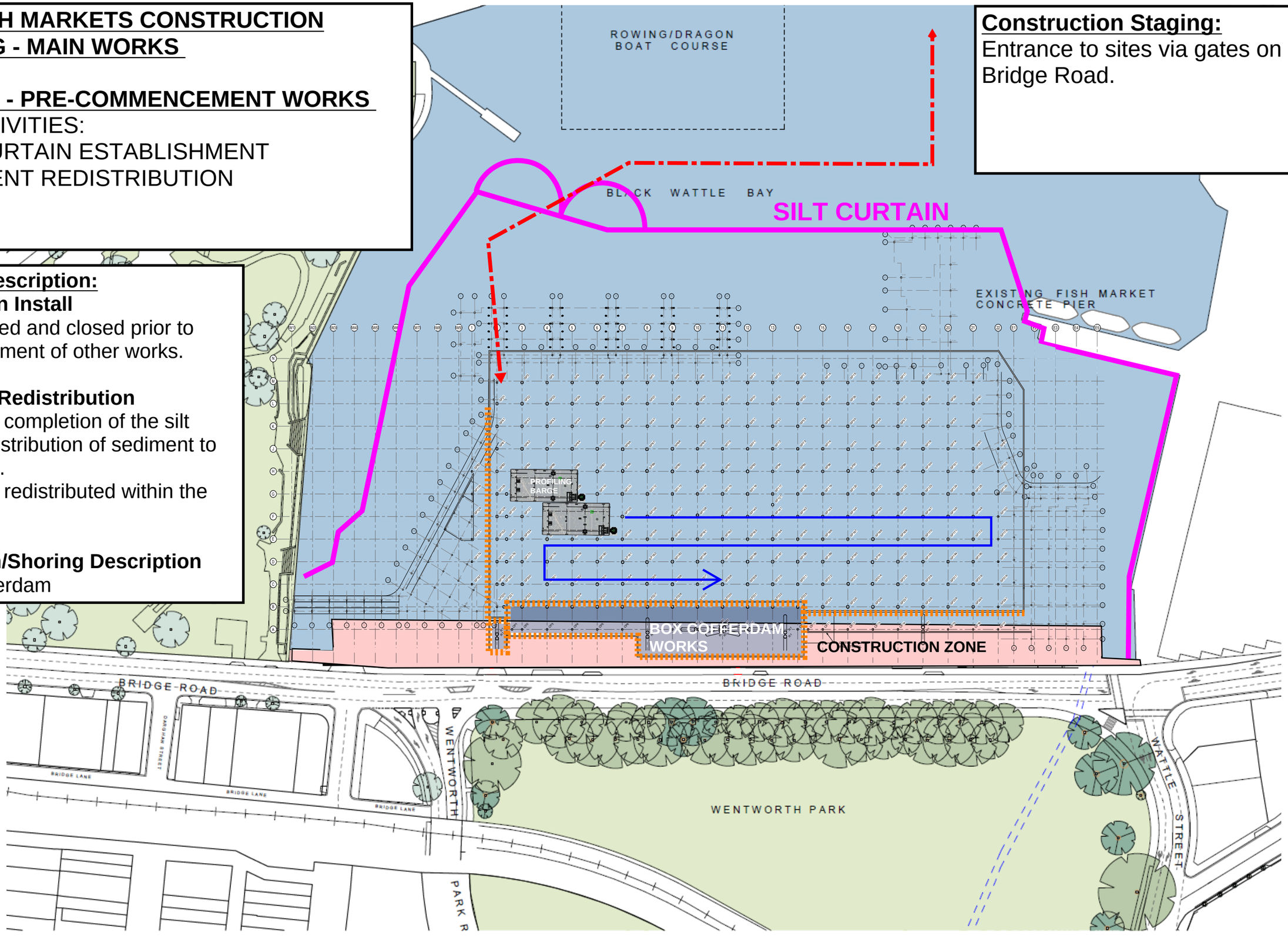
Activity Description:

Silt Curtain Install
- Silt installed and closed prior to commencement of other works.

Sediment Redistribution
- Following completion of the silt curtain redistribution of sediment to commence.
- Sediment redistributed within the site.

Cofferdam/Shoring Description
- Start cofferdam

Construction Staging:
Entrance to sites via gates on Bridge Road.



NEW FISH MARKETS CONSTRUCTION STAGING - MAIN WORKS

STAGE 1 - MARINE WORKS

KEY ACTIVITIES:
-COFFERDAM/SHORING INSTALL
-BOX COFFERDAM WORKS
-MARINE AND LAND BASED PILING
-SITE ESTABLISHMENT
-BACKFILL WITHIN COFFERDAM
-SITE ESTABLISHMENT

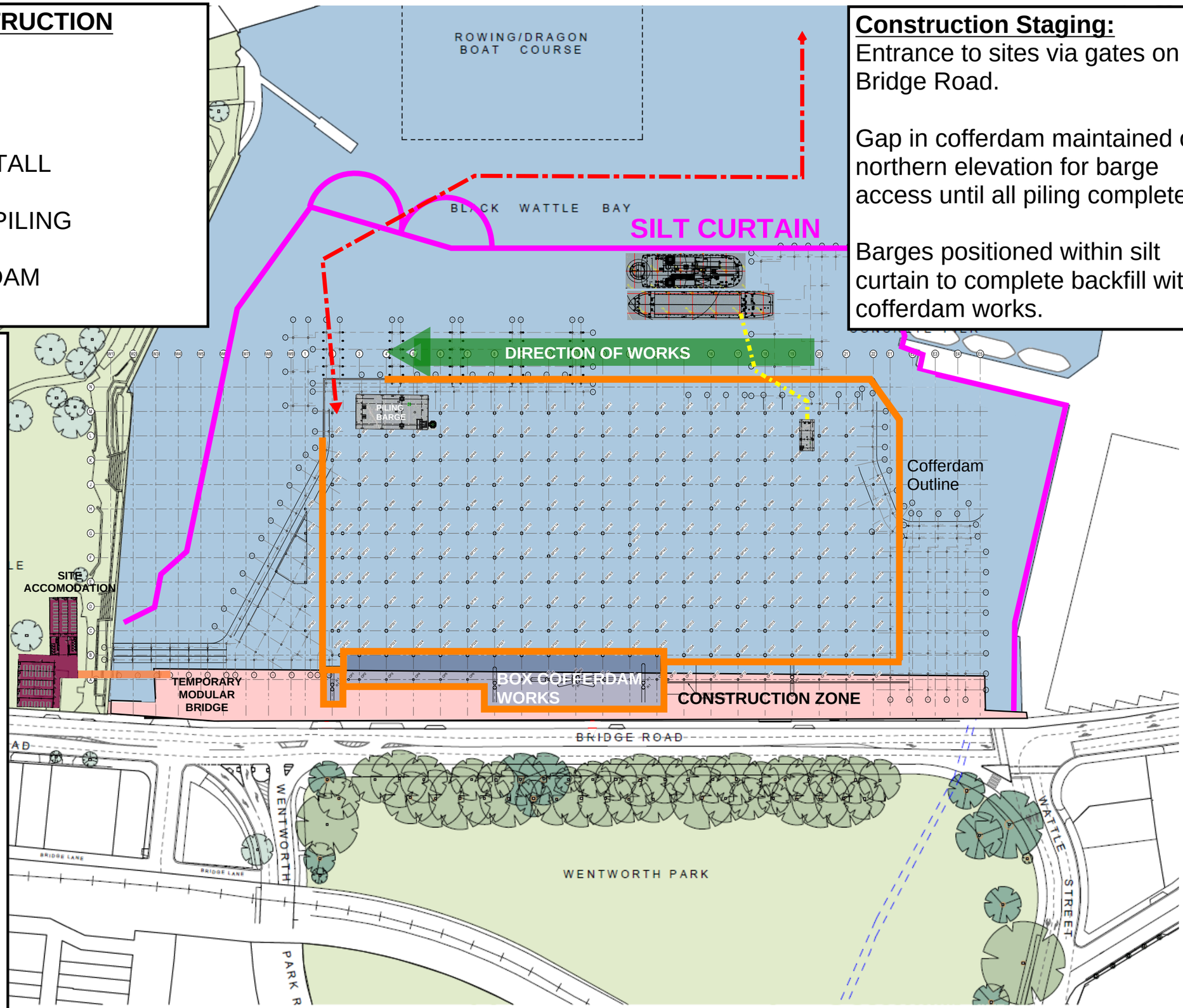
Activity Description:

Marine Piling Description
- Install of Steel Hollow Section piles into Class III rock. Including some promenade piles not impacted by cofferdam.
- Piles
- Promenade Piles

Cofferdam/Shoring Description
- Single skin steel pile cofferdam wall made up sheet piles.
- Southern Shoring wall to be completed landbased and waterside on other elevations.

Box Cofferdam Description
- Southern box cofferdam to be completed with steel pile cofferdam walls.
- Install of anchors to box cofferdam southern sheets
- Commence prep works for piling platform and landbased piles.

Backfill within Cofferdam Description
- Split Hopper and Excavator Barge feeding sand/stone backfill inside cofferdam.



Construction Staging:
Entrance to sites via gates on Bridge Road.

Gap in cofferdam maintained on northern elevation for barge access until all piling complete.

Barges positioned within silt curtain to complete backfill within cofferdam works.

NEW FISH MARKETS CONSTRUCTION STAGING - MAIN WORKS

STAGE 2 - DEWATERING, LANDBASED PILES

KEY ACTIVITIES:
-DEWATERING OF COFFERDAMS
-COMPLETION OF LANDBASED PILES
-PROMENADE SLABS
-CRANE ERECTION

Activity Description:

Backfill within Cofferdam Description

- Split Hopper and Excavator Barge feeding sand/stone backfill inside.

Cofferdam Dewatering

- Dewater approx 2m of water to expose top of piles usin submersible pumps.
- Trim piles installed to allow install of pile caps.

Landbased Piling:

Commence install of land based piles. Raker piles and Plumb Piles

Promenade Slabs:

Headstocks and pre-cast concrete elements to be install. Promenade slabs poured to allow for additional construction staging space.

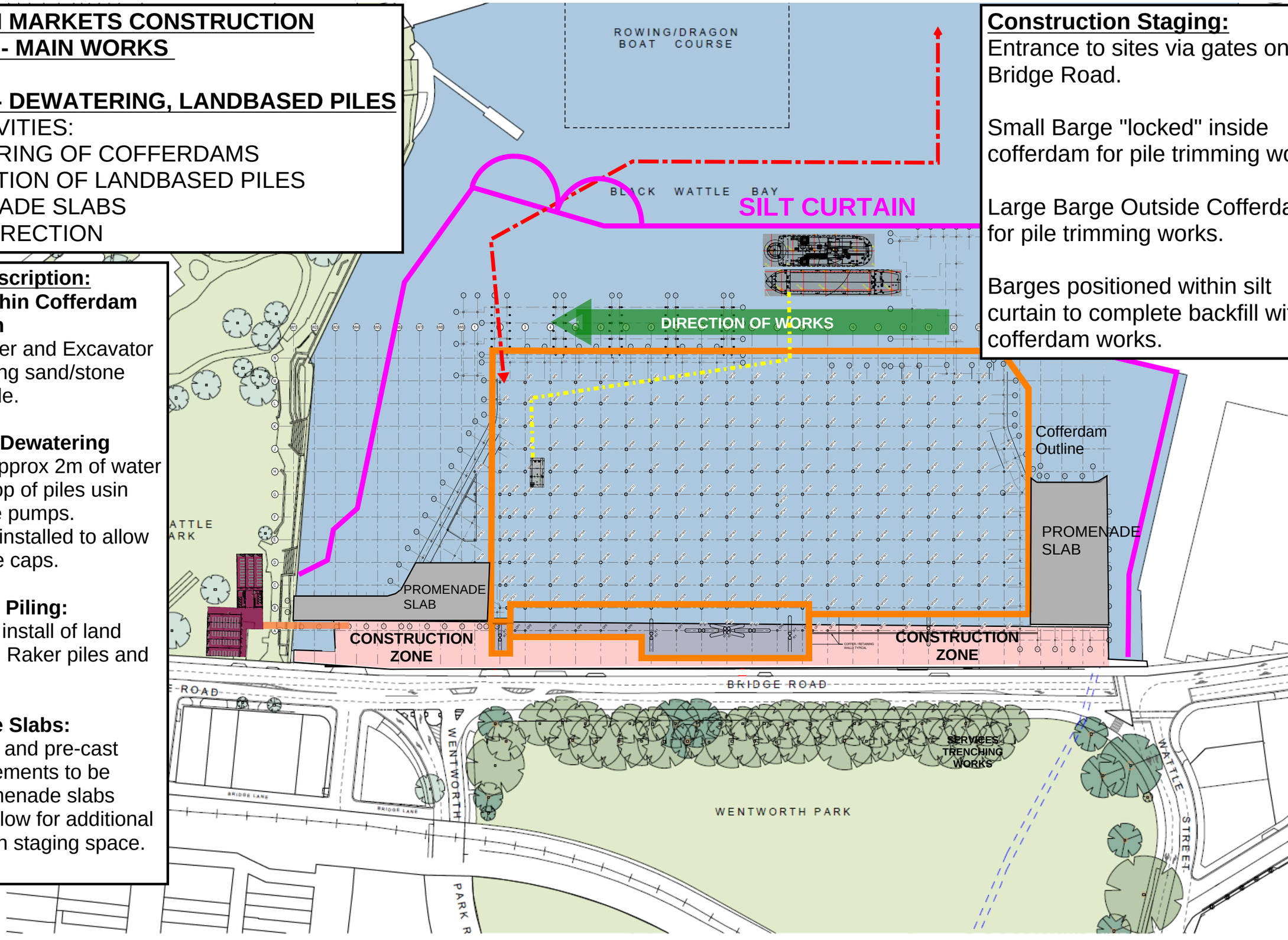
Construction Staging:

Entrance to sites via gates on Bridge Road.

