13 November 2020

Infrastructure NSW
Attn: Jennifer Chang
Level 27, 201 Kent Street
Sydney NSW 2000

By email: jennifer.chang@infrastructure.nsw.gov.au

Dear Jennifer,

RE: LETTER - SSD FOR EARLY WORKS AND MAIN WORKS, THE NEW SYDNEY FISH MARKET

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Ref 318000632

As a NSW Environment Protection Authority (EPA) accredited Contaminated Sites Auditor, I am conducting an Audit in relation to the new Sydney Fish Market.

Development Consent

Redevelopment of the site is subject to two State Significant Development (SSD) applications approved by the Minister of Planning and Public Spaces on 12 June 2020. SSD 8924 provided approval for demolition of existing structures and approval of the proposed development envelope for use as a fish market. SSD 8925 provided approval of the construction, use and operation of the new Sydney Fish Market.

Conditions relevant to the site audit include B25-B27 in SSD 8924 and B93-B94 in SSD 8925, as follows:

B25/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 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.*
>
> *Any deficiencies identified by the auditor in the interim audit advice must be addressed."*

B26/B94

> *"Prior to the commencement of works, the Applicant must engage an EPA-accredited auditor to prepare a Section B Site Audit Statement that confirms*

that the remediation action plan is appropriate for the site and that the site can be made suitable for the proposed use."

B27/B94

"The Applicant must adhere to the management measures accepted or recommended by the site auditor."

Audit Deliverables Prepared to Date

I previously prepared 'Interim Audit Advice Letter No. 1 – Data Gap Assessment and Hazardous Materials Management Plan, the New Sydney Fish Market', dated 13 August 2020 (the IAA). The IAA Letter reviewed the suitability and appropriateness of the Data Gap Assessment (DGA) (12 March 2019) and Hazardous Materials Management Plan (HMMP) (8 April 2019) prepared by JBS&G Australia Pty Ltd (JBS&G).

I subsequently prepared 'Site Audit Report – Revised Remedial Action Plan, The New Sydney Fish Market, Pyrmont NSW' (the SAR) and Section B Site Audit Statement TO-054-B dated 1 August 2020 (the SAS). The SAR and SAS were prepared to assess the suitability of a Remedial Action Plan (RAP) (8 July 2020) prepared by JBS&G.

The IAA and SAR/SAS were prepared to address the requirements of Condition B25 and B26 of SSD 8924. They do not reference condition B93 and B94 of SSD 8925 as I was not aware of them at the time. I have since reviewed the consent condition requirements and note that they are identical. I therefore consider that the findings and conclusions of the IAA and SAR/SAS are relevant to both SSD 8924 and SSD 8925. Amendment of the IAA and SAR/SAS to refer to SSD 8925 is not considered to be required.

* * *

Yours faithfully
Ramboll Australia Pty Ltd

Tom Onus
EPA Accredited Site Auditor 1505

Prepared for

Infrastructure NSW

Prepared by

Ramboll Australia Pty Ltd

Date

13 August 2020

Project Number

318000632

Audit Number

TO-054-B

SITE AUDIT REPORT

REVISED REMEDIAL ACTION PLAN, THE NEW SYDNEY FISH MARKET, PYRMONT NSW

RAMBOLL Bright ideas. Sustainable change.

RAMBOLL

ENVIRONMENT
& HEALTH

13 August 2020

Infrastructure NSW
Attn.: Jennifer Chang
Level 12, 19 Martin Place
Sydney NSW 2000

By email: jennifer.chang@infrastructure.nsw.gov.au

Dear Jennifer

SITE AUDIT REPORT - REVISED REMEDIAL ACTION PLAN, THE NEW SYDNEY FISH MARKET, PYRMONT NSW

I have pleasure in submitting the Site Audit Report for the subject site. The Site Audit Statement, produced in accordance with the NSW *Contaminated Land Management Act 1997*, is included as Appendix B of the Site Audit Report. The Audit was commissioned by Infrastructure NSW (formerly UrbanGrowth NSW Development Corporation) to assess the suitability of a remedial action plan.

The Audit was undertaken to comply with a condition of the approval of SSD 8924 issued on 12 June 2020 by the Minister for Planning and Public Spaces and is therefore a statutory audit.

Thank you for giving me the opportunity to conduct this Audit. Please call me if you have any questions.

Yours faithfully,
Ramboll Australia Pty Ltd

Tom Onus
EPA Accredited Site Auditor 1505

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APPENDICES

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Appendix C
Interim Audit Advice

LIST OF ABBREVIATIONS

Measures

%	per cent
µg/L	Micrograms per Litre
µg/kg	Micrograms per Kilogram
ha	Hectare
m	Metre
m AHD	Metres Australian Height Datum
mbgl	Metres below ground level
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Litre
ppm	Parts Per Million

General

ACM	Asbestos Containing Material
ADWG	Australian Drinking Water Guidelines
AF	Asbestos Fines
AHD	Australian Height Datum
ALS	Australian Laboratory Services
APEC	Areas of Potential Environmental Concern
ASS	Acid Sulfate Soils
AST	Aboveground Storage Tank
ANZECC	Australian and New Zealand Environment and Conservation Council
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes & Naphthalene
CCME	Canadian Council of Ministers of the Environment
CH_4	Methane
CLM Act	NSW Contaminated Land Management Act 1997
CO_2	Carbon Dioxide
CO	Carbon Monoxide
COC	Chain of Custody
COPC	Contaminant of Potential Concern
Council	City of Sydney Council
CSM	Conceptual Site Model
DA	Development Application
DGA	Data Gap Assessment
DGV	Default Guideline Value
DP	Deposited Plan
DQI	Data Quality Indicator
DQO	Data Quality Objective
EIL	Ecological Investigation Level
ENM	Excavated Natural Material
Envirolab	Envirolab Services Pty Ltd
EPA	Environment Protection Authority (NSW)
ESL	Ecological Screening Level
FA	Fibrous Asbestos
GSV	Gas Screening Value
GV-High	Upper Guideline Value
HIL	Health Investigation Level
HSL	Health Screening Level
ISQG	Interim Sediment Quality Guideline
LCS	Laboratory Control Sample
Mercury	Inorganic mercury unless noted otherwise
Metals	As: Arsenic, Cd: Cadmium, Cr: Chromium, Cu: Copper, Ni: Nickel, Pb: Lead, Zn: Zinc, Hg: Mercury
MS	Matrix Spike
NATA	National Association of Testing Authorities
NC	Not Calculated
ND	Not Detected
NEPM	National Environment Protection Measure
NHMRC	National Health and Medical Research Council
NL	Non-Limiting

n	Number of Samples
OCPs	Organochlorine Pesticides
OEH	Office of Environment and Heritage
OH&S	Occupational Health & Safety
OPPs	Organophosphorus Pesticides
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
pH	A measure of acidity, hydrogen ion activity
PID	Photoionisation Detector
PQL	Practical Quantitation Limit
QA/QC	Quality Assurance/Quality Control
RAP	Remediation Action Plan
RPD	Relative Percent Difference
RSL	Regional Screening Level
SAR	Site Audit Report
SAS	Site Audit Statement
SWL	Standing Water Level
TBT	Tributyltin
TCLP	Toxicity Characteristic Leaching Procedure
TOC	Total Organic Carbon
TPHs	Total Petroleum Hydrocarbons
TRHs	Total Recoverable Hydrocarbons
UCL	Upper Confidence Limit
UPVC	Unplasticised Polyvinylchloride
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VENM	virgin excavated natural material
VOCs	Volatile Organic Compounds
-	On tables is "not calculated", "no criteria" or "not applicable"

1. INTRODUCTION

1.1 Audit Details

A site contamination audit has been conducted in relation to the site at 1A to 1C Bridge Road, Glebe, NSW and part of 56-60 Pyrmont Bridge Road, Pyrmont, NSW.

The Audit was conducted to provide an independent review by an EPA Accredited Auditor of the suitability and appropriateness of a remedial action plan (RAP) i.e. a "Site Audit" as defined in Section 4 (1) (b) (v) of the NSW *Contaminated Land Management Act 1997* (the CLM Act).