Small Barge "locked" inside cofferdam for pile trimming works.

Large Barge Outside Cofferdam for pile trimming works.

Barges positioned within silt curtain to complete backfill within cofferdam works.



NEW FISH MARKETS CONSTRUCTION STAGING - MAIN WORKS

STAGE 3 - SUBSTRUCTURE RL -0.3

KEY ACTIVITIES:
-SUBSTRUCTURE RL-0.3
-SETUP OF SITE CRANES

Activity Description:

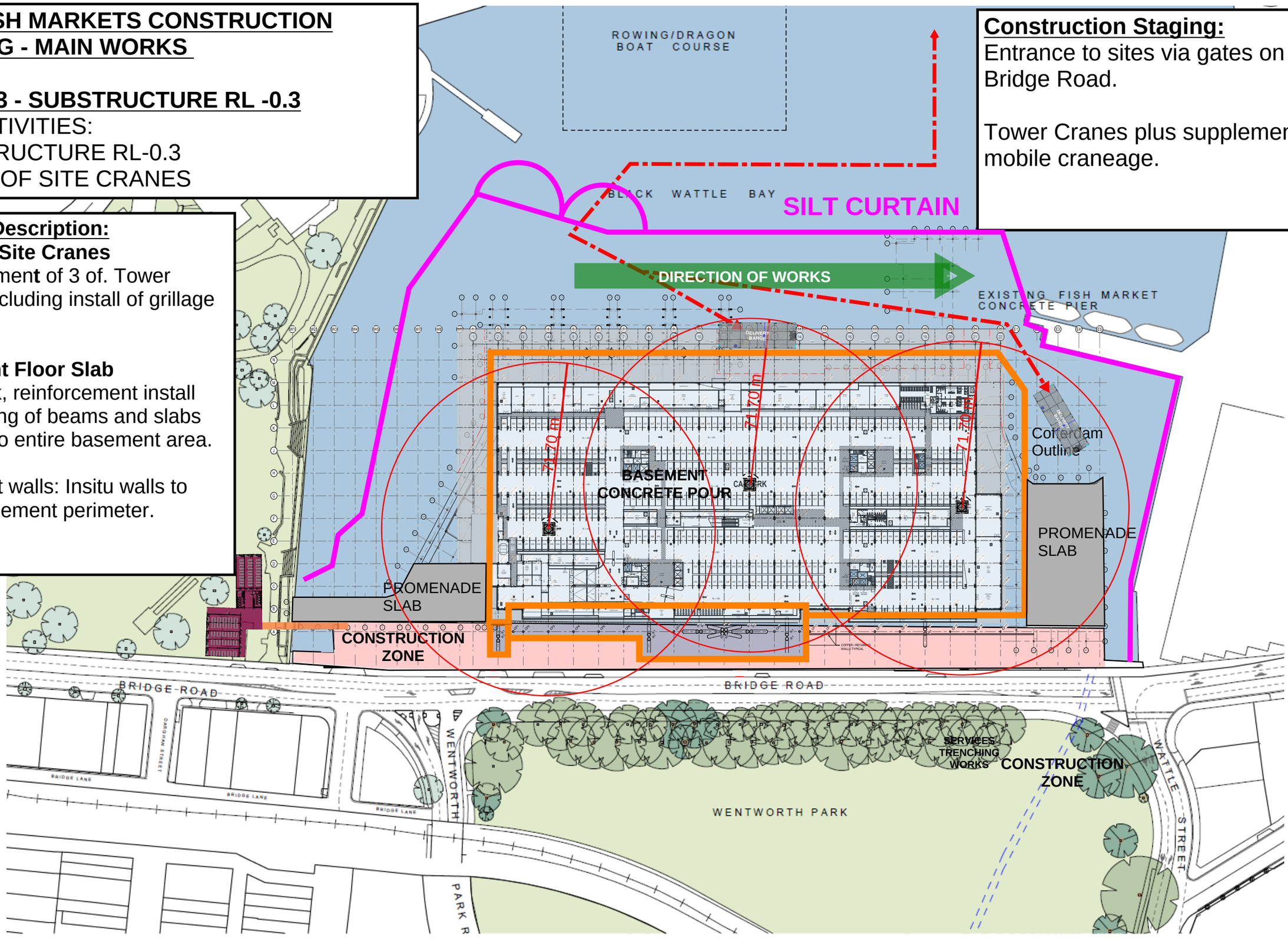
Setup of Site Cranes
Establishment of 3 of. Tower Cranes including install of grillage to piles.

Basement Floor Slab
Formwork, reinforcement install and pouring of beams and slabs installed to entire basement area.

Basement walls: Insitu walls to entire basement perimeter.

Construction Staging:
Entrance to sites via gates on Bridge Road.

Tower Cranes plus supplementary mobile craneage.



NEW FISH MARKETS CONSTRUCTION STAGING - MAIN WORKS

STAGE 4 - GROUND FLOOR SLAB RL_3.1

KEY ACTIVITIES:
-GROUND FLOOR

Activity Description:

Ground Floor Slab

Cast in-situ slab to entire basement area RL+3.1

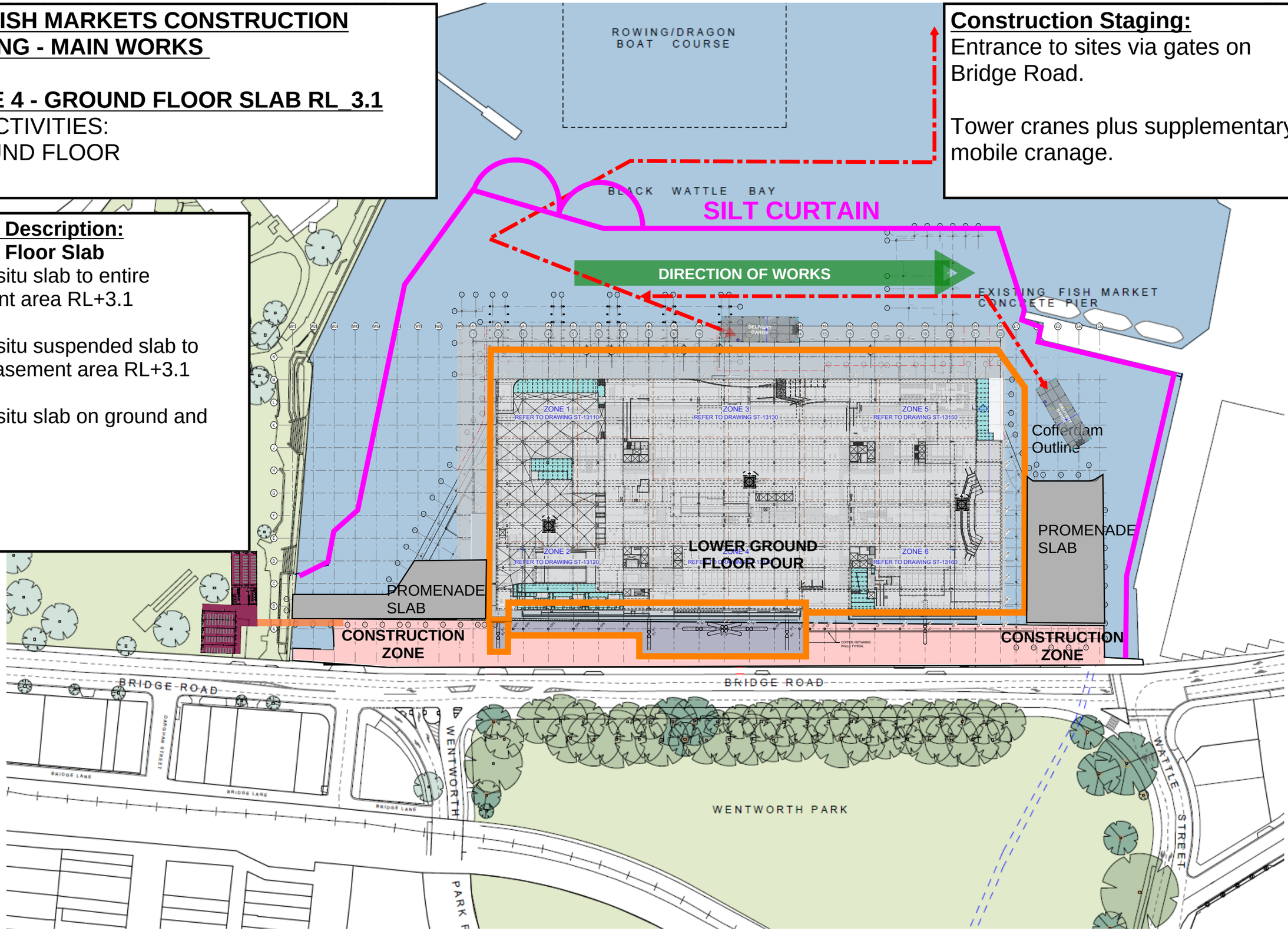
Cast in-situ suspended slab to entire basement area RL+3.1

Cast in-situ slab on ground and piles.

Construction Staging:

Entrance to sites via gates on Bridge Road.

Tower cranes plus supplementary mobile cranage.



NEW FISH MARKETS CONSTRUCTION STAGING - MAIN WORKS

STAGE 5 - SUPERSTRUCTURE

KEY ACTIVITIES:
-UPPER GROUND FLOOR (LEVEL 1) Slab RL +9.6
-MEZZANINE (LEVEL 2) Slab RL +15.1
-BRIDGE ROAD UPGRADE EASTBOUND

Activity Description:

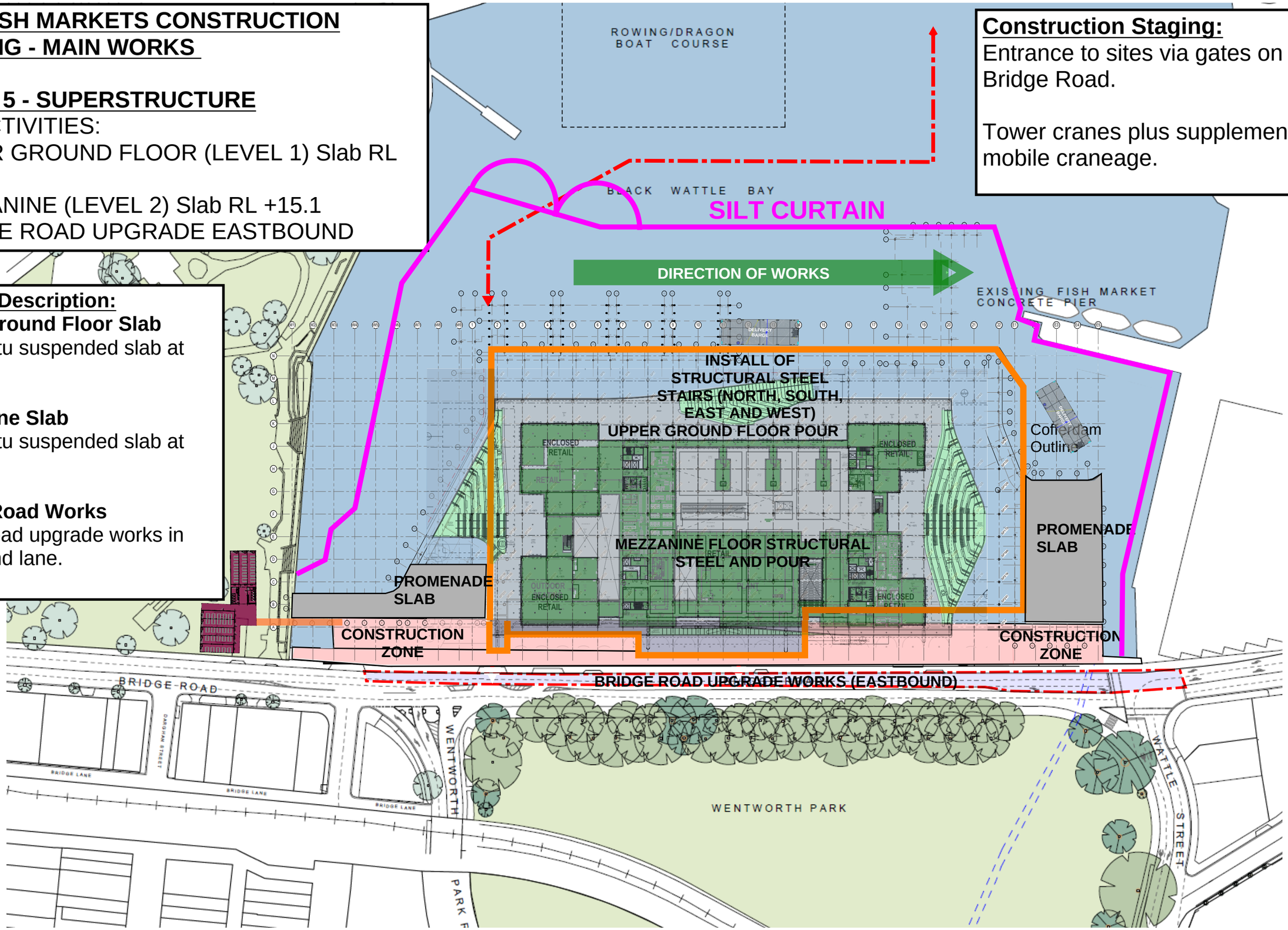
Upper Ground Floor Slab
Cast insitu suspended slab at RL+9.6

Mezzanine Slab
Cast insitu suspended slab at RL+15.1

Bridge Road Works
Bridge road upgrade works in eastbound lane.