State Significant Development (SSD) application 8924 was approved by the Minister of Planning and Public Spaces on 12 June 2020 for demolition of existing structures and approval of the proposed development envelope for use as a fish market. Condition B26 requires a site audit as follows:

> *"Prior to the commencement of works, the Applicant must engage an EPA-accredited auditor to prepare a Section B Site Audit Statement that confirms that the remediation action plan is appropriate for the site and that the site can be made suitable for the proposed use".*

Details of the Audit are:

Requested by:	Jennifer Chang on behalf of Infrastructure NSW (formerly UrbanGrowth NSW Development Corporation)
Request/Commencement Date:	17 December 2018
Auditor:	Tom Onus
Accreditation No.:	1505

It is noted that 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 the report is interchangeable with Infrastructure NSW.

1.2 Scope of the Audit

The scope of the Audit included:

- Review of the following reports:
  - 'Environmental Site Investigation Blackwattle Bay Maritime Precinct, Blackwattle Bay Maritime Precinct, NSW', Report No. 2116954A PR_9459 Rev B, 9 March 2009, Parsons Brinkerhoff Australia Pty Ltd (PB)
  - 'Preliminary Environmental Site Assessment for Proposed Redevelopment – Waterfront at Sydney Fish Markets, 56-60 Pyrmont Bridge Road, Pyrmont, NSW', Report No. E24125Krpt, August 2010, Environmental Investigation Services (EIS)
  - 'Geotechnical Desktop Review', Report No. NB00046-300-ESG-RP-0001 / B, 6 August 2014, Jacobs Group (Australia) Pty Ltd (Jacobs)
  - 'Environmental Site Assessment - The Bays Precinct Urban Transformation Area', Report No. 50460-101699 (Rev 1), 18 November 2015, JBS&G Australia Pty Ltd (JBS&G 2015(a))
  - 'Site Wide Remedial Concept Plan – The Bays Precinct Urban Transformation Area', 4 December 2015, JBS&G (JBS&G 2015(b))
  - 'Bays Market Precinct: Blackwattle Bay & Wentworth Park - History, Built Heritage, Archaeology & Landscape Study', Report No. H-16-237 (Rev 02), 17 July 2017, City Plan Heritage Pty Ltd (CPH)

- 'Contamination Investigation, The Bays Precinct – Separable Portion 1, Blackwattle Bay, Pyrmont, NSW', Report No. E29245KletRev1-SP1, 12 July 2017, Environmental Investigation Services (EIS)
- 'Revised Geotechnical Report to UrbanGrowth NSW on Geotechnical Investigation for Proposed Bays Market District at Blackwattle Bay & Wentworth Park, Pyrmont, NSW', Report No. 29245SrptRev2, 14 September 2017, JK Geotechnics
- 'Data Gap Assessment, The New Sydney Fish Market, 1A to 1C Bridge Rd, Glebe NSW', Report No. 54162/119400, 12 March 2019, JBS&G (*the DGA*)
- 'Acid Sulfate Soil Management Plan, The New Sydney Fish Market, 1A to 1C Bridge Road, Glebe, NSW', Report No. 54162/113896 (Rev 2), 4 April 2019, JBS&G (*the ASSMP*)
- 'Environmental Site Assessment, The new Sydney Fish Market, 1A to 1C Bridge Road, Glebe and part 56-60 Pyrmont Bridge Road, Pyrmont, NSW', Report No. 54162 – 112239 (Rev 3), 4 April 2019, JBS&G (*the ESA*)
- 'Remedial Action Plan, The New Sydney Fish Market, 1A to 1C Bridge Road, Glebe and part 56-60 Pyrmont Bridge Road, Pyrmont, NSW', Report No. 54162/113808 (Rev 3), 4 April 2019, JBS&G (*the RAP*)
- 'Remedial Action Plan, The New Sydney Fish Market, 1A to 1C Bridge Road, Glebe and part 56-60 Pyrmont Bridge Road, Pyrmont, NSW', Report No. 54162/113808 (Rev 4), 8 July 2020, JBS&G (*the Revised RAP*)
- 'Hazardous Materials Removal Management Plan, The New Sydney Fish Market, 1A to 1C Bridge Road, Glebe and Part 56-60 Pyrmont Bridge Road, Pyrmont, NSW', Report No. 54162/114239 (Rev 4), 12 August 2020, JBS&G (*the HMRMP*)

- A site visit by the Auditor on 5 March 2019
- Discussions with Infrastructure NSW, and with JBS&G who prepared the RAP.

The various site investigations were completed prior to the Auditor's engagement and no discussions with the consultants was undertaken regarding the scope of work. It is also noted that the PB (2009) Environmental Site Investigation referenced and reviewed six previous reports that were not provided for auditor review.

1.3 Background

The site has previously been subject to site audit as part of the Bays Precinct Urban Transformation Area, comprising commercial and industrial land adjoining Blackwattle Bay, Rozelle Bay and White Bay. The following site audit report (SAR) and site audit statement (SAS) were prepared:

- 'Site Audit Report – Site Wide Remedial Concept Plan, The Bays Precinct Urban Transformation Area' and SAS GN 510 dated 28 January 2016 prepared by Graeme Nyland of Ramboll Environ Australia Pty Ltd (Ramboll).

The Auditor previously prepared the following Section B SAS and SAR reviewing the previous RAP (JBS&G, 2019):

- 'Site Audit Report – The New Sydney Fish Market, 1A to 1C Bridge Road, Glebe and Part of 56-60 Pyrmont Bridge Road, Pyrmont, NSW' and SAS TO-054-A dated 25 September 2019.

The Revised RAP was subsequently prepared to incorporate the findings of the DGA and address the requirements of SSD 8924.

The Auditor prepared an interim audit advice (IAA) letter, dated 13 August 2020, reviewing the DGA and HMRMP. The IAA was prepared to address comments from the NSW EPA (letter dated 20 March 2020) on the development application, as well as the requirements of Condition B25 of the development consent. The IAA is attached in Appendix C.

2. SITE DETAILS

2.1 Location

The site locality is shown on Attachment 1, Appendix A.

The site details are as follows:

Street address:	1A to 1C Bridge Road, Glebe, NSW and part of 56-60 Pyrmont Bridge Road, Pyrmont, NSW.
Identifier:	Lots 3-5 in DP 1064339; Part Lot 107 in DP1076596; Part Lot 1 in DP835794 (Attachment 2, Appendix A)
Local Government:	City of Sydney Council
Owner:	Roads and Maritime Services (RMS)
Leaseholder:	Infrastructure NSW
Site Area:	Approximately 3.7 ha (approximately 0.76 ha land-based)

The site boundaries are well defined by Bridge Road to the southeast and the existing fish market to the northeast. The site extends approximately 100 m into Blackwattle Bay and a further approximately 50 m at three areas comprising the footprint of wharf structures to be built as part of the proposed development (Attachment 2, Appendix A).

2.2 Zoning

The RAP reports that the current zoning of the site is 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.

2.3 Adjacent Uses

The surrounding site use includes:

Northwest: Blackwattle Bay, part of Sydney Harbour

Northeast: the existing Sydney Fish Market

Southeast: Bridge Road, with Wentworth Park recreational area to the southeast

Southwest: Park area and Sydney Secondary College – Blackwattle Bay (Secondary School)

Blackwattle Bay represents a sensitive offsite receiving environment with estuarine waters of the bay connected to Rozelle Bay which flows into Darling Harbour and then into central Sydney Harbour.

2.4 Site Condition

The site is located within an area of commercial/industrial use and comprises four separate areas with different commercial/industrial uses.

The south-western portion of the site (Lot 5 DP 1064339) was occupied by a Hanson Cement concrete batching plant. The central premises of the site (Lot 4 DP 1064339) comprised infrastructure associated with commercial hire boat operations and the remnants of the former Jones Brothers coal loader facilities (Lot 3 DP 1064339). The eastern most portion of the site comprised public open space areas of the current fish market (Lot 1 DP 835794) along the Blackwattle Bay foreshore area.