Construction Staging:
Entrance to sites via gates on Bridge Road.

Tower cranes plus supplementary mobile craneage.



NEW FISH MARKETS CONSTRUCTION STAGING - MAIN WORKS

STAGE 6 - SUPERSTRUCTURE ROOF & COFFERDAM REMOVAL

KEY ACTIVITIES:
-ROOF CONSTRUCTION
-COFFERDAM REMOVAL
- BRIDGE ROAD UPGRADE WORKS (WESTBOUND)

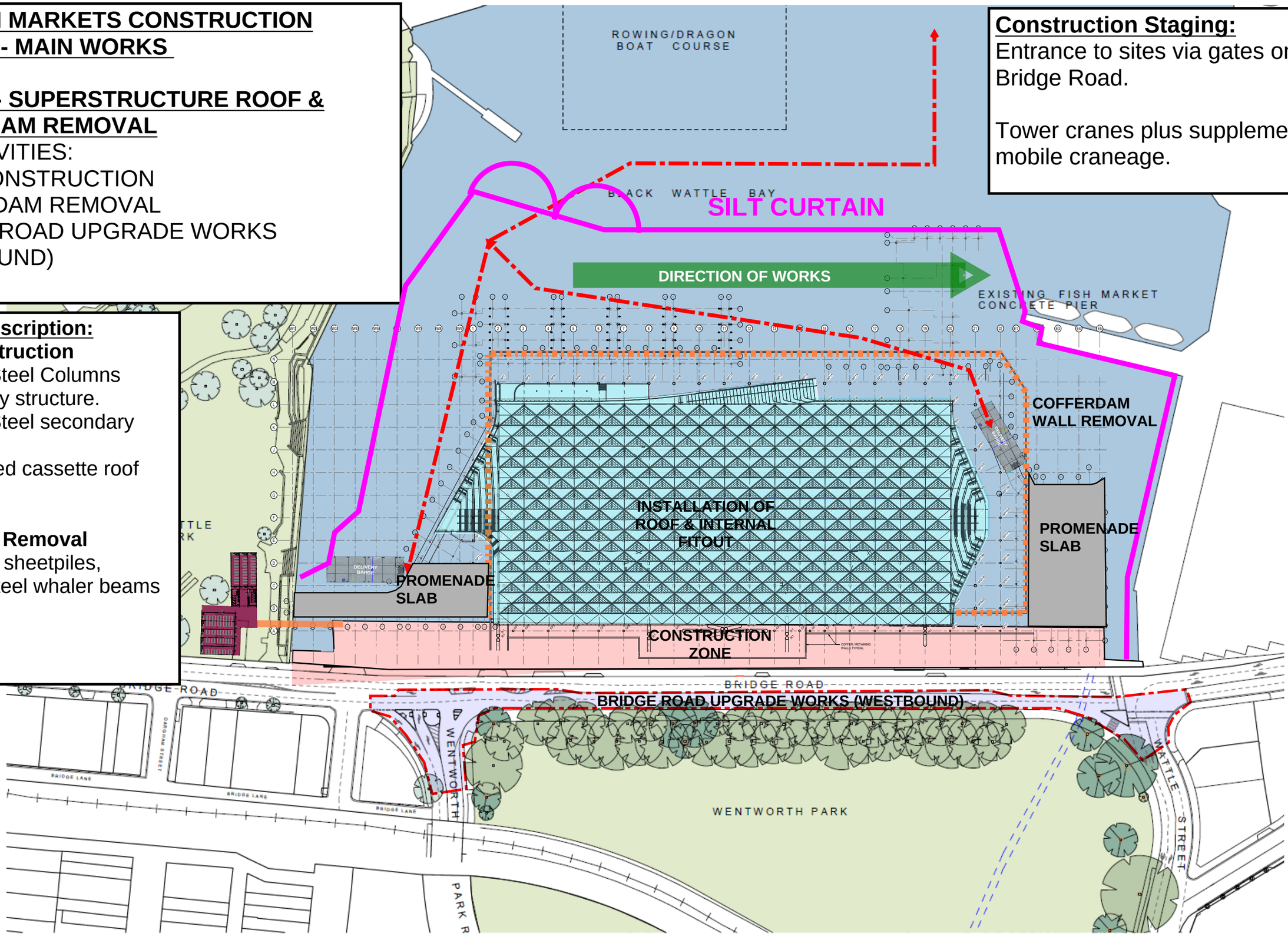
Activity Description:

Roof Construction
Structural Steel Columns
CLT Primary structure.
Structural Steel secondary structure
Prefabricated cassette roof modules

Cofferdam Removal
Removal of sheetpiles, structural steel whaler beams via barge

Construction Staging:
Entrance to sites via gates on Bridge Road.

Tower cranes plus supplementary mobile craneage.



NEW FISH MARKETS CONSTRUCTION STAGING - MAIN WORKS

STAGE 7 - COFFERDAM REMOVAL, PROMENADE MARINE PILING AND INTERNAL BUILDING WORKS

KEY ACTIVITIES:
-COFFERDAM REMOVAL
- PROMENADE WORKS
-INTERNAL BUILDING WORKS
-ONGOING BRIDGE ROAD UPGRADE (WESTBOUND)

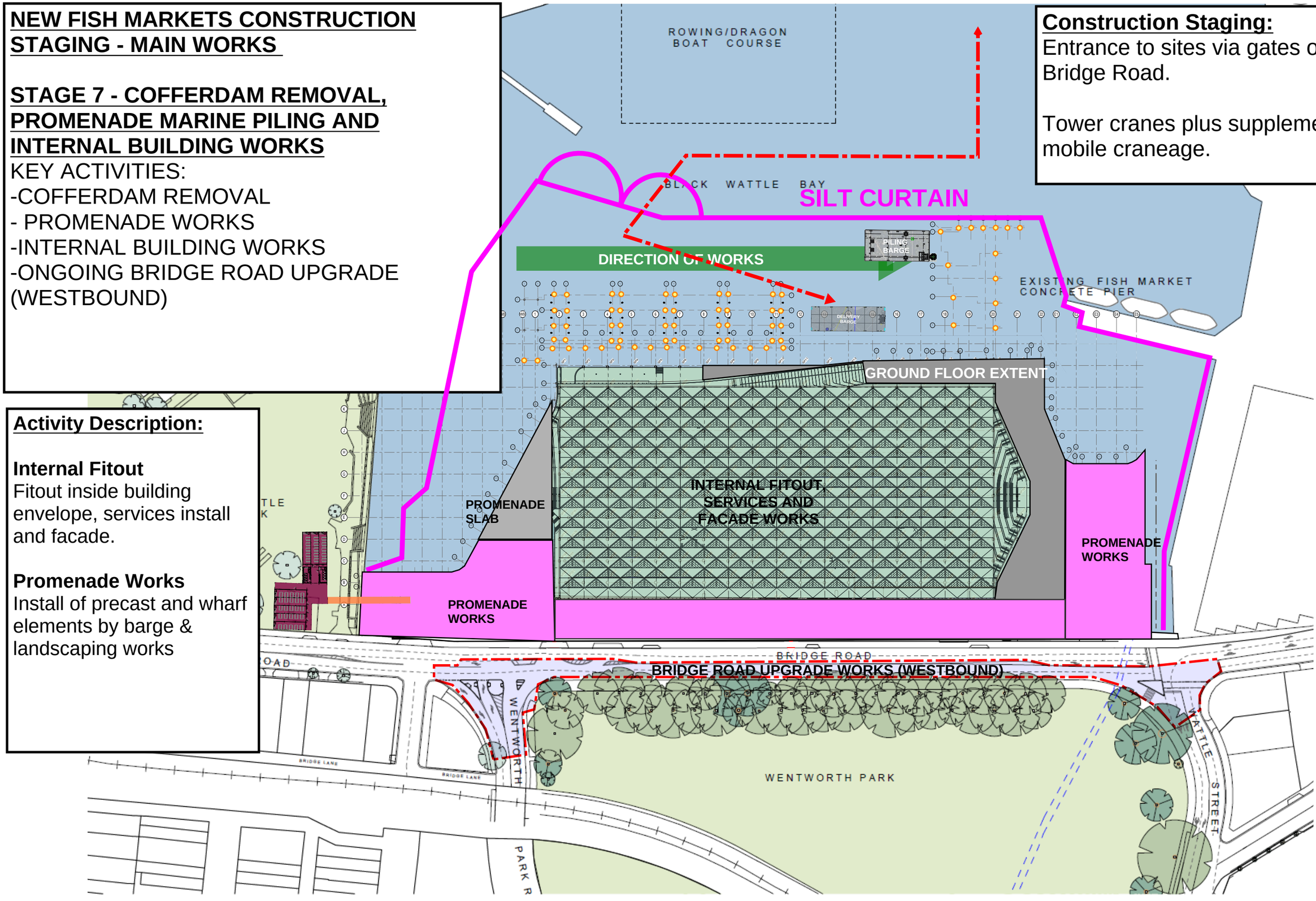
Activity Description:

Internal Fitout
Fitout inside building envelope, services install and facade.

Promenade Works
Install of precast and wharf elements by barge & landscaping works

Construction Staging:
Entrance to sites via gates on Bridge Road.

Tower cranes plus supplementary mobile craneage.



NEW FISH MARKETS CONSTRUCTION STAGING - MAIN WORKS

STAGE 8 -PROMENADE AND WHARF CONSTRUCTION AND INTERNAL BUILDING WORKS

KEY ACTIVITIES:
-ONGOING INTERNAL FITOUT
-WHARF CONSTRUCTION
-EXTERNAL WORKS
-BRIDGE ROAD FINALISATION

Activity Description:

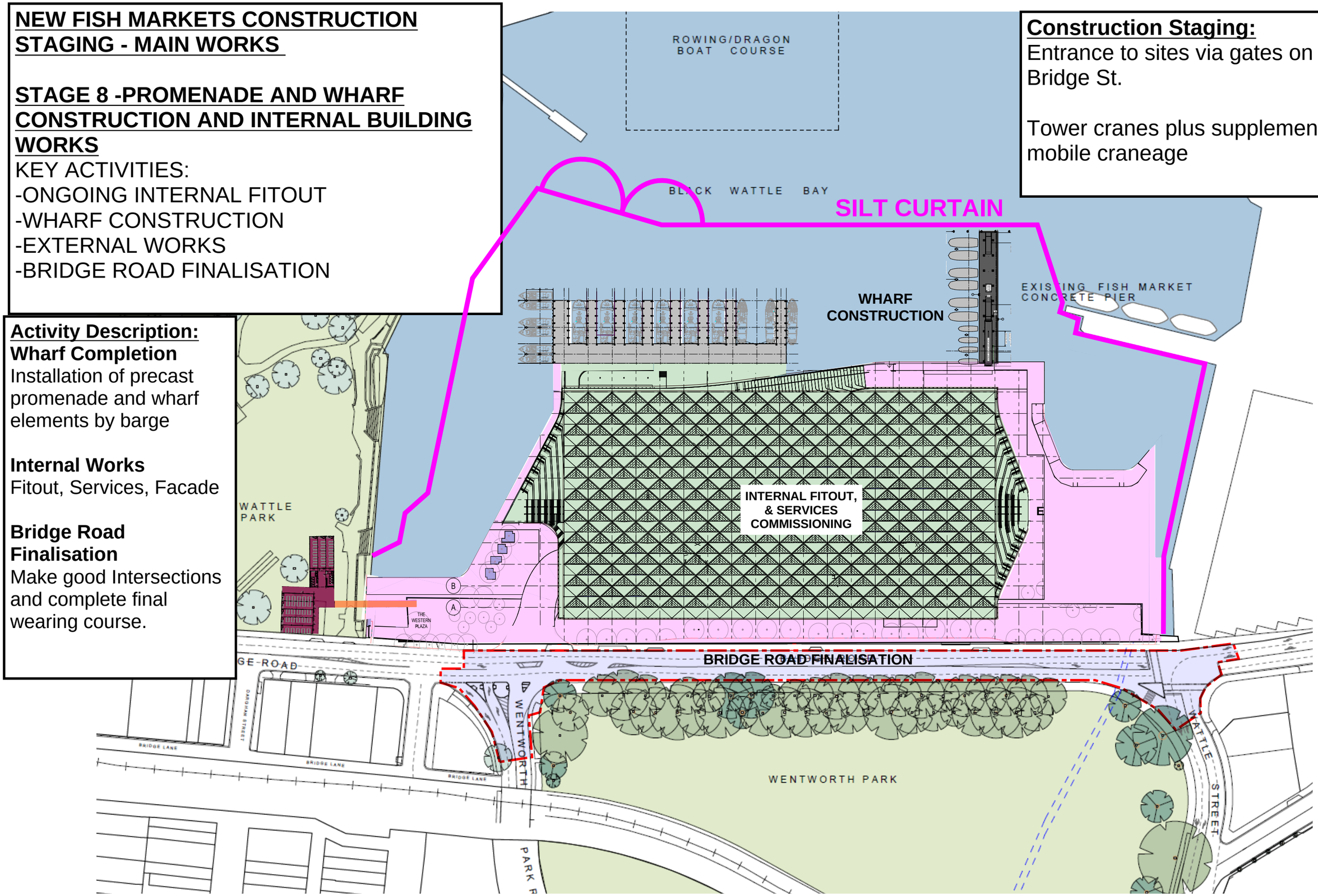
Wharf Completion
Installation of precast promenade and wharf elements by barge

Internal Works
Fitout, Services, Facade

Bridge Road Finalisation
Make good Intersections and complete final wearing course.