The ESA noted that the Hanson Cement concrete batching plant comprised several large bulk material silos, loading infrastructure, several washdown bays, and vehicle movement areas, vessel unloading facilities and a site office building. The northern portion of the premises was situated on a concrete deck wharf structure overlying hardwood girders, whilst the southeast

portion appeared to have been constructed on retained fill to the rear of a sea wall. A number of conveyors connected the batch plant, four silos, and truck filling point infrastructure in addition to the adjoining weighbridge. Two designated bunded areas for chemical storage were located in the central portion and batch plant areas of the Blackwattle Bay Precinct. A two-storey site office building and Ausgrid substation (S1608) were situated in the east of the premises.

The commercial hire boat operations included facilities such as a wharf portion and associated finger jetty berths in the north, with vehicle parking areas, a demountable office building and shipping containers used for storage of supplies and audio-visual equipment. The wharf deck comprised a combination of concrete and asphalt pavement supported on timber beams and turpentine piles. The southern portion of the premises was established on fill material retained by a sea wall. Beyond the sea wall, services supporting the boats at dock were attached to the underside of the wharves (including sewer, water and power). A sewer pump-out facility was situated adjacent to the entry from Bridge Road, connected to the facilities beneath the wharves. One small building of unknown former use was located at the eastern most extent of the premises. Inspection of the site pavements during the ESA was limited by the presence of shipping containers, other equipment and vehicles. Areas able to be visually inspected did not identify indications of above ground storage tanks (AST) or underground storage tanks (UST).

The remnants of the former Jones Brothers coal loader facility included a rendered wall and timber framework adjacent to the street boundary and a paved yard area where structural steel infrastructure was stockpiled. The structure included an Ausgrid substation (S405) that was not inspected. Several temporary building structures were also located in this area. A sandstone block retaining structure retained the land portion of the premises above the water line. Weed vegetation and several mid-sized trees were located in this portion of the site.

The area located directly west of the current fish markets building, which is part of the site, comprised public open space along the Blackwattle Bay foreshore area in the easternmost portion of the site. The area was primarily used as an outdoor dining area for patrons at the current fish markets. The eastern portion of the site was predominantly covered in hardstand, with the exception of a small grassed area in the southern portion of the property and rocks/boulders lining the foreshore area. The ESA noted that the hardstand ground surface of this portion of the site comprised a deck that overlies a mixture of soils (above the high-water level mark) and the surface waters of Blackwattle Bay.

The site is situated on predominantly flat terrain. The ESA noted that a review of topographic information available on the NearMap spatial information database indicated that the southern portion of the site had been subject to land reclamation and had an elevation of approximately 2 m Australian Height Datum (AHD). The northern portion of the site was situated on piers overlying the surface waters of Blackwattle Bay. Site surface water was anticipated to drain directly into Blackwattle Bay.

The Auditor's observations during the site visit on 5 March 2019 generally confirm the above consultant's observations, although the following additional observations were made:

- The premises in the central portion of the site were no longer operational, with the commercial hire boat operations having ceased. The premises were largely vacant, however the buildings remained and the sewer pump-out facility was reportedly still in use. No indications of ASTs or USTs were observed.
- Fill material was observed on the ground surface in the former coal loader facility and beneath the deck of the open space area adjacent to the current fish markets. A fragment of suspected asbestos containing material (ACM) was observed on the ground surface at the former coal loader facility.
- The concrete batching plant (Hanson Cement) was in operation at the time of the site visit and was therefore not inspected. The HMRMP reported that the plant was in the process of being demolished in April 2020.

2.5 Proposed Development

It is understood that the site is to be redeveloped by Infrastructure NSW as a new Fish Markets. The most recent development plans for the proposed Fish Markets are dated 18 September 2019. It is understood that statutory approval for the proposed development scheme was 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 was approved for:

- building envelope for a 3-storey building
- use of the site for the fish market, including waterfront commercial and tourist facilities and ancillary uses
- waterfront structures, including wharves
- public domain, including landscaping and foreshore promenade
- pedestrian, cycle, footpath and Bridge Road works
- demolition of existing wharves, structures, utilities and services

The Main Works development application seeks approval for construction of a new fish market including land and water-based structures. The building will include three above ground levels and one basement level. The basement will comprise a car park, plant and storage, waste management facilities, and bathrooms. The building will include wholesale services (storage, processing and sales), retail premises, waste management facilities, office space, amenities, plant and storage.

For the purposes of this audit, the ‘commercial industrial’ land use scenario will be assumed.

3. SITE HISTORY

The ESA and RAP provided a summary of the key aspects of the site history based on a review of previous investigations of the site.

Table 3.1: Site History

Date	Activity
1836 to 1891	The site and Blackwattle Bay were reclaimed. CPH (2017) suggested that reclamation of the Bay took place between 1859 and 1909. During the 1880s reclamation of the swamp at the head of Blackwattle Bay took place with material dredged from established bay deep-water berths.
From 1900 onwards	The site was used for commercial purposes that included timber merchants, abattoirs and garbage collectors. CPH (2017) suggested that government coal depots were present on the site between 1910 and 1925 and commercial coal depots were present between 1926 and 1943.
1995	The site formerly had five 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 excavated and removed from the site, with the resulting excavations validated. Heavy metal impacts remained in-situ at the limit of the completed investigations.
1995	Demolition of former site structures resulted in the removal of 700 m^2 of asbestos from the site.
Present	The southern portion of the site was used as a concrete batching plant since the 1980s, however was recently demolished. The central and northern portions of the site were not currently in use.

The site history summary indicates that the site has been used for a range of commercial/industrial uses, including timber merchants, abattoirs and garbage collectors, coal depots, cement works, and commercial boat hire.

3.1 Auditor's Opinion

The ESA reported the removal of five USTs from the site in 1995, with post-removal validation indicating residual contamination of soils with heavy metals:

> *"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 total petroleum hydrocarbons (TPH), however it was further reported that heavy metal impacts remained in-situ at the limit of the completed investigations."*

The location of the former USTs was not identified, and a recent SafeWork NSW Dangerous Goods Records search has not been undertaken. It is however noted that the DGA did not identify petroleum hydrocarbon impact in groundwater or soil vapour. Significant impact associated with the former USTs is therefore considered unlikely.

In the Auditor's opinion, the site history provides a general indication of past site uses. Details of activities and operations at the site were not available and the source of material used for reclamation of the bay is unknown, although may comprise potentially contaminated dredged material from deep-water berths formerly located in Blackwattle Bay. Sources of site history information, such as historical aerial photographs, NSW EPA records, SafeWork NSW dangerous goods records, Council records and Certificates of Title, were not reviewed in the reports provided. The resulting uncertainty was addressed by a higher density of sampling during the DGA.

4. CONTAMINANTS OF CONCERN

The ESA provided a list of the contaminants of potential concern (COPC) and potentially contaminating activities. These have been tabulated in Table 4.1.

Table 4.1: Contaminants of Concern

Area	Activity	Potential Contaminants
Approximately 20 m wide area along Bridge Road and approximately 10 m along the eastern portion of the site adjacent to the existing fish markets (Attachment 2, Appendix A)	Reclaimed land with fill material	Heavy metals, total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), herbicides, polychlorinated biphenyls (PCBs), asbestos, acid sulphate soils (ASS) and ground gases (methane, hydrogen sulfide, carbon dioxide, carbon monoxide and oxygen)
Former coal wharf	Not discussed in the ESA	Heavy metals, TPH/VOCs, PAHs, asbestos and tributyltin (TBT)
Current and former concrete batch plant	Not discussed in the ESA	Heavy metals, TPH/VOCs, PAHs, solvents, asbestos and TBT
Current and former industrial areas	Fuel storage and dispensing, building material	Heavy metals, TPH/VOCs, PAHs, VOCs, OCPs, herbicides, PCBs and asbestos
Marina areas	Maintenance and storage activities	Heavy metals, TPH/VOCs, PAHs, asbestos and TBT

4.1 Auditor's Opinion

The Auditor considers that the contaminants of concern analysed during the ESA and DGA adequately reflect the site history and condition.

ASS are considered likely to be present across all areas of the site, including alluvial soil and fill material used in land reclamation. On this basis, the disturbance of materials during site redevelopment works will be required to be conducted in accordance with the ASSMP.

There has been no assessment by the consultants for the presence of per- and poly-fluoroalkyl substances but in my opinion, there are no indications in the site history that they would be potential contaminants of concern.

5. STRATIGRAPHY AND HYDROGEOLOGY

Following a review of the reports listed in Section 1.2, a summary of the site stratigraphy and hydrogeology was compiled as follows.

5.1 Stratigraphy

JK Geotechnics (2017) 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 an approximate northwest to southeast alignment.

Boreholes in Blackwattle Bay identified a subsurface profile generally comprising natural clay and sandy clay soils 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 4.7 m depth was encountered. There generally appeared 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 within the site identified between 2.5 and 5.5 m of orange to yellow-brown gravelly sandy clay fill material, with inclusions of sandstone, wood/timber, ash, slag and brick. Boreholes in adjoining Wentworth Park identified fill comprising silty sand or sandy clay containing varying amounts of inclusions such as sandstone and igneous gravel, timber, tile, ceramic, glass, shell, concrete and brick fragments, slag and ash. Underlying natural material within land-based portions of the site comprised grey-brown silty marine sediments, containing abundant shell material.

Sandstone bedrock was encountered underlying natural soils at depths ranging from approximately 5.5 to 13.4 m below ground level (bgl), which is equivalent to -9.1 to -18.5 mAHD, although yellow-brown medium-grained sandstone bedrock was present at a depth of 3.20 mbgl in the central eastern portion of the site.

5.2 Potential for Acid Sulfate Soils

Review of the ASS Risk Map for Prospect/Parramatta (Acid Sulfate Soil Risk Map – Prospect/Parramatta, Edition 2, 1997, NSW Department of Land and Water Conservation) indicated that the site is located within an area of 'high probability' of ASS within bottom sediments.

PB (2009) noted potential indicators of ASS comprising odorous marine sediments with seashells 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 by JBS&G (2015) and EIS (2017), however no samples were analysed at a laboratory to confirm if the soils comprised actual ASS.

The DGA included assessment of fill material and natural marine sediments within the land-based portion of the site for ASS. Shallow gravelly sandy fill was considered to not comprise ASS or PASS. However, underlying saturated silty-sand and sandy clay materials (sediments) was PASS and will require management during future construction activities where works disturb these materials. Results are discussed in Section 9.3 of the IAA in Appendix C.

Management of the potential ASS (PASS) is proposed as discussed in the ASSMP.

5.3 Hydrogeology

The ESA stated that a review of the registered bore information maintained by the NSW Department of Primary Industries identified 14 registered bores within a 500 m radius of the site. The closest wells (approximately 250 m southwest of site) were constructed for monitoring

purposes and were reported to contain a standing water level (SWL) of approximately 0.6 m within shallow fill materials.

During the DGA, boreholes undertaken in the land portion of the site identified saturated conditions at depths of between 1.8 and 3 mbgl.

Groundwater monitoring was undertaken as part of previous investigations by PB (2009) (one monitoring round at three monitoring wells - PBMW02, PBMW03 and PBMW04), JBS&G (2015) (one monitoring round at one monitoring well - MW1) and the DGA (one monitoring round at ten locations, including the four existing locations and six new locations – SBMW01 to SBMW06). The investigations identified the following:

- Site groundwater reported total dissolved solid (TDS) concentrations consistent with saline waters.
- Groundwater had a relatively neutral pH and was low in oxygen.
- Depth to groundwater was approximately 1.3-2.3 mbgl.
- SWLs correspond with tidal surface water levels of Blackwattle Bay into which site groundwater is anticipated to discharge.
- No odours or sheens were observed.

5.4 Auditor's Opinion

The Auditor considers that the investigations undertaken to date give a reasonable understanding of the site stratigraphy, however the investigation methodology (hand augers, pushtube and solid stem augers) makes assessment of layering and composition of material difficult. Variability in the composition and depths of different strata is therefore likely.

Potential ASS materials were identified within saturated marine sediments within the bay and land portions of the site. The lateral and vertical identification and assessment for ASS has not been undertaken in accordance with the guidance provided in ASSMAC (1998). Consequently, the acid generating potential of the PASS material as well as the extent/volumes of PASS material are currently unknown. Assessment of ASS/PASS is proposed in the data gap assessment discussed in the RAP. It is noted that the ASSMP considers these uncertainties and assumes that sediment is PASS until confirmed otherwise. The Auditor considers this appropriate.

The Auditor considers that the site hydrogeology is sufficiently well known for the purpose of remedial planning.

6. EVALUATION OF QUALITY ASSURANCE AND QUALITY CONTROL

The Auditor has assessed the overall quality of the data by review of the information presented in the referenced reports, supplemented by field observations.

The ESA has been prepared on the basis of previous assessments by PB (2009), EIS (2010 and 2017) and JBS&G (2015a), which are listed in Table 6.1 below. The objective of the ESA was to *"identify potential site contamination issues that will require to be addressed during the construction works prior to the use of the site for a fish market. The findings of the ESA are proposed to inform the development of a Remedial Action Plan (RAP) to be implemented prior to the construction works such that the site can be demonstrated as suitable for the proposed land use as required under SEPP55"*.

The DGA (JBS&G, 2019) was subsequently undertaken to address some of the data gaps identified in the ESA. The scope of the DGA is provided in Table 6.1.

Table 6.1: Summary of Investigations

Investigations	Field Investigations	Analytical Data Obtained
PB (2009)	Soil (7 sample locations – PBBH01 to PBBH05, PBHA01 to PBHA02) Groundwater (3 borehole locations – MW2A to MW4A) Sediments (18 locations – PBSS1 to PBSS12 and PBDSS1 to PBDSS6)	Soils: Metals, TRH/BTEX, PAHs, OCPs, PCBs, asbestos. Groundwater: Metals, TRH/BTEX, PAHs. Sediments: Metals, TRH/BTEX, PAHs, OCPs, PCBs, TOC, TBT
EIS (2010)	Surface sediment (1 location – SSB/SWB) Surface water (1 location - SSC/SWC).	Soils: Metals, TRH/BTEX, PAHs, OCPs, OPPs, PCBs, cyanide, asbestos. Sediments: Metals, TRH/BTEX, PAHs, OCPs, OPPs, PCBs, Cyanide, TBT. Surface Water: Metals, TPH, VOCs, PAHs, Cyanide, TBT.
JBS&G (2015a)	Soil (1 location – HHBH1/MW1) Groundwater (1 location – HHBH1/MW1) Ground Gas (1 location HHBH1/MW1)	Groundwater: Metals, TRH/BTEX, PAHs, VOCs, total nitrogen, phosphorus, potassium, hardness.
EIS (2017)	Sediments (17 locations, 7 of which are offsite – BH8 to BH24)	Sediments: Metals, TRH/BTEX, PAHs, OCPs, PCBs, VHCs, asbestos
The DGA (JBS&G, 2019)	Soil (13 sample locations – SB01 to SB10 and SB05A to SB05C) Groundwater (six new wells SBMW01 to SBMW06, sampling of new and existing wells (total 10), including MW1, MW2A to MW4A). Ground Gas (10 borehole locations – MW 1, MW2A to MW4A, SBMW01 to SBMW06) Soil Vapour (20 sample locations – SS01 to SS20) Acid Sulphate Soils (10 sample locations - SB01 to SB10) TCLP leachability (1 borehole location – SB05)	Soils: Metals, TRH/BTEX, PAHs, Tributyltin (TBT), asbestos Groundwater: Metals, TRH/BTEX, PAHs Ground Gas: Methane (CH_4), Carbon Dioxide (CO_2), Oxygen (O_2), Hydrogen Sulfide (H_2S), Carbon Monoxide (CO) Soil Vapour: VOCs ASS: SPOCAS, ASS testing TCLP leachability: Metals, PAHs

The Auditor has assessed the overall quality of the data by review of the information presented in the referenced reports, supplemented by field observations. The Auditor's assessment of the ESA follows in Tables 6.2 and 6.3. The Auditor's assessment of the DGA data quality is presented in Tables 7.1 and 7.2 of the IAA in Appendix C.