Construction Staging:
Entrance to sites via gates on Bridge St.

Tower cranes plus supplementary mobile craneage



NEW FISH MARKETS CONSTRUCTION STAGING - MAIN WORKS

STAGE 9 - NEW FISH MARKET PRACTICAL COMPLETION, WHARF WORKS and PROMENADE COMPLETION

KEY ACTIVITIES:
-COMPLETION OF WHARVES
-TESTING COMMISSIONING AND OPENING OF NEW FISH MARKET

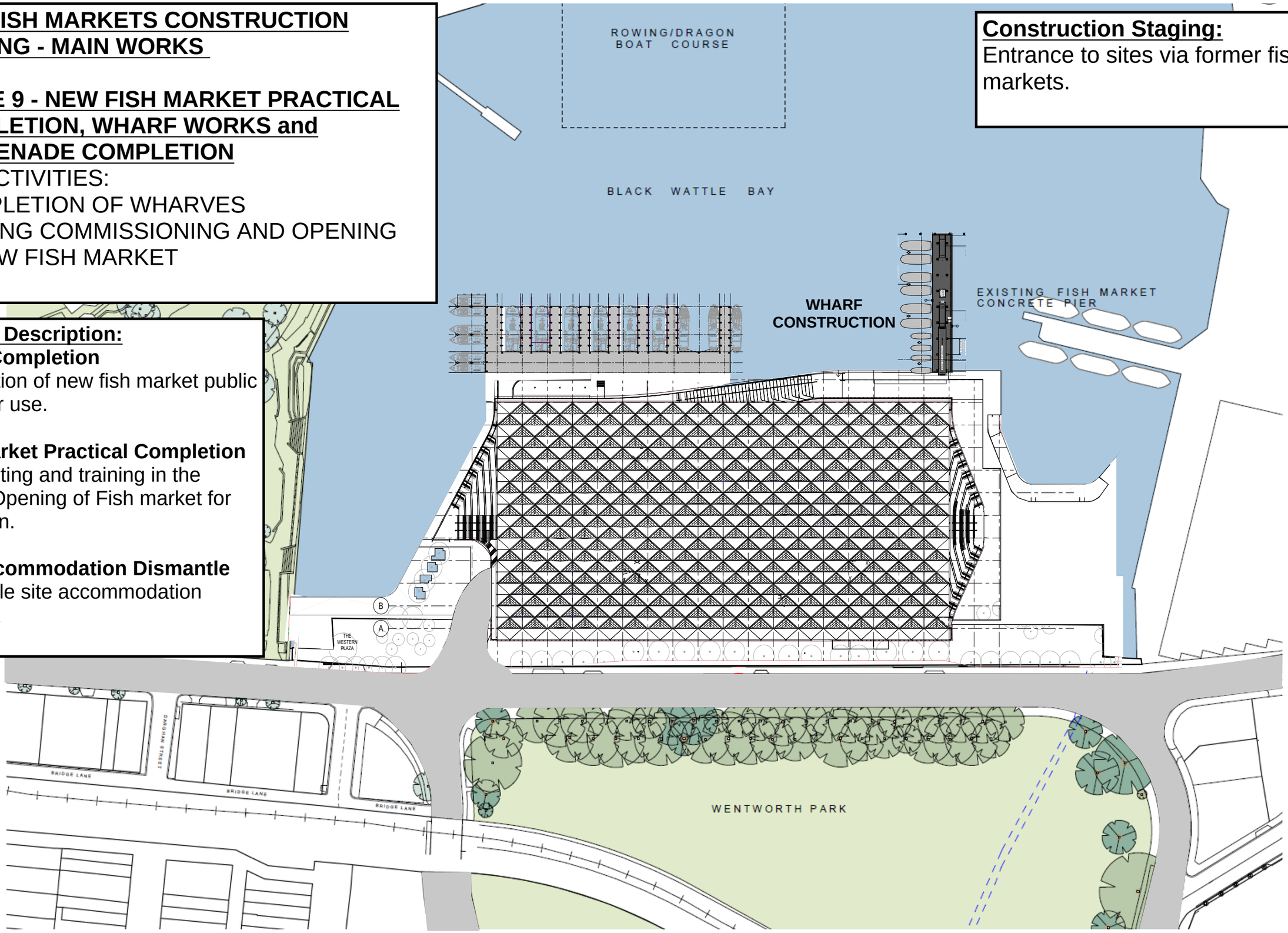
Activity Description:

Wharf Completion
Completion of new fish market public wharf for use.

Fish Market Practical Completion
User testing and training in the space. Opening of Fish market for operation.

Site Accommodation Dismantle
Dismantle site accommodation complex

Construction Staging:
Entrance to sites via former fish markets.



Appendix 22: Environmental Assessment

Senversa Pty Ltd
Level 24, 1 Market St, Sydney 2000
ABN 89 132 231 380 www.senversa.com.au

15 February 2022

Paul Couani
Development Manager
Multiplex
The New Sydney Fish Markets
22 Bridge Road
Glebe NSW 2037

Dear Paul,

Re: Sediment Capping - Environmental Assessment

New Sydney Fish Market

Senversa Pty Ltd (Senversa) has been engaged by Multiplex to support environmental management aspects of Multiplex's construction of the new Sydney Fish Markets (nSFM). The NSW State Government engaged Multiplex as the Principal Contractor (PC) to design and construct the nSFM (Stage 2).

Multiplex has considered two options best suited to reduce exposure of potential acid sulfate sediments (PASS) during dewatering and construction works within the cofferdam:

- Option 1 – Dewater to 1 m above sediment and conduct construction works over water within the cofferdam.
- Option 2 – Cap sediments prior to dewatering and create a dry working surface within the cofferdam. This is Multiplex's preferred approach.

This letter describes the proposed methodology, and an assessment of environmental management risks and controls associated with preferred option of sediment capping within the cofferdam.

1. Background

The nSFM project was declared State Significant Development (SSD 8925) under the *Environmental Planning and Assessment Act 1979*, with approval of the development application by the Minister for Planning and Public Spaces on 12 June 2020. There have been subsequent approved modifications, including the most recent approved MOD4 (approved 2 July 2021), which relates to sediment requiring redistribution to level the seabed under the building basement. MOD4 included as assessment of environmental impacts, including updated versions of the following key environmental management plans and assessments that relate to sediments:

- Marine Ecology Assessment[1].

[1] Ecological Australia (2022). *New Sydney Fish Markets Ecology Assessment – Sub-basement rock placement*. 20WOL-16700, 14 February 2022.

- Acid Sulfate Soil Management Plan (ASSMP)[2].
- Remediation Action Plan (RAP)[3].

The RAP and ASSMP assessed and developed the approach to manage contaminated sediments that require redistribution within the site as part of the project. The key environmental management requirements in Section 5.4 of the ASSMP include a requirement for consideration of in-situ capping of placed sediments as part of the redistribution works.

Multiplex is proposing to conduct in-situ capping of the sediments following redistribution works in order to:

1) Provide a safe working surface for construction and enable the basement to be constructed as a 'dry' activity.
2) While this is the primary objective of the works, there are secondary environmental benefits to reduce the potential for mobilisation of suspended solids and exposure of PASS sediments to the atmosphere during construction works within the cofferdam.

Sediment capping works are proposed to be carried out as per the Multiplex methodology provided in **Attachment A**. While the proposed works are broadly in line with works approved in MOD4, Senversa understands there is a requirement of approval to conduct these capping works. This letter has been prepared to meet the requirements of an environmental assessment for approval by the Harbour Master and/or a modification application to SSD 8925 to conduct these works.

2. Proposed Capping Works

Construction of the nSFM building requires the following approved works:

- Sediments to be redistributed within the work area as outlined in the approved MOD4 application.
- Installation of a temporary cofferdam around the construction footprint overlying Blackwattle Bay (refer drawings in **Attachment B**).
- Temporary partial dewatering inside the cofferdam to facilitate pile completion and building construction.
- Flooding and subsequent removal of the cofferdam on completion of building basement construction.

Drawings in **Attachment B** present the extent of the cofferdam.

As per **Attachment A**, Multiplex is proposing to place a 1.6 m thick layer of suitable sand and sandstone virgin excavated natural material (VENM) or quarried rock product over approximately 23,000 m^2 redistributed sediments inside the cofferdam prior to commencing building construction works within this area. The capping material will be validated by a suitably qualified and experienced person to meet specifications for imported VENM in Section 6.7 of the approved RAP. The capping records shall be documented in the validation reporting required by the RAP.

The cap will remain in-situ, i.e. will remain in place underlying the constructed building.

The sediment area to be capped is presented in drawings in **Attachment B**.

Silt curtains will be maintained in place around the work area during capping works, and surface water quality monitoring will be conducted as required by the project approval conditions.

[2] JBS&G (Apr 2021). *Acid Sulfate Soil Management Plan, The new Sydney Fish Markets, 1A to 1C Bridge Rd, Glebe NSW*. Revision 6, 26 April 2021.

3 JBS&G (2020). *Remedial Action Plan - The new Sydney Fish Market*, Rev 4. 8 July 2020

3. Project Conditions and Management Plans

SSD DA 8925 MOD4 development application was approved based on several conditions. Conditions of approval relevant to the proposed capping works are outlined below in the following table.

Condition	Addressed
B90 – "*Prior to the commencement of works, the Applicant must prepare a Dewatering Plan demonstrating that dewatering will not result in the discharge of pollutants at non-trivial levels*".	A Dewatering Management Plan (DMP) [4] has been prepared.
B94 – "*Prior to the commencement of works, the Applicant must submit to the Certifier a Section B Site Audit Statement, prepared by an EPA accredited Site Auditor that confirms that the remediation action plan is appropriate for the site and that the site can be made suitable for the proposed use*." **B95** – "*The Applicant must adhere to the management measures accepted or recommended by the site auditor*".	The Site Auditor has provided a Section B Site Audit Statement on the RAP. This letter will be provided to the Site Auditor for comment.
B103 – "*All recommendations within the Marine Ecology Assessment report (MEA), prepared by Ecological Australia, dated 2 April 2019 shall be implemented, including preparation of an Aquatic Biodiversity Management Plan (ABMP), which shall address OEH guidelines. Further, research from Macquarie University and University of NSW to enhance native habitat-forming organisms shall be included in the ABMP, once proof of the concept phase is completed, where relevant. Prior to the commencement of works, details demonstrating compliance with this requirement shall be submitted to the Planning Secretary and Certifier*".	A Marine Ecology Assessment (MEA) [5] was included in the original project application and updated in the MOD4 application [6]. An additional ecological assessment in relation to the proposed capping works is provided in **Attachment C**.
C17 – *"All remediation work must be undertaken in accordance with the remediation action plan and site auditor's section B Site Audit Statement."*	The proposed capping works will be conducted consistent with requirements in the RAP. The RAP concludes that "*Subject to the successful implementation of the measures described in this RAP and with consideration to the Limitations presented in Section 11, it is considered that the Site can be made suitable for the intended uses and that the risks posed by contamination can be managed in such a way as to be adequately protective of human health and the environment*."
C19 – *"The Applicant must ensure the proposed development does not result in a change of risk in relation to any pre-existing contamination on the site so as to result in significant contamination [note this would render the Applicant the 'person responsible for the contamination under section 6(2) of the Contaminated Land Management Act 1997]."*	This is assessed in **Section 4** – the proposed works are consistent with the approved ASSMP and should result in further mitigation of contamination risk.

[4] Senversa (2021). *Dewatering Management Plan – Construction of New Sydney Fish Market*, S18417_003_RPT_Rev1 DMP, dated 29 April 2021.

[5] Ecological Australia (2019). *Marine Ecology Assessment – Stage 1 (Concept & Demolition) and Stage 2 (Main Works)*, V6, dated 2 April 2019.

[6] Ecological Australia (2021). *New Sydney Fish Markets (MOD4): Modification Consistency with Marine Ecology Assessment*. 20WOL-16700, 16 April 2021.

Condition	Addressed
C30 – "*The Applicant must ensure silt curtains are installed throughout the duration of the works to minimise disturbance and mobilisation of sediments and contaminants in the seabed of Blackwattle Bay. The silt curtains must be installed and maintained throughout the duration of works. The silt curtain must extend from the surface of the water to the seabed and ensure that all attachment points for the silt curtains are firmly anchored to avoid gaps and release of contaminants."*	The proposed capping works will be conducted inside the cofferdam, which will control sediment disturbance. The capping will allow better control of ongoing cofferdam dewatering. Silt curtains are currently installed around the outside of the work area and will be maintained during the works as required by project approval conditions. Sediment redistribution, cofferdam installation and dewatering, and surface water quality monitoring will be conducted as required by existing project approval conditions.
C32 – *"All works must be undertaken in a manner that ensures the protection of the water quality objectives and environmental values for Sydney Harbour estuarine waters in accordance with the NSW Water Quality Objectives and the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) for the environmental values under the ANZECC Guidelines*[7]*."*	
C34 – *"No approval is permitted to pollute waters. All water discharge from the site must meet all requirements of the Protection of Environment Operations Act 1997."*	
C38 – *"All fill imported onto the site shall be validated to ensure the imported fill is suitable for the proposed land use from a contamination perspective. Fill imported on to the site shall also be compatible with the existing soil characteristics for site drainage".*	Imported VENM will meet the environmental specifications of the approved RAP.
C57 – *"The Applicant must ensure that any acid sulfate soil (ASS) and potential acid sulfate soil (PASS) excavated or other disturbed during construction is managed in accordance with the Acid Sulfate Soils Manual 1988 (NSW Acid Sulfate Soil Management Advisory Committee and the EPA's Waste Classification Guidelines 2014 (Part 4: Acid Sulfate Soils)."*	The proposed capping works are consistent with requirements of Section 5.4 of the approved ASSMP.
C58 – "*All recommendations contained in the Acid Sulfate Soils Management Plan prepared by JBS&G Australia Pty Ltd dated 26 April 2019 must be implemented throughout the works*".	