Table 6.2: QA/QC – Sampling and Analysis Methodology Assessment

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Data Quality Objectives (DQO) PB (2009), EIS (2010) and JBS&G (2015b) defined specific DQOs in accordance with the seven-step process outlined in DEC (2006) Guidelines for the NSW Site Auditor Scheme and Schedule B2 of NEPM 2013. DQOs were not defined by EIS (2017).	These were considered appropriate for the investigations conducted. Where not provided, these were not considered to impact the reliability of the investigations undertaken.
Sampling pattern and locations *Soil:* PB (2009) conducted soil sampling via boreholes at seven locations within the land portion of the site. The sampling locations were generally placed on a systematic grid, with certain locations skewed to target specific areas of environmental concern including the area of the former USTs. One soil borehole location (HHBH1/MW1) was sampled by JBS&G (2015a) in the southwestern portion of the site. *Groundwater:* In the site investigation by PB (2009) three boreholes were converted into groundwater monitoring wells and groundwater was subsequently sampled. The locations (PBMW2A, PBMW3A and PBMW4A) were situated in the central southern portion of the site only, resulting in a limited spatial coverage of the site. One groundwater well (HHBH1/MW1) was installed and sampled by JBS&G (2015a) in the south-western portion of the site. *Ground Gas:* Ground gas sampling was undertaken by JBS&G (2015) at on location (MW1 which is identical to HHBH1/MW1) situated in the southwestern portion of the site. *Sediments*: The investigation by PB (2009) included the collection of sediment samples from 18 locations within Blackwattle Bay. A further 16 locations were sampled in the sediment investigation by EIS (2017), which were based on a systematic sampling grid in Blackwattle Bay. *Surface Water*: During the investigation by EIS (2010) two surface water samples were collected from the eastern portion of Blackwattle Bay.	In the Auditor's opinion, the previous investigations of various environmental media within the site, including sampling and analysis of soils, groundwater, ground gas, sediments and surface water, provide incomplete coverage of the site. The results of UST removal and validation have also not been provided for review. Data gaps and a plan for addressing data gaps are discussed in Section 13 of the SAR.
Sampling density *Soil:* The sampling density of eight locations over a land-based area of approximately 0.72 ha is below the minimum sampling frequency recommended by the NSW EPA (1995) *Sampling Design Guidelines*. *Groundwater*: A total of four groundwater wells were previously installed at the site. *Ground gas:* Sampling was undertaken from a groundwater monitoring well (MW1) located in the southwestern portion of the site. *Sediment*: A total of 34 sediment sampling locations were located across the Blackwattle Bay area, including in areas within the water-based portion of the site.	The soil sampling density is low, and the eastern area of the site adjacent to the existing fish market has not been assessed. The soil sampling undertaken to date gives a reasonable indication of site conditions, however further sampling and analysis of soil is proposed in the RAP. It is noted that EIS (2010) undertook limited soil sampling (two soil bores BH601 and BH602) in the vicinity of the easternmost land-based portion of the site, although these data were not included in the summary review presented in the ESA as they were located offsite. ASS and PASS material in soils and sediments have not been assessed to date. Assessment is proposed as part of the data gap investigation detailed in the RAP. The density of groundwater wells across the site is low. Assessment is proposed as part of the data gap investigation detailed in the RAP. The density of sediment samples is not uniform across all areas of the site. In particular sediments in the western portion of the site have been sampled at a lower density.

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
	Assessment is proposed as part of the data gap investigation detailed in the RAP.
Sample depths Samples were collected and analysed from a range of depths at seven soil sample locations, reaching depths of up to 6.5 mbgl and terminating in sandstone, marine sediments or clay at six of the eight locations. Two short hand auger coring locations (PBHA01 and PBHA02) terminated in fill material.	In the Auditor's opinion, further characterisation of soils and sediment is required.
Well construction *Groundwater:* PB (2009) installed three groundwater monitoring wells (PBMW02A, PBMW03A, PBMW04A). The wells were constructed with 50 mm, class 18 unplasticised polyvinyl chloride (UPVC) screen and casing and were extended to at least 3 m into groundwater, or to a maximum depth of 6 mbgl. Monitoring wells were constructed using sand to pack the screen to a nominal depth of 0.5 m above the top of screen. Bentonite was then added to a nominal depth of 0.5 m above the sand level to seal the well. More sand was then added above the bentonite to the surface which was concreted and equipped with a road box. The well locations were surveyed, however the well heights were not surveyed due to their proximity to the water's edge and the tidal nature of the water within the wells. JBS&G (2015a) installed one groundwater monitoring well (HHBH01/MW1) in the southwestern portion of the site. The borehole was pre-drilled using solid flight augers to a depth of 6.7 mbgl. The well was constructed from 50 mm UPVC screen and casing, with appropriate gravel pack and bentonite seal. The well location and height were surveyed. *Ground gas:* Ground gas was sampled from the groundwater monitoring well HHBH01/MW1 installed by JBS&G. The well was fitted with a vapour tight well cap with a sample ports (Ex Cap) at the time of well development and remained in place until after completion of the landfill gas screening event.	In the Auditor's opinion the groundwater well construction was acceptable. Sampling ground gas from groundwater monitoring wells is not ideal. Samples may represent off-gassing from groundwater within the well, rather than ground gas within soil. The data is not considered representative of subsurface conditions.
Sample collection method *Soils:* During the PB (2009) investigation the boreholes were drilled with solid flight auger and hand auger. Soil samples were collected by grab sample directly from the auger. Soil sampling locations undertaken for the investigation by JBS&G (2015a) were completed using a small track mounted drill rig fitted with spiral flight augers and standard penetration test (SPT) sampling equipment. *Groundwater*: PB (2009) wells were developed immediately after drilling by removing approximately five bore volumes of water using a disposable polyethylene bailer or until groundwater parameters had stabilised. Wells were purged and sampled more than one week after development using disposable polyethylene bailers. Prior to groundwater sampling, wells were gauged using an oil/water interface probe. The JBS&G (2015a) well was developed on the same day as installation with a steel bailer. During sampling, wells were purged and samples collected using a low flow peristaltic pump using new disposable silicone tubing and disposable Low-Density Polyethylene (LDPE) tubing. The LDPE tubing was lowered to a maximum depth of two-thirds of the wetted screen length of the monitoring well prior to the commencement of purging. Purging of groundwater was undertaken generally at a rate of 0.2 L to 0.5 L/minute while ensuring that the drawdown does not exceed 300 mm during the pumping event. *Ground Gas:* The groundwater monitoring well sampled for ground gas in JBS&G (2015a) was fitted with a vapour tight well cap with sample port (Ex Caps) at the time of well development. A field meter was connected to the port during field screening. *Sediments:* During the investigation by PB (2009) sediments were collected at 12 locations across the bay area using drop cores from a	The Auditor notes that soil sample collection from the auger flights is not ideal as it can result in loss of volatiles and sample cross contamination, although cross contamination was minimised by removing external material. Volatiles are not considered to be present at significant concentrations given that soil and groundwater concentrations were typically less than the detection limit. It is noted that the sampling of sediments by drop corer may result in the potential loss of the surficial hydrous layer from the uppermost layer of sampled sediments, due to the loss of this material from resuspension and turbulence from the drop corer's bow wave prior to penetration of the core tube into the sediment profile. Overall the sample collection methodologies for the sampling of soils, groundwater and sediments employed were found to be acceptable. The surface water sampling methodology was not provided, and more current data will be required to inform site management