4. Environmental Assessment

The original project application and MOD4 application included assessments of environmental impacts associated with the nSFM construction. The proposed sediment capping works are consistent with the requirements of the ASSMP approved as part of the MOD4 application. An assessment of the key environmental factors associated with the proposed capping works are presented in the following sections – these are limited to:

- Marine ecology impacts.
- Contamination management.
- Acid sulfate soil management.
- Water quality impacts.

7 ANZECC (2000) guidelines have been superseded by the ANZG (2018) guidelines

4.1 Marine Ecology Impacts

Potential ecological impacts were assessed in the MEA in the approved original project development application and approved MOD4 application. Further ecological assessment of potential impacts from the proposed capping was conducted (refer **Attachment C**). This assessment confirms that the proposed rock placement beneath the basement is acceptable from a marine ecology perspective and is comparable with what has been previously assessed in the approved in original project development application and approved MOD4 application. The existing conditions and monitoring requirements of these approvals are applicable.

4.2 Contamination Management

The RAP and subsequent investigations reported that sediments in the extent of the development site are variably contaminated with heavy metals, petroleum hydrocarbons and some other semi volatile organic compounds, and that the sediments of Blackwattle Bay had significant metal and nutrient contamination, indicative of highly disturbed conditions. Asbestos fibres were also reported within a number of sediment samples. On this basis, the RAP concluded that elevated contaminant concentrations reported in sediments within the development site were likely reflective of conditions throughout the extent of Blackwattle Bay as a result of historical industrial activities along the foreshore of the bay.

The sediments also comprise PASS (refer **Section 4.3** below).

The RAP considered that specific remediation of the sediments was not required, but that environmental management of sediments was required during construction – the ASSMP sets out these requirements, which are discussed in **Section 4.3** below. The RAP concluded that "…….*and that the risks posed by contamination can be managed in such a way as to be adequately protective of human health and the environment*." The proposed capping will likely have a net environmental benefit relative to existing works.

The RAP includes requirements for importation of materials to the site. The capping materials shall comprise suitable imported VENM or quarried rock product, as required in the approved RAP. The capping material will be validated prior to importation to meet specifications for imported VENM in Section 6.7 of the approved RAP.

In summary, potential environmental impacts associated with sediment contamination as part of the approved nSFM project have previously been assessed and are managed via the RAP and ASSMP. The RAP and ASSMP conclude that appropriate implementation of the measures in the plans will minimise or adequately protect human health and the environment risks associated with the works. The proposed capping works are consistent with the requirements of the approved RAP and ASSMP.

4.3 Acid Sulfate Soil Management

Previous investigations found that all sediments encountered within the wider development footprint comprise PASS.

Management of PASS is outlined in the approved ASSMP. The ASSMP concludes that "*Where existing and future assessment data identifies the presence of ASS/PASS materials that may be disturbed during construction activities, the measures identified in this acid sulfate soil management plan (ASSMP) provide appropriate procedures to manage the risks associated with the proposed activities. If successfully implemented, these measures will minimise the environmental risks associated with disturbance of the PASS materials.*"

The proposed capping works are consistent with the requirement in Section 5.4 of the ASSMP that "*should further assessment of site conditions prior to, or during disturbance identify geochemical changes in the in-situ sediments upon this disturbance works, consideration will be given to capping the newly exposed material so as to preserve the anoxic balance of material within this portion of the site*." The capping is an additional practical step to further mitigate the potential for environmental impact (i.e. will likely have a net environmental benefit relative to existing works) caused by potential exposure of redistributed PASS sediments to the atmosphere and formation of acidity and mobilisation of suspended solids by:

- Reduce oxygen permeation into sediments from overlying oxygenated water or atmosphere.
- Providing a buffer when undertaking temporary dewatering of the cofferdam to more practicably maintain underlying sediments in a saturated condition.
- Reduce potential for disturbance and entrainment of PASS sediments in water during cofferdam dewatering and construction works.

The capping will also provide physical separation between PASS sediments and construction workers or future ecological receptors.

The capping materials shall comprise suitable imported sand or sandstone VENM or quarried rock product, as required in the approved RAP. The capping material will be validated prior to importation to meet specifications for imported VENM in Section 6.7 of the approved RAP.

In summary, potential environmental impacts associated with PASS sediments as part of the approved nSFM project have previously been assessed and are managed via the RAP and ASSMP. The RAP and ASSMP conclude that appropriate implementation of the measures in the plans will minimise or adequately protect human health and the environment risks associated with the works. The proposed capping works are consistent with the requirements of the approved RAP and ASSMP.

4.4 Water Quality Impacts

The proposed in-situ capping has potential environmental benefits on water quality via:

- Reduced potential for disturbance and mobilisation of contaminated or PASS sediments during construction and ongoing use.
- Reduced potential for exposure and oxidation of PASS sediments, and associated generation of acidity or dissolution of metals and nutrients, during building construction and dewatering of the cofferdam.

The proposed in-situ capping has potential environmental impacts on water quality within Blackwattle Bay associated with:

- Temporary disturbance of redistributed sediments during placement of the capping layer.
- Future erosion of capping layer material, following removal of cofferdam.
- Ongoing leaching of contaminants from the capping material into surface water.

These potential environmental impacts can be mitigated to low and acceptable levels via appropriate implementation of the following:

- Use of suitable imported sand or sandstone VENM or quarried rock product. The capping material will be validated prior to importation to meet specifications for imported VENM in Section 6.7 of the approved RAP. This validation shall include sampling and chemical analysis of the materials by a suitably qualified and experienced person.
- Placement within the cofferdam. This, and the period of construction, will allow control of any suspended solids and fines to settle to acceptable levels.
- Management and monitoring of temporary partial dewatering of the cofferdam in accordance with the DMP.

- Maintenance of the silt curtain around the perimeter of the development site, including during installation of the capping layer and removal of the cofferdam, as required by the conditions of project approval. The silt curtain will mitigate migration of suspended solids if appropriately installed and maintained.
- Undertake water quality monitoring outside the silt curtain within Blackwattle Bay as required by conditions of the ASSMP, Water Quality Management Plan (WQMP), DMP and other project approval.

5. Environmental Assessment Summary

The table below identifies the key potential environmental hazards associated with proposed capping and control measures to reduce risk of adverse impacts to the environment to acceptable levels.

Hazard	Potential Impact	Mitigation
Impacts to marine ecology	Direct or indirect harm to marine animals or vegetation. There is minimal change from the existing design.	Comply with existing conditions of approval for the original development application in the MEA, including monitoring during dewatering of the cofferdam.
Impact on contamination of sediments	Disturbance or exposure of existing contaminated sediments.	The capping is considered likely to have a net environmental benefit in relation to mitigation of contamination and PASS risks – consideration of in-situ capping is a requirement of Section 5.4 of the approved ASSMP. Implement the approved ASSMP.
Impact on PASS sediments	Disturbance or exposure and oxidation of existing PASS generating acidity or dissolution of metals and nutrients.	
Impacts on water quality in Blackwattle Bay	Mobilisation of contaminated sediments or increased dissolution of contaminants from sediments into the water column and migration into Blackwattle Bay caused by the capping during construction. Importation of unsuitable capping materials and ongoing leaching of contaminants into surface water.	Placement of the cap within the cofferdam extent. Use of suitable imported sand or sandstone VENM or quarried rock product. The capping material should be validated prior to importation to meet specifications for imported VENM in Section 6.7 of the approved RAP. Handling, sampling, and inspection of imported material to be conducted in accordance with the RAP. Installation and maintenance of a silt curtain around site boundary (outside of cofferdam) during capping and cofferdam removal to reduce risk of off-site sediment migration. Implementation of the DMP during cofferdam dewatering. Surface water monitoring outside the silt curtain in accordance with requirements in the approved ASSMP and WQMP.

6. Conclusion and Recommendations

This environmental assessment has been prepared as part of an application for a modification to SSD 8925 to conduct sediment capping works for the nSFM project.

The original nSFM project and MOD4 applications included assessments of environmental impacts associated with the nSFM construction. The environmental assessments concluded that the works were assessed to be of minimal environmental impact, subject to appropriate implementation of various environmental controls and procedures required by the conditions of approval. The conditions of approval include, but are not limited to, requirements to implement the RAP and management plans.

The proposed sediment capping works are considered to be consistent with the requirements of the RAP and management plans approved as part of the MOD4 application, and on this basis and the additional assessment in this letter, are expected to have minimal environmental impact if the recommended mitigations outlined in this letter are appropriately implemented-. Additionally, any sampling, monitoring or unexpected finds identified during these works should be recorded in accordance with specified management plans.

If you have any comments or questions, please do not hesitate to contact the undersigned at zoe.smith@senversa.com.au on 0488 211 265.

Yours sincerely,
On behalf of **Senversa Pty Ltd**



Zoe Smith
Senior Environmental Scientist



Andrei Woinarski
Principal

Enclosures: Attachment A: Multiplex Proposed Sediment Capping Methodology
Attachment B: Drawings
Attachment C: New Sydney Fish Market Ecological Assessment – Sub-basement rock placement

Limitations

Senversa has prepared this document for use only by its client for the specific purpose described in its proposal, which is subject to limitations. Matters of possible interest to third parties may not have been specifically addressed for the purposes of preparing this document and Senversa's use of professional judgement for the purposes of the work means that matters may have existed that would have been assessed differently on behalf of third parties.

Attachment A: Multiplex Proposed Sediment Capping Methodology

High level Methodology – Sediment Capping

The works proposed in this methodology describe the installation method of a working platform that is installed atop the profiled marine sediments. The platform is made up of two 600mm bands of clean sand (VENM) followed by a 400mm layer of suitable crushed stone (VENM). The platform provides a means of working safely inside the cofferdam to construct the Nsfm building. The works extent of sediment capping activities will be inside of the sites steel cofferdam structure, and an indicative sketch is shown further below in Figure 1 and a typical section of the proposed works is shown in Figure 2.



Figure 1. Extent of works inside cofferdam shown in red outline.

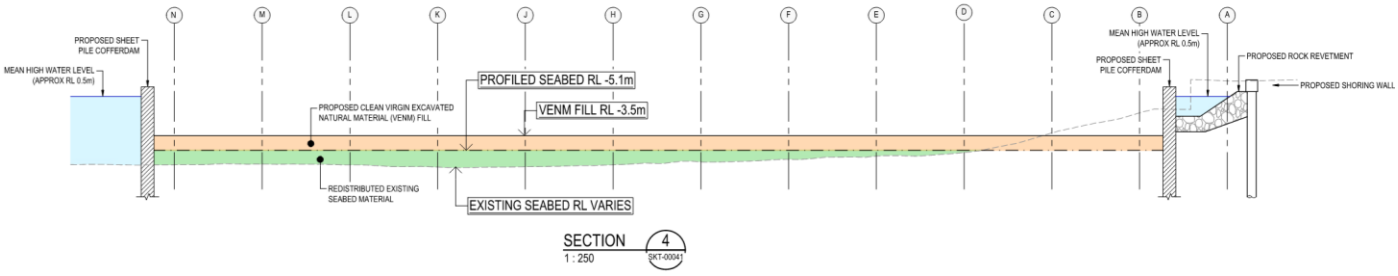


Figure 2. Extent of works inside cofferdam shown in section

The sediment capping works will be carried out by machinery currently utilised on the project. A non-propelled 'split hopper barge' will be moored alongside a backhoe profiling barge (which provides mooring) and has a capacity to store up to 1200m3 of material. The sand material to be installed will be loaded onto the 'hopper barge' at a storage facility in Glebe Island which is currently being used on the project. Refer to Figure 3a below for a snap shot of the Glebe island facility and to Figure 3b for an image showing the anticipated marine plant required for these works. The preferred method of connection between the tug and hopper barge when transiting will be via 'hip tow', which is a tow to the side of the vessel as demonstrated in Figure 4 below. All tugs will be fitted with heavy duty towing winches so that barges can be retrieved to the tug quickly and safely.