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
sampling vessel. In areas of restricted access, an additional six locations under the wharfs were sampled using divers (i.e. a total of 18 sampling locations). Samples retrieved by drop core involved lowering a weighted 1.8 m long, 100 mm diameter aluminium tube to the bay floor off the side of the sampling vessel. Each tube had a catch and sock on the end which would retain sediment that was pushed into the tube. Samples were collected from each tube by tipping the contents directly into the sample jar. New drop cores were used for each sample location to reduce cross-contamination. EIS (2017) undertook sediment sampling within Blackwattle Bay by advancing boreholes with SFA and Standard Penetration Test (SPT) sampler equipment mounted on a floating barge. *Surface water*: Sampling methodology was not provided.	procedures during remediation and redevelopment of the site. The surface water data has therefore not been considered further in this SAR.
Decontamination procedures *Soil/Sediments:* PB (2009) state that the decontamination of augering equipment was achieved by washing with phosphate-free detergent and tap water, followed by a final distilled water rinse. Decontamination was conducted after the collection of samples at each sample location. EIS (2010 and 2017) states that *"Appropriate industry standard sampling equipment and decontamination procedures"* were used. JBS&G (2015a) state that samples were collected by JBS&G personnel wearing fresh disposable nitrile gloves for each sample. Non-disposable sampling equipment was decontaminated between sampling locations. Prior to the commencement of sampling activities, non-disposable sampling equipment, including the SPT splits were cleaned with a high-pressure water/ detergent spray, rinsed with water and then air dried. The equipment was then inspected to ensure that no soil, oil, debris or other contaminants were apparent on the equipment prior to the commencement of works. Sampling equipment was subsequently decontaminated using the above process between each sample (for SPT splits, sampling knife, etc.) or between locations (augers). *Groundwater*: PB (2009) note that sampling equipment used was disposable. The interface probe used for water gauging was cleaned with Decon 90 diluted in tap water and rinsed with tap water between each well. JBS&G (2015a) note that dedicated sampling equipment was used for each well. Re-useable equipment including the flow cell and interface probe was decontaminated as per the general procedures discussed above for non-disposable soil sampling equipment. New nitrile gloves were reportedly used for each new sample.	Acceptable
Sample handling and containers PB (2009) stated that soil samples were placed in 125 gram clean glass jars, leaving no headspace, and closed using Teflon-coated lids. Samples were then stored in an ice brick-cooled esky and transported to the laboratory. Groundwater samples were placed in appropriate glass bottles, glass vials or plastic bottles. The samples were preserved in accordance with water sampling requirements detailed in NEPM 1999. Samples for heavy metals analysis were filtered at 0.45 µm and acidified. Samples for VOC (TPH) analysis were filled with zero headspace and a Teflon seal container. Bottles were placed directly into a pre-chilled ice chest, for transport to the testing laboratories. *Surface water:* It was not reported if samples for heavy metal analysis were filtered in the field.	Acceptable for soil and groundwater. It is not clear if surface water samples were field filtered, and more current data will be required to inform site management procedures during remediation and redevelopment of the site. The surface water data has therefore not been considered further in this SAR
Chain of Custody (COC) Completed chain of custody (COC) documentation was provided by PB (2009), EIS (2010), JBS&G (2015a) and EIS (2017).	Acceptable.
Detailed description of field screening protocols *Soil/Sediments:* PB (2009), EIS (2010) and JBS&G (2015a) state that a duplicate sample was screened with a photo-ionisation detector (PID) to analyse for VOCs using the soil sample headspace method. Results were provided on borehole logs.	Acceptable.

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Groundwater: Field screening was not discussed by PB (2009) and JBS&G (2015a), however field logs indicate that field parameters were measured during purging of wells. *Ground Gas:* The following parameters were monitored using an appropriately calibrated instrument (GFM435): methane, carbon dioxide, oxygen, hydrogen sulphide, carbon monoxide, atmospheric pressure, differential pressure and gas flow.	
Calibration of field equipment The reports indicated that calibration of PID field equipment had been undertaken prior to use and checks were performed during use. PB (2009) stated that the water quality meter was calibrated at the beginning of the day, with calibration records provided in Appendix D of the report. Further, the PID was checked in the field prior to works using a 100 ppm isobutylene in air calibration standard. EIS (2010) stated that the PID was calibrated before use by measurement of an isobutylene standard gas. Calibration records for the PID were provided in the report. JBS&G (2015a) state that the PID was calibrated prior to the commencement of field works and then check readings were completed on a daily basis during the field program using suitable calibration gas. If required, the PID was recalibrated during the field program in accordance with manufacturer's instructions. JBS&G (2015a) provided the calibration certificates from the equipment supplier (Airmet). A calibration certificate was provided by the supplier for the groundwater quality meter, however field records were not provided. EIS (2017) stated that the PID was calibrated before use by measurement of an isobutylene standard gas.	Acceptable.
Sampling logs Logs of soil boreholes, sediment boreholes and groundwater wells are provided in PB (2009), EIS (2010), JBS&G (2015a) and EIS (2017). The borehole logs indicate sampling depth, sampling interval, lithology, observations and well construction details.	Acceptable.

Table 6.3: QA/QC – Field and Lab Quality Assurance and Quality Control

Field and Lab QA/QC	Auditor's Opinion
Field quality control samples *PB (2009):* Field QA samples were analysed as follows: • Intra-laboratory duplicate samples at a rate of 1 in 10 primary samples. • Inter-laboratory duplicate samples at a rate of 1 in 20 primary samples. • Rinsate blanks (at a rate of one per site) • Trip blanks (at a rate of one per site) • No trip spike was obtained. *EIS (2010):* • Intra-laboratory duplicate samples at a rate of 10 to 15% of primary samples. • Inter-laboratory duplicate samples at a rate of 5-7% of primary samples. • 2 rinsate blanks • 3 trip blanks (2 sand and 1 water) • 5 trip spikes (2 for soils and 1 for surface sediment (sand trip spike), 1 for surface water and 1 for groundwater (water trip spike).	The overall field QA/QC from the PB (2009), EIS (2010) and JBS&G (2015a) investigations is acceptable. The absence of a trip spike in PB (2009) and EIS (2017) is unlikely to have affected the overall assessment of the data quality objectives. The absence of rinsate samples in EIS (2017) for sediment sampling is of concern due to the elevated concentrations of COPC, which increases the potential for cross-contamination.

Field and Lab QA / QC	Auditor's Opinion
JBS&G (2015a): • Intra-laboratory duplicate samples for soil were collected at a rate of greater than 1 per 20 primary samples analysed, meeting the adopted DQI frequency. • Inter-laboratory duplicated were collected at a rate of greater than 1 per 20 primary samples analysed, meeting the adopted DQI frequency. • Rinsate samples were collected at regular intervals during sampling to demonstrate the effectiveness of decontamination procedures. • A trip spike and trip blank were submitted with each batch of soil and groundwater samples, with the exception of a single groundwater sample (MW1). *EIS (2017):* • Intra-laboratory duplicate samples collected at a rate of 8% of primary samples. • Inter-laboratory duplicate samples collected at a rate of 5% of primary samples. • Three soil trip blanks were analysed for BTEX at a frequency of one blank per batch of volatiles. • No rinsate sample and trip spike was obtained.	
Field quality control results *PB (2009):* Multiple samples reported RPD values above the acceptance limit of 50%, which was considered to be due to the heterogeneity of fill material analysed. *EIS (2010):* The intra-laboratory and inter-laboratory RPD values for the soil and sediment samples indicated that field precision was acceptable, however report RPD values for individual PAHs, TRH and heavy metals outside the acceptance criteria, ranging from 67% to 190%. The RDP values outside of acceptable limits have been attributed to sample heterogeneity and the difficulties associated with obtaining homogenous duplicate samples of heterogeneous matrices. Where applicable, the higher duplicate value has been adopted as a conservative measure. The intra-laboratory and inter-laboratory RPD values for the groundwater samples indicated that field precision was acceptable. The RPD values for a range of individual PAHs and heavy metals were outside the acceptance criteria, ranging from 58% to 156%. The RDP values outside the acceptable limits were attributed to results that are close to the PQL. Where applicable, the higher duplicate value has been adopted as a conservative measure. *JBS&G (2015a):* The intra-laboratory soil sample and primary sample RPDs were within the acceptable limit (<50% RPD) with the following exceptions: Chromium 116% RPD; Nickel 88% RPD; and Zinc 88% RPD. The inter-laboratory duplicate soil sample and primary sample RPDs were within the acceptable limit (<50% RPD) with the following exceptions: Chromium 61% RPD; Lead 113% RPD; Nickel 68% RPD; Zinc 140% RPD; TRH (>C_{16}-C_{34} fraction) 130% RPD; and PAHs (various) 0-162% RPD. The elevated RPD calculations for the soil duplicates were attributed to the heterogeneous nature of the fill present in the sampled soils and were not considered to limit the overall precision of the dataset. Groundwater split duplicates were collected at a rate of greater than 1 per 20 primary samples analysed and resultant RPDs were within the acceptable limit (<50% RPD). Trip spike recoveries were within the acceptable limit of 70-130% and trip blank results were less than the LOR. *EIS (2017):* Inter- and intra-laboratory RPD values for a range of PAHs and heavy metals were outside the acceptance criteria, which was attributed to sample heterogeneity and the difficulty of obtaining homogeneous duplicate samples of heterogeneous matrices.	Overall, in the context of the dataset reported, the elevated RPD results are not considered significant and the field quality control results are acceptable.

Field and Lab QA / QC	Auditor's Opinion
NATA registered laboratory and NATA endorsed methods *PB (2009):* Primary samples were analysed by LabMark. Inter-laboratory duplicates were sent to ALS for analysis. Both laboratories are accredited by the National Association of Testing Authorities (NATA) for the laboratory analysis undertaken. *EIS (2010):* Primary samples were analysed by Envirolab and inter-laboratory duplicates were analysed y SGS. Both are NATA-accredited analytical laboratories. *JBS&G (2015a):* Primary samples were analysed by Eurofins, and inter-laboratory duplicate samples were analysed by Envirolab. Both are NATA-accredited analytical laboratories. *EIS (2017):* Primary samples were analysed by Envirolab in Sydney, and inter-laboratory duplicate samples were analysed by Envirolab in Victoria. Both are NATA-accredited analytical laboratories.	Acceptable, however it is noted that analytical results for TPH reported in PB (2009) were present as NEPC (1999) fractions, which limits the application of the data to the current adopted criteria
Analytical methods Analytical methods were included in the laboratory test certificates provided in PB (2009), EIS (2010), JBS&G (2015a) and EIS (2017).	Acceptable
Holding times *PB (2009):* The laboratory sample receipt notices (SRN) from LabMark state that the *"date received allows for sufficient time to meet Technical Holding Times"*. *EIS (2010):* An assessment of the DQIs states that samples were extracted and analysed within holding time. *JBS&G (2015a):* The extraction and analysis of selected soil and groundwater samples were completed within the recommended holding times for all analytes. *EIS (2017):* Inspection of analytical certificates of analysis, chain of custody and SRN documentation indicates that analytical holding times were within allowable criteria.	Acceptable
Practical Quantitation Limits (PQLs) *Soil and Groundwater:* PQLs were less than the threshold criteria for the contaminants of concern. *Sediment:* PB (2009) noted that laboratory PQLs were required to allow for comparison with the then-applicable ISQG criteria. In addition, for comparison with the ISQG criteria, results for organic analytes required normalisation to 1% Total Organic Carbon (TOC). PQLs for some individual OCPs and PCBs were higher than the site criteria, however the PQLs were considered to be sufficiently low to allow significant impacts to be identified for the purpose of the preliminary investigation program. EIS (2017) noted that the PQLs for a number of individual PAHs, pesticides and total PCBs were greater than the ISQG criteria. However, this was not considered to have adversely impacted the general interpretation of the data set with regard to the overall sediment quality due to the large number of elevated PAH concentrations.	*Soil and groundwater:* Overall the PQLs are acceptable. *Sediment:* PQLs are insufficiently low to adequately characterise some sediment quality default guideline values (DGVs) and upper guideline values (GV-High) presented in ANZAST (2018). For example, the DGV and GV-High values for total DDT are 1.2 µg/kg and 5.0 µg/kg, respectively. In contrast, the analytical LOR for total DDT in PB (2009) and in EIS (2017) was 5 µg/kg and 100 µg/kg, respectively. Similarly, the PQLs of other OCPs also exceed the DGVs in ANZAST (2018) or were not analysed (i.e. op + pp DDD in PB (2009), chlordane and lindane in PB (2009) and EIS (2017)). PQLs for PCBs are 3000 µg/kg in PB (2009) and 100 µg/kg in EIS (2017), which compares to a DGV and GV-High of 34 µg/kg and 280 µg/kg. Nevertheless, two sediment samples (BH8_1.25-1.75 and BH10_1.9-2.35) exceeded these very high PQLs and concentrations of total PCBs of 300 µg/kg and 200 µg/kg, respectively, which exceeds the DGV (34 µg/kg) and GV-High (280 µg/kg). It is highly likely that other sediment samples would have exceeded one of the sediment quality values of total PCBs had the

Field and Lab QA / QC	Auditor's Opinion
	PQL been lower during the investigation.
Laboratory quality control samples and results Laboratory quality control samples including laboratory control samples, matrix spikes, surrogate spikes, blanks and duplicates were undertaken by the laboratory. No quality control samples were undertaken during asbestos analysis. *PB (2009):* The QA/QC results provided with the laboratory reports were satisfactory for the analyses undertaken. *EIS (2010):* Matrix spike recovery concentrations were within the acceptable limits of 60-140% for organics and 70-130% for inorganics. Surrogate spike recovery concentrations were within the acceptable limits of 60-140% for organics and 70-130% for inorganics. Surrogate concentrations were not reported for TPH in some soil samples, with the lack of results explained as matrix interference. LCS recovery concentrations were within the acceptable limits of 60-140% for organics and 70-130% for inorganics. Laboratory blanks had results <PQLs. *JBS&G (2015a):* Elevated RPD values for soil laboratory duplicates were recorded for nickel and copper (53% RPD and 69%, respectively) which was described as most likely being due to the heterogeneous nature of the soil sample analysed and the relatively low concentrations recorded, and which was not considered to be reflective of the precision of the dataset. Soil surrogate spikes were conducted on all samples submitted for organic constituent analysis and all recoveries were reported within the acceptable range (70-130%). Surrogate recoveries outside the acceptable range were recorded for a number of surrogate compounds in groundwater samples. The recoveries ranged from 50-130%, with values between 50-70% recovery reported beyond the DQIs. However, it is noted that the reported results were within the laboratory accepted range adopted by the NATA accredited laboratory. Therefore, the surrogate exceedances were considered not to affect the accuracy of the analytical data. Matrix spikes and laboratory control samples were analysed for soil and groundwater analysis and reported recoveries were within the acceptable range (70-130%). Method blanks results were less than the PQL. *EIS (2017):* The laboratory reports do not flag data irregularities, with the exception of PAHs, noting that the RPD for duplicate results is accepted due to the non-homogenous nature of the sample. Further, the laboratory RPD acceptance criteria were exceeded for lead and mercury and a poor spike recovery was considered to be due to the inhomogeneous nature of the soil.	The Auditor notes that the heterogeneity of soils is likely due to the presence of fill material, which resulted in several exceedances of laboratory control criteria for heavy metals and PAHs. However, in the context of the dataset reported, the elevated RPDs are not considered significant and the laboratory quality control results are acceptable.
Data Quality Indicators (DQI) and Data Evaluation (completeness, comparability, representativeness, precision, accuracy) DQIs were identified by PB (2009), EIS (2010), JBS&G (2015a) and EIS (2017). PB (2009) concluded that *"the data is sufficiently precise and accurate and that the results can be used for the purpose of this project. It is noted however that the fill material is heterogeneous, and this should be taken into consideration in the interpretation of the results"*. EIS (2010) undertook an assessment of the DQIs, however did not provide an overall conclusion on the data quality. JBS&G (2015a) concluded that *"…the soil and groundwater data is of an acceptable quality upon which to draw conclusions regarding the environmental condition of the site"*. EIS (2017) did not provide a summary statement in relation to DQIs. However, it was stated that the results indicated that field precision was acceptable.	An assessment of the data quality with respect to the five category areas has been undertaken by the Auditor and is summarised below.