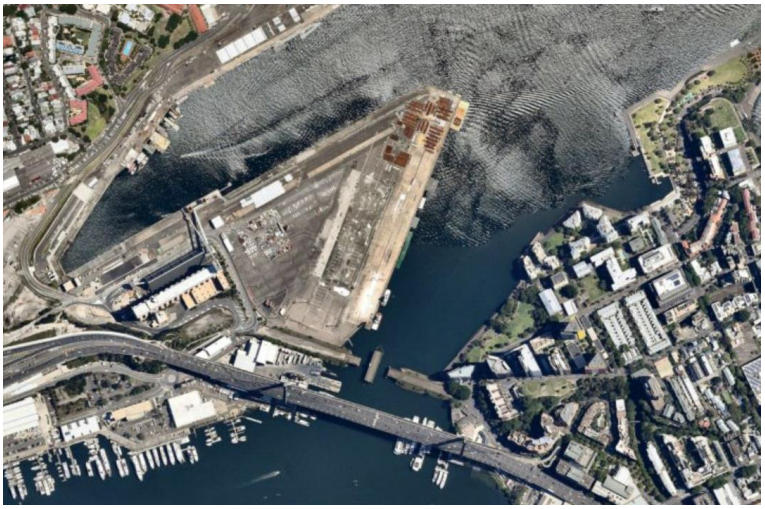


Figure 3a. Glebe Island Storage Facility

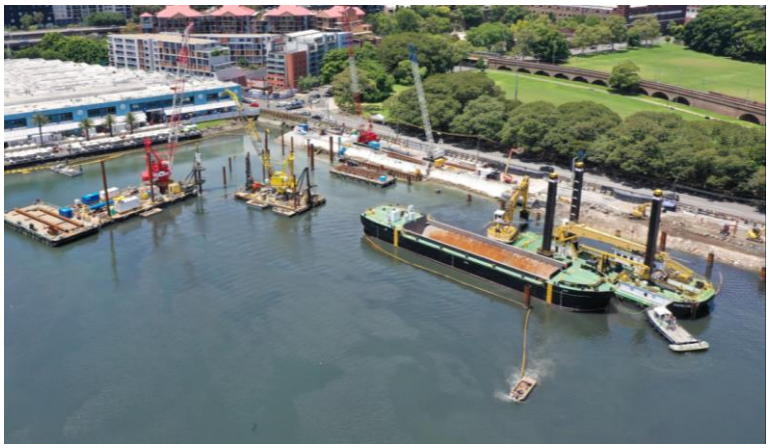


Figure 3b. Machinery proposed (right)



Figure 4. Hip Tow zone arrangement (bottom)

The hopper barge will have sand pumped directly from the hopper to the workface via a hydraulically driven submersible pump (DOP pump). A pontoon located inside the cofferdam will help position and release the end of the pumping line to evenly distribute the sand across the cofferdam footprint. The works will progress working behind the cofferdam and marine piling works.

An indication of the works method is indicated in Figure 5 and 6 below.

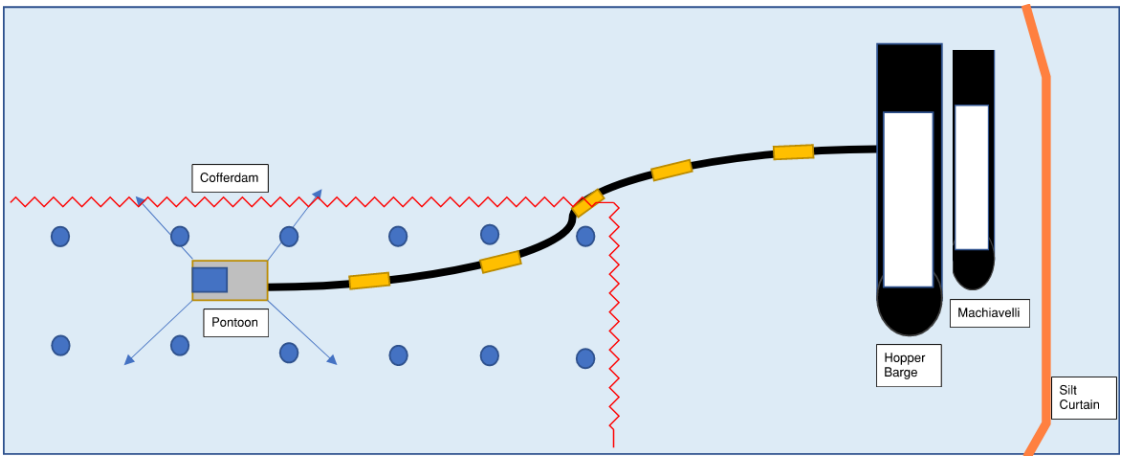


Figure 5. Typical arrangement (plan)

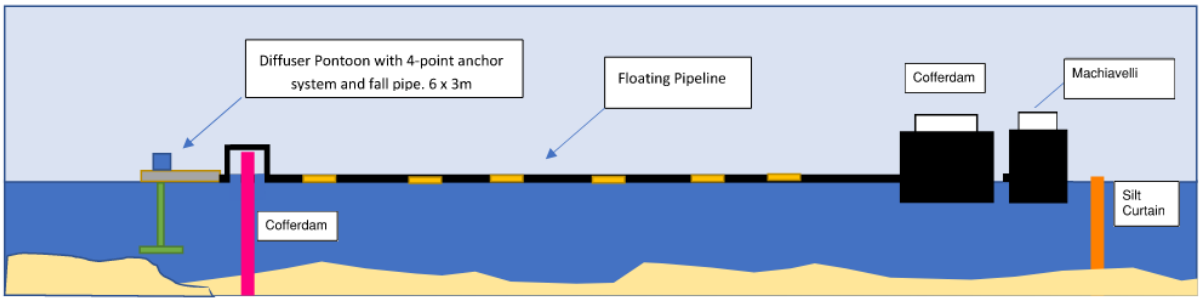


Figure 6. Typical arrangement (plan)

The marine based installation method for the sand layers of the capping platform provides an efficient way to deliver the material into place, and minimises disruption to vehicular traffic in the precinct as well as site congestion. The marine based placement takes place following authority approval which is anticipated approximately to be in April 2022.

The completion of the marine based installation of the sediment capping works coincides with the dewatering of the cofferdam. At this stage, the level of the sediments will be -3.9 AHD, which is 200mm above the dewater level. Following this dewatering, the remaining sediment capping layer of crushed stone will be installed via land based machinery and will work progressively out from land to the extents of the cofferdam footprint, in sequence with the construction of the buildings structure. Traditional excavators and earth moving equipment will be utilised for those works, building the sediment level up to -3.5 AHD, which is approximately 2.93m below mean low water tide (-0.57 AHD). An indicative plan set out is shown below in figure 7.

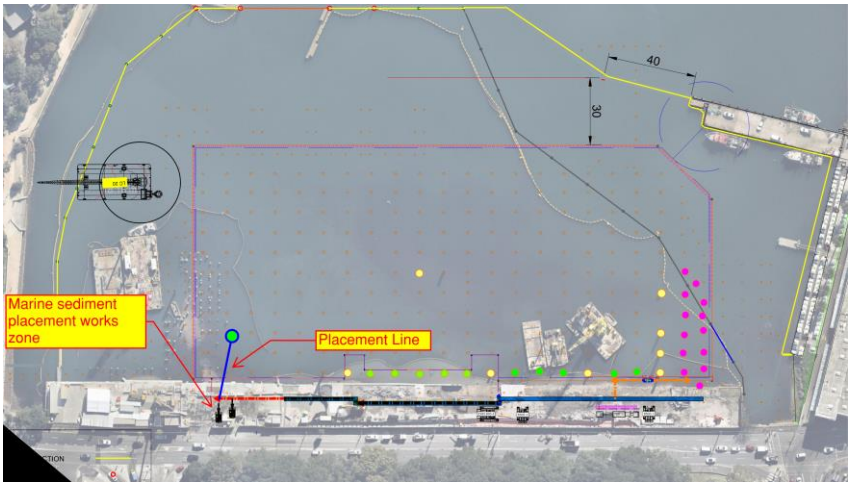


Figure 7. Location of plant setup on land based approach following dewater (plan)

Following completion of the sediment capping, the Nsfm building structure progresses, effectively forming off the installed sediment capping. Once the basement structure is complete, the cofferdam will be removed from the project. It is at this stage the sediment capping layer becomes fully submersed by the natural water levels of Blackwattle Bay. An indication of the overall basement structure and water level are shown further in figure 8 below.

During the proposed works, the site's perimeter silt curtain will be maintained consistent with exiting project approval conditions.

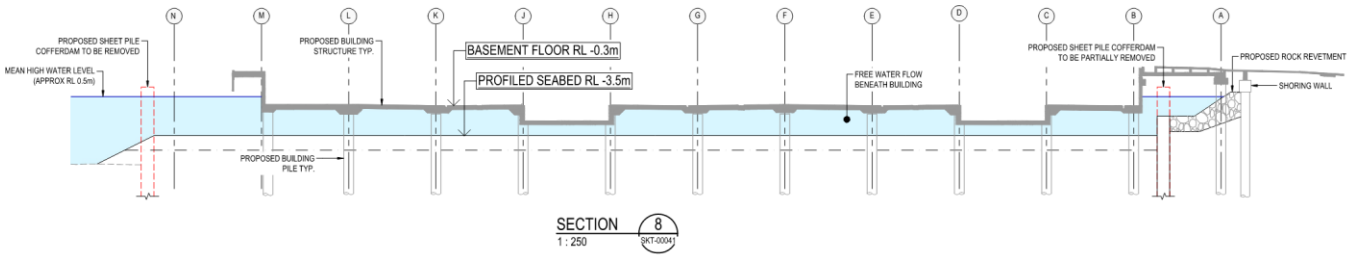
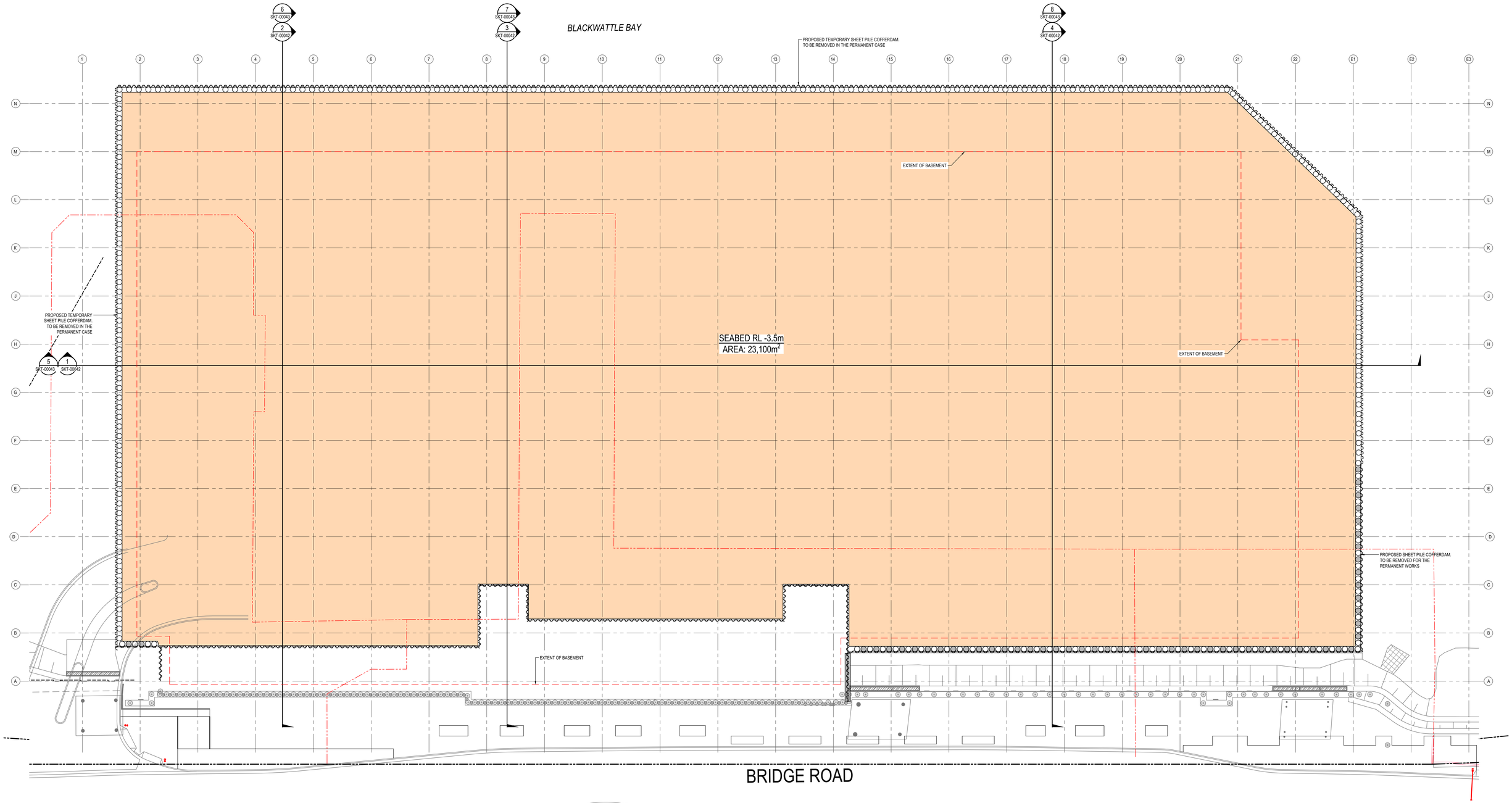


Figure 8. Natural water levels submerse platform following cofferdam removal (section).

Overall the planned works provide some key benefits for the project;

- Offset additional truck movements that would otherwise be expected utilising alternate basement construction methods.
- Net positive impact to capping PASS sediments
- Reduction in vessels inside the cofferdam
- Provides a conventional, tried and tested approach to forming the submerged basement structure.
- Provides simpler, safer access to the workface, removing dependence on water based construction.
- Reduction of approximately 2000 Tonnes of C02 (carbon) emissions for temporary steel work, which would otherwise be required for alternate methodologies.

Attachment B: Drawings



Issue	Description	Date
2	ISSUED FOR INFORMATION	24-11-21
1	ISSUED FOR INFORMATION	08-10-21

100mm on Original

Bar Scales

0 5 10 15 20 25m

1 : 250 @ A0

THIS DRAWING CANNOT BE COPIED OR REPRODUCED IN ANY FORM OR USED FOR ANY OTHER PURPOSE OTHER THAN THAT ORIGINALLY INTENDED WITHOUT THE WRITTEN PERMISSION OF AT&L

Client

MULTIPLEX

Scales 1:250

Grid MGA56 (GDA94)

Height Datum AHD

Drawn PDK

Designed

Checked

Approved

Project

SYDNEY FISH MARKETS

Title

COFFERDAM PROFILING PLAN

Civil Engineers and Project Managers
at&l
Level 7, 153 Walker Street
North Sydney NSW 2060
ABN 96 130 882 405
Tel: 02 9439 1777
Fax: 02 9923 1055
www.atl.net.au
info@atl.net.au

Status FOR INFORMATION (NOT FOR CONSTRUCTION)

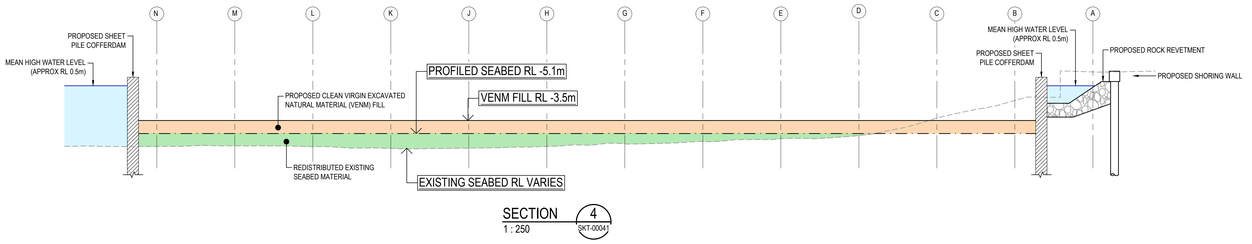
A0

Drawing No. ATL-CV-SKT-00041

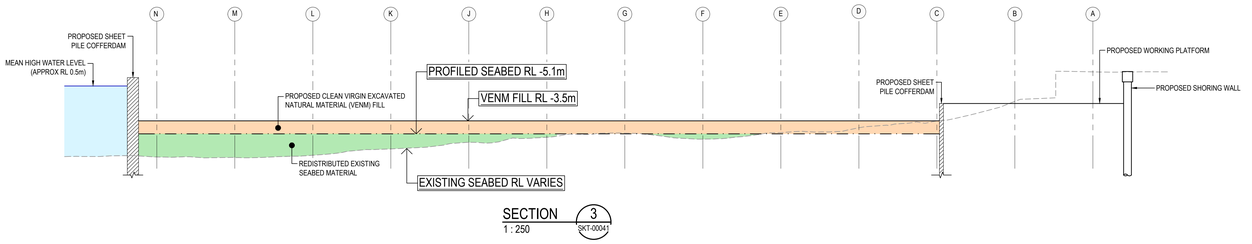
AT&L Project 20-819

Issue 2

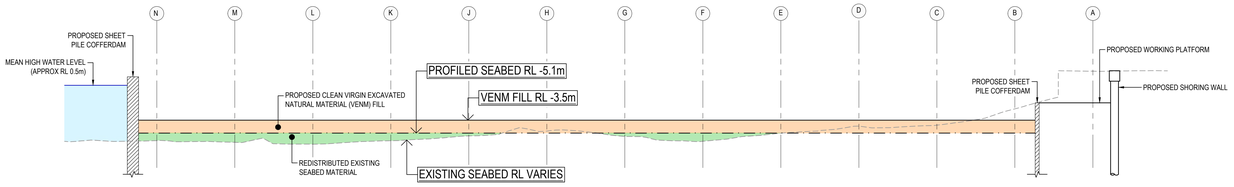
F:\20-819 Fish Markets\6.0 Drgs\Civil\Sketches\ATL-CV-SKT-00041.dwg



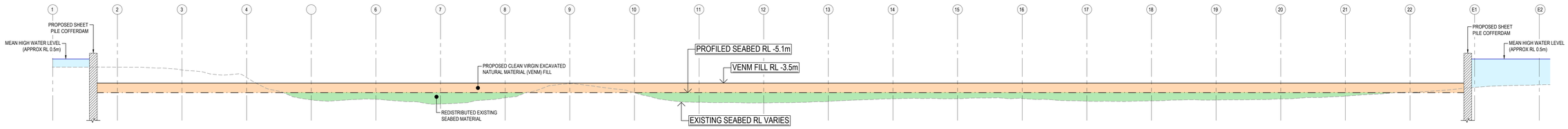
SECTION 4
1 : 250 SKT-00041



SECTION 3
1 : 250 SKT-00041



SECTION 2
1 : 250 SKT-00041



SECTION 1
1 : 250 SKT-00041

Issue	Description	Date
2	ISSUED FOR INFORMATION	24-11-21
1	ISSUED FOR INFORMATION	10-10-21

100mm on Original

Bar Scales

0 5 10 15 20 25m

1 : 250 @ A0

THIS DRAWING CANNOT BE COPIED OR REPRODUCED IN ANY FORM OR USED FOR ANY OTHER PURPOSE OTHER THAN THAT ORIGINALLY INTENDED WITHOUT THE WRITTEN PERMISSION OF AT&L

Client

MULTIPLEX

Scales 1:250

Grid MGA56 (GDA94)

Height Datum AHD

Drawn PDK

Designed

Checked

Approved

Project

SYDNEY FISH MARKETS

Title

TEMPORARY COFFERDAM PROFILING SECTIONS

Civil Engineers and Project Managers

at&l

Level 7, 153 Walker Street
North Sydney NSW 2060
ABN 96 130 882 405
Tel: 02 9439 1777
Fax: 02 9923 1055
www.atl.net.au
info@atl.net.au

Status FOR INFORMATION (NOT FOR CONSTRUCTION)

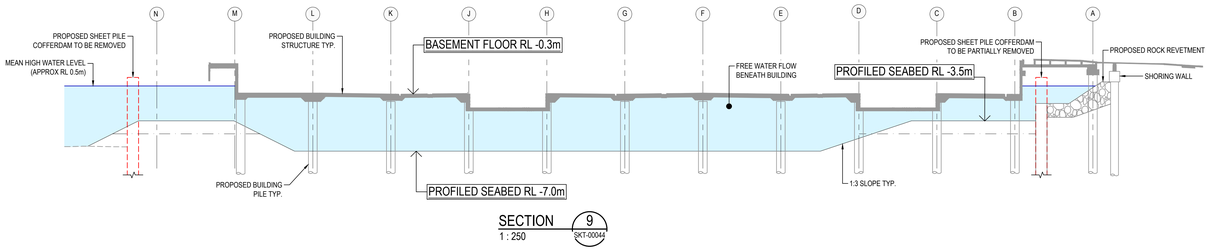
A0

Drawing No. ATL-CV-SKT-00042

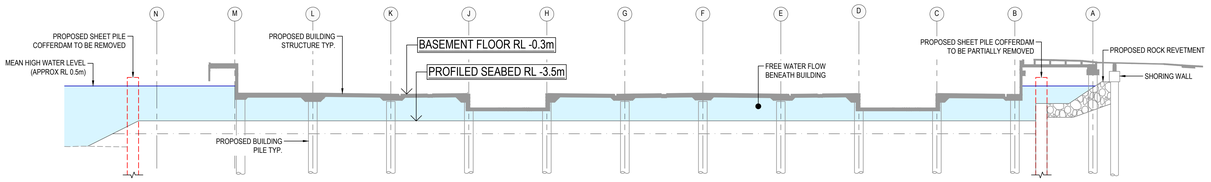
AT&L Project 20-819

Issue 2

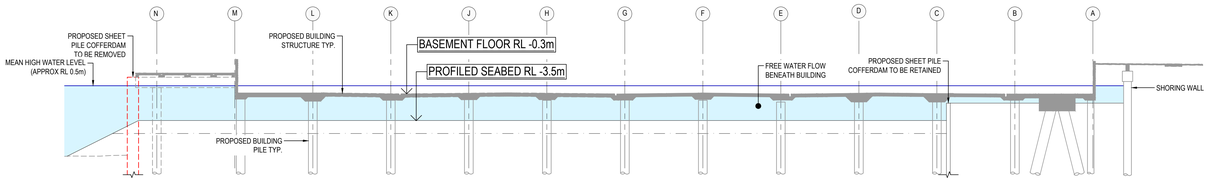
F:\20-819 Fish Markets\6.0 Drgs\Civil\Sketches\ATL-CV-SKT-00042.dwg



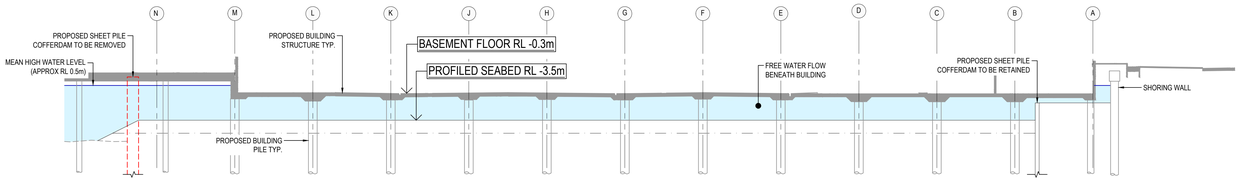
SECTION 9
1 : 250 SKT-00044



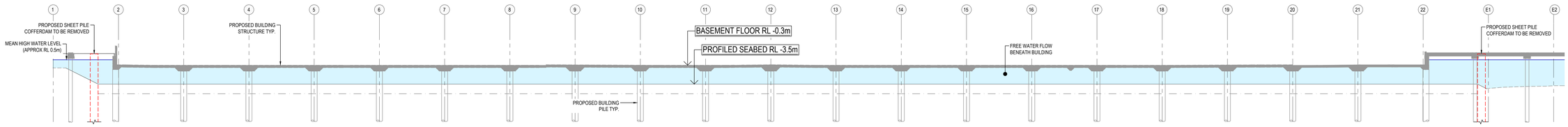
SECTION 8
1 : 250 SKT-00043



SECTION 7
1 : 250 SKT-00041



SECTION 6
1 : 250 SKT-00041



SECTION 5
1 : 250 SKT-00041

Issue	Description	Date
2	ISSUED FOR INFORMATION	24-11-21
1	ISSUED FOR INFORMATION	10-10-21

100mm on Original

Bar Scales

0 5 10 15 20 25m

1 : 250 @ A0

THIS DRAWING CANNOT BE COPIED OR REPRODUCED IN ANY FORM OR USED FOR ANY OTHER PURPOSE OTHER THAN THAT ORIGINALLY INTENDED WITHOUT THE WRITTEN PERMISSION OF AT&L

Client

MULTIPLEX

Scales	1:250	Drawn	PDK
		Designed	
Grid	MGA56 (GDA94)	Checked	
Height Datum	AHD	Approved	

Project

SYDNEY FISH MARKETS

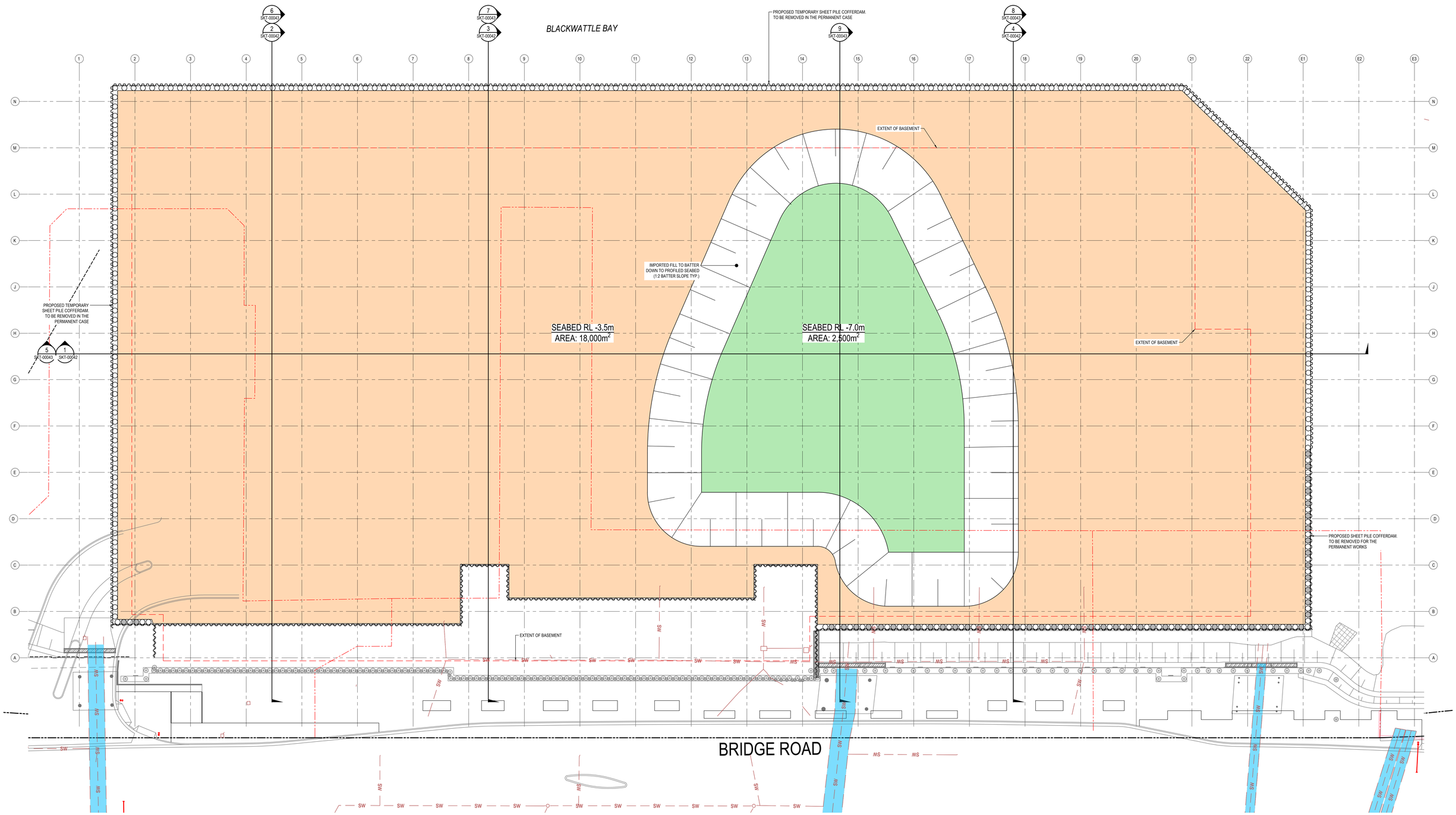
Title

PERMANENT COFFERDAM PROFILING SECTIONS

Civil Engineers and Project Managers
at&l
Level 7, 153 Walker Street
North Sydney NSW 2060
ABN 96 130 882 405
Tel: 02 9439 1777
Fax: 02 9923 1055
www.atl.net.au
info@atl.net.au

Status		
FOR INFORMATION (NOT FOR CONSTRUCTION)		A0
Drawing No.	AT&L Project	Issue
ATL-CV-SKT-00043	20-819	2

F:\20-819 Fish Markets\6.0 Drgs\Civil\Sketches\ATL-CV-SKT-00043.dwg



Issue	Description	Date
1	ISSUED FOR INFORMATION	24-11-21

100mm on Original

Bar Scales

0 5 10 15 20 25m

1 : 250 @ A0

THIS DRAWING CANNOT BE COPIED OR REPRODUCED IN ANY FORM OR USED FOR ANY OTHER PURPOSE OTHER THAN THAT ORIGINALLY INTENDED WITHOUT THE WRITTEN PERMISSION OF AT&L

Client

MULTIPLEX

Scales	1:250	Drawn	PDK
		Designed	
Grid	MGA56 (GDA94)	Checked	
Height Datum	AHD	Approved	

Project

SYDNEY FISH MARKETS

Title

COFFERDAM PROFILING PLAN WITH CENTRAL CULVERT INDICATIVE DREDGING AREA

Civil Engineers and Project Managers
at&l
Level 7, 153 Walker Street
North Sydney NSW 2060
ABN 96 130 882 405
Tel: 02 9439 1777
Fax: 02 9923 1055
www.atl.net.au
info@atl.net.au

Status		
FOR INFORMATION (NOT FOR CONSTRUCTION)		A0
Drawing No.	AT&L Project	Issue
ATL-CV-SKT-00044	20-819	1

F:\20-819 Fish Markets\6.0 Drgs\Civil\Sketches\ATL-CV-SKT-00044.dwg

Attachment C: New Sydney Fish Market Ecological Assessment – Sub-basement rock placement

Suite 204, Level 2
62 Moore Street
Austinmer NSW 2515
t: (02) 4243 3808

14 February 2022

Our ref: 20WOL-16700

Multiplex Constructions Pty Ltd

Site Address: Level 2, 22 Bridge Road Glebe, NSW 2037

Attention: Anthony Toomeh Anthony.Toomeh@multiplex.global

Dear Anthony,

RE: New Sydney Fish Markets Ecology Assessment – Sub-basement rock placement

This letter confirms the proposed rock placement beneath the basement is acceptable from a marine ecology perspective and is comparable with what has been previously assessed in the approved Development Application (DA).

The Marine Ecology Assessment approved under the DA states that the entire area beneath the basement is 'Key Fish Habitat Type 3' and will be completely lost due to absolute shading by the basement. The crushed rock would also be 'Key Fish Habitat Type 3' of similar value. So, anything beneath the basement is regarded (and approved) as lost habitat.

In relation to an early DA modification (sediment redistribution), the Environmental, Energy and Science (ESS) group provided an evaluation of the marine ecology in the same area (ESS letter ref DOC21/367964), noting that:

- The existing habitat or biota would not be significantly impacted because the site is so depauperate
- Ecological impacts remain the same regarding lost habitat opportunities because of increased hard substrate
- Methods to minimise escape of sediment are adequate.

Please contact me on the number above should you have any questions.

Regards,



Ian Dixon
Senior Aquatic Ecologist

Appendix 23: Marine Ecology Statement

Suite 204, Level 2
62 Moore Street
Austinmer NSW 2515
t: (02) 4243 3808

14 February 2022

Our ref: 20WOL-16700

Multiplex Constructions Pty Ltd

Site Address: Level 2, 22 Bridge Road Glebe, NSW 2037

Attention: Anthony Toomeh Anthony.Toomeh@multiplex.global

Dear Anthony,

RE: New Sydney Fish Markets Ecology Assessment – Sub-basement rock placement

This letter confirms the proposed rock placement beneath the basement is acceptable from a marine ecology perspective and is comparable with what has been previously assessed in the approved Development Application (DA).

The Marine Ecology Assessment approved under the DA states that the entire area beneath the basement is 'Key Fish Habitat Type 3' and will be completely lost due to absolute shading by the basement. The crushed rock would also be 'Key Fish Habitat Type 3' of similar value. So, anything beneath the basement is regarded (and approved) as lost habitat.

In relation to an early DA modification (sediment redistribution), the Environmental, Energy and Science (ESS) group provided an evaluation of the marine ecology in the same area (ESS letter ref DOC21/367964), noting that:

- The existing habitat or biota would not be significantly impacted because the site is so depauperate
- Ecological impacts remain the same regarding lost habitat opportunities because of increased hard substrate
- Methods to minimise escape of sediment are adequate.

Please contact me on the number above should you have any questions.

Regards,



Ian Dixon
Senior Aquatic Ecologist

Appendix 24: Air Quality Statement

15 February 2022

610.30264.00200-L02-v2.1-20220215.docx

Multiplex Constructions Pty Ltd
135 King St
Sydney NSW 2000

Attention: Anthony Toomeh

Dear Anthony

New Sydney Fish Market
Modification 7 - Sediment Capping
Air Quality

Multiplex Constructions Pty Ltd (Multiplex) are currently undertaking construction activities for the new Sydney Fish Market in Blackwattle Bay, Sydney. As part of the ongoing refinement of the construction methodology of the new Sydney Fish Market, Multiplex are proposing to conduct in-situ capping of the sediments following redistribution works (Mod4).

In order to ensure appropriate air quality mitigation measures are identified and implemented. It is appropriate to review the potential emissions from the sediment capping activity as well as mitigation measures adopted by the existing Construction Air Quality and Dust Management Plan. This letter has been prepared by SLR Consulting Pty Ltd (SLR) at the request of Multiplex, to detail the review of potential impacts and required mitigation measures.

1 Background

SLR was commissioned by UrbanGrowth NSW Development Corporation (UrbanGrowth NSW) to perform Air Quality Impact Assessments (AQIA) for Stage 1 and Stage 2 of the proposed development (SLR refence, 610.17553-R02-v4.0 and 610.17553-R03-v3.0 respectively). SLR also prepared a *Construction Air Quality and Dust Management Plan – SSD 8925* for the works (SLR reference, 610.30264-R01-v0.1.docx, February 2021), commissioned by Multiplex.

The main potential sources of air emissions associated with the construction works were identified as:

- Dust impacts during the demolition works;
- Dust impacts due to loading and unloading of materials;
- Wheel-generated dust from trucks travelling along unpaved roads;
- Wind erosion of exposed surfaces and stockpiles; and
- Odour impacts due to the decomposition of marine growth on the underwater structures should they be stored on-site for an extended period.

The potential for off-site dust impacts was assessed using a qualitative risk-based approach prescribed by the Institute of Air Quality Management (IAQM). The results of this assessment indicated that dust impacts due to the construction activities could be adequately managed with the implementation of site-specific mitigation measures, and that the risk of residual impacts was *low* for demolition, earthworks and construction activities and *negligible* for track-out.

2 Main Works SSDA Modification 7

Multiplex are proposing to place a 1.6 m thick layer of sand and crushed stone over approximately 18,000 m^2 of redistributed sediments inside the cofferdam prior to commencing building construction works within this area in order to:

- Further mitigate potential environmental impacts from sediments following redistribution during temporary construction dewatering of the cofferdam – this will be via physical separation to reduce the potential for mobilisation of suspended solids and exposure of sediments to atmosphere during construction works.
- Provide a safe working surface for construction.

The cap will remain in place underlying the constructed building.

The bottom 1.0 m to 1.2 m of the cap will be sand, which is proposed to be brought onto site on barges and placed onto the seabed prior to dewatering of the cofferdam. The top 0.4 m to 0.6 m layer is proposed to be crushed stone, which will be brought onto site via road and placed onto the dewatered area within the cofferdam using excavators.

3 Mitigation Measures Currently in Place

The mitigation measures listed in Section 8 of the *Construction Air Quality and Dust Management Plan* to minimise the potential for off-site dust and nuisance odour impacts associated with transport and handling of potentially dusty material are as follows:

- *Where excessive dust events occur (i.e. prolonged visual dust in a particular area), additional watering of dust producing activities will be undertaken or activities temporarily halted until such times that the dust source is under control.*
- *All materials shall be stored or stockpiled at suitable locations and stockpiles shall be maintained at manageable sizes which allow them to be covered, if necessary, to control emissions of dust and or VOCs/odour*
- *The surface should be dampened slightly to prevent dust from becoming airborne but should not be wet to the extent that run-off occurs*
- *Stockpiles that will be in place for more than 20 days and are not actively used as well as any stockpiles that are susceptible to wind or water erosion will be suitably protected from erosion within 10 days of the establishment of each stockpile.*
- *All vehicles carrying spoil or rubble to or from the site shall at all times be covered to prevent the escape of dust or other material*
- *All on-road vehicles will comply with relevant vehicle emission standards (prescribed by the NSW RMS), where applicable, and will be maintained in good condition, in accordance with manufacturer's specifications and POEO Act.*

- *Delivery trucks will switch off engines whilst undertaking a delivery on-site, if idling time is likely to exceed 5 minutes.*
- *Truck queuing and unnecessary trips will be minimised through logistical planning and by the identification and use of specific park up/hold areas away from the Project.*
- *Adequate water supply will be available on the site for effective dust/particulate matter suppression/ mitigation using a combination of potable and non-potable water sources.*
- *Works will be assessed during strong winds or in weather conditions where high levels of airborne particulates may potentially impact the sensitive receivers.*
- *All trucks entering or leaving the Site will have their loads covered.*
- *If unanticipated strong odours or significant visual dust emissions are noted or observed on site, an investigation will be undertaken by the Project Manager to identify the scope of work or source of the emission prior to undertaking and applying any additional mitigation measures.*
- *Sand and other aggregates will not be allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.*

4 Implications of Modification 7 for Air Quality Impacts

The proposed sediment capping is in line with the *Construction Air Quality and Dust Management Plan* measure to keep seabed material covered to limit odour emissions. In addition, the sand layer will be wet when first exposed after dewatering and the crushed stone would have a relatively low potential for dust generation after placement.

Sediment capping was not specifically identified as an activity in the AQIA reports and the assessment assumed a 'Medium' dust emission magnitude for earthwork activities, which is applicable to sites with a total of between 20,000 t to 100,000 t of material moved. However, as the sensitivity of the general area was classified '*medium*' for dust soiling and *'medium'* for health effects by the AQIA, a 'Large' dust emission magnitude for earthwork activities (which is applicable to sites with a total greater than 100,000 t of material moved), would not change the level of air quality risk due to earthwork activities nor the recommended mitigations measures based on the IAQM methodology. In accordance with the *Construction Air Quality and Dust Management Plan* water sprays should be used to suppress dust during placement of the crushed stone layer, should it be required.

Based on the above, no changes to the conclusions of the Air Quality Impact assessment, or to the mitigation measures included in the *Construction Air Quality and Dust Management Plan* are identified as being required as a result of proposed SSDA Modification 7. The additional activities associated with the sediment capping are not expected to lead to a significant change in air quality impacts for the Project.

Yours sincerely



ALI NAGHIZADEH
Principal - Air Quality

Checked/
Authorised by: KL

Appendix 25: Tidal Flow Assessment

Advisian
WorleyParsons Group

Advisian
Level 12, 141 Walker St
North Sydney NSW 2060
Australia

P: +61 2 8923 6866

Trading as WorleyParsons
Services Pty Ltd
ABN: 61 001 279 812

www.advisian.com

17 December 2021

Peter Wark
Associate Director
at&l
Level 7 153 Walker Street
North Sydney NSW 2060

By email: peter.w@atl.net.au

Dear Peter

SYDNEY FISH MARKETS – TIDAL IMACTS OF PROPOSED CONSTRUCTION METHOD

I have reviewed the tidal impacts of the proposed method of construction comprising capping the seabed beneath the structure to allow works to be undertaken in the dry, as depicted in the sketches ATL-CV-SKT-00041, 00042, 00043 and 00044 dated 24-11-21.

The works associated with this method would have no impact on the tidal prism of Sydney Harbour as the works proposed would be undertaken entirely below the lowest tidal level. Further, the works would allow for the incorporation of sediment discharged from the Central Culvert and would allow for the free flow of tidal streams beneath the Sydney Fish Markets once completed.

I trust this is suited to your requirements, but should you have any queries please contact me.

Yours sincerely,

Alexander Nielsen NER RPENSW
Principal Consultant