6.1 Auditor's Opinion

The Auditor is of the opinion that the completeness, comparability, representativeness, precision and accuracy of the available data are acceptable for the purposes of this assessment, with the exception of the following:

- PB (2009) data is approximately eight years old, and there is a potential that this data set may underestimate levels of contaminants where significant contaminating activities have occurred on, or in proximity of, the site subsequent to 2009.
- The data is not complete, with some data gaps identified. Some were addressed in the DGA (reviewed in the IAA in Appendix C), however some data gaps remain and are discussed in Section 13 of this SAR.
- An absence of TOC analyses in the data set obtained by EIS (2017) prevents a direct normalisation of the concentrations of organic contaminants with respect to 1% TOC on a sample by sample basis, as per guidance provided in CSIRO (2013). Instead, an approximation, using an average concentration of TOC of 3.9% in sediment samples obtained by PB (2009) was used in the ESA to assess exceedances of DGVs or GV-High values for organic contaminant concentrations in sediments. This is considered acceptable for the current assessment, noting that further assessment of sediment is proposed in the data gap assessment.
- The surface water sampling methodology data was not provided and it was not clear if samples were filtered in the field. More current data will be required to inform site management procedures during remediation and redevelopment of the site. Surface water data has not been considered further in the SAR.

7. ASSESSMENT CRITERIA

Assessment criteria are the concentrations of a contaminant above which further appropriate investigation and evaluation will be required, and provide the basis of a Tier 1 risk assessment. As defined in National Environmental Protection Council (2013) *National Environmental Protection (Assessment of Site Contamination) Measure* (NEPM (2013)), a Tier 1 risk assessment is a risk-based analysis comparing site data against generic assessment criteria for various land uses to determine the need for further assessment or development of an appropriate management strategy.

Assessment criteria are developed for the protection of human health and ecological receptors, for a range of media including soil, groundwater and ground gas. Soil vapour assessment criteria are not discussed as no VOC detections were made during the DGA.

7.1 Site Land Use and Assessment Criteria

When choosing the most appropriate human health assessment criteria for the site, the Auditor has considered the form of the proposed development (Section 2.5). The human health assessment criteria adopted for this Audit are therefore considered to be protective of 'commercial/industrial' land use.

Although the protection of human health often drives the first stages of a site assessment, NEPM (2013) requires that all site assessments considers the protection of the environment (terrestrial and aquatic receptors). Ecological assessment criteria appropriate for 'commercial/industrial' land use were adopted.

The assessment criteria adopted for the protection of human health and ecological receptors are outlined below.

7.2 Soil Assessment Criteria

Human Health Assessment Criteria

The Auditor has adopted soil assessment criteria protective of human health from the following Australian sources:

- NEPM (2013) Health Investigation Levels (HILs) for non-volatile soil compounds for 'Commercial/Industrial' (HIL-D) land use.
- NEPM (2013) Health Screening Levels (HSLs) for TRH, BTEX and naphthalene compounds for 'Commercial/Industrial' (HSL-D) land use (0-1 m depth), for the vapour inhalation pathway. The HSLs assumed a sand soil type.
- NEPM (2013) Management Limits for Petroleum Hydrocarbons for Commercial/Industrial land use and assuming coarse soil texture. Criteria are relevant for operating sites where significant sub-surface leakage of petroleum hydrocarbons has occurred and when decommissioning industrial and commercial sites. These are therefore conservative when applied to the site.
- NEPM (2013) HSLs for Asbestos Contamination in Soil. Criteria applicable for 'Commercial/Industrial' (HSL-D) land use were adopted for AF/FA. ACM criteria were not applicable since 10 L samples were not field screened. Presence/absence of asbestos was adopted for sampling and analysis undertaken prior to NEPM (2013).
- Friebel & Nadebaum (2011) HSLs for direct contact for Commercial/Industrial (HSL-D), and vapour inhalation/direct contact pathways for intrusive maintenance workers.
- US EPA Region 9 screening levels (soil) for commercial/industrial land use for dibutyltin (DBT) and TBT (and oxide) have been used in the absence of established Australian soil criteria for organotin compounds.

Ecological Assessment Criteria

The Auditor has adopted ecological soil assessment criteria from the following sources:

- NEPM (2013) Ecological Screening Levels (ESLs) for 'Commercial/Industrial' land use, assuming coarse soil.
- NEPM (2013) Ecological Investigation Levels (EILs) for 'Commercial/Industrial' land use. In the absence of site-specific soil data on pH, clay content, cation exchange capacity and background concentrations, the lowest added contaminant limits have been applied as an initial screen.
- Canadian Council of Ministers of the Environment (CCME) (2010) *Canadian Soil Quality Guidelines: Carcinogenic and Other Polycyclic Aromatic Hydrocarbons (PAHs)* soil quality guideline (SQG) for benzo(a)pyrene for 'Commercial/Industrial' land use. The SQG has been adopted in place of the NEPM (2013) ESL as it is based on a larger and more up-to-date toxicity database than the low reliability NEPM (2013) ESL.

Soil Aesthetic Considerations

The Auditor has considered the need for soil remediation based on 'aesthetic' contamination as outlined in *Section 3.6 Aesthetic Considerations* of NEPM (2013) Schedule B1, which acknowledges that there are no chemical-specific numerical aesthetic guidelines. Instead, site assessment requires a balanced consideration of the quantity, type and distribution of foreign material or odours in relation to the specific land use and its sensitivity.

7.3 Groundwater Assessment Criteria

Human Health Assessment Criteria

The Auditor notes that at this site there is no risk of human groundwater consumption due to its saline nature, and the presence of a drinking water supply. There is also a low risk of the saline groundwater being extracted for beneficial use (e.g. watering, recreation). Assessment criteria protective of drinking water were therefore not adopted.

Criteria protective of recreational users were adopted from NHMRC (2011) *National Water Quality Management Strategy, Australian Drinking-Water Guidelines 6, Version 3.4 Updated October 2017*. The guidelines were derived assuming a human will ingest 2 L of water per day. Therefore, application of these drinking-water guidelines is overly conservative when exposure is assumed to occur incidentally during activities such as irrigation, swimming and/or maintenance of sumps/pipelines. A factor of 10 was therefore applied to the criteria to account for incidental ingestion in accordance with recommendations provided in Section 9.3.2 of the NHMRC (2008) *Guidelines for Managing Risks in Recreational Water*.

Ecological Assessment Criteria

The Auditor has adopted ecological groundwater assessment criteria from Australian and New Zealand Governments and Australian state and territory governments (ANZAST) (2018) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG) (available at www.waterquality.gov.au/anz-guidelines).

Vapour Inhalation

When considering the vapour inhalation pathway for TRH, BTEX and naphthalene compounds in groundwater, the Auditor adopted the groundwater HSLs recommended by NEPM (2013) for 'Commercial/Industrial' land use (HSL-D) and assuming coarse soil texture and depth to groundwater of 2 to <4m. Groundwater was shallower than 2 mbgl in some locations and therefore the HSLs are not strictly applicable in those locations, however, were adopted as an initial screen.

7.4 Ground Gas Considerations

The Auditor has assessed the ground gas data provided by the consultant with reference to the NSW EPA (2020) *Assessment and Management of Hazardous Ground Gases, Contaminated Land Guidelines*.

7.5 Acid Sulfate Soil Criteria

The assessment of ASS conditions was undertaken by laboratory SPOCAS analysis, and the results were compared to the ASS action criteria in the *Acid Sulfate Soil Manual* (ASSMAC, 1998).

7.6 Sediment Assessment Criteria

The Auditor has assessed the sediment data against the toxicant default guideline values (DGVs) for sediment quality (ANZAST, 2018) in accordance with the rationale outlined in these guidelines. ANZAST (2018) provides sediment DGVs and upper guideline values (GV-High).

For the organic contaminants listed, including tributyltin (TBT), values are normalised to 1% organic carbon (TOC) within the limits of 0.2 to 10%.

7.7 Consultants Assessment Criteria

The human health and environmental quality criteria referenced by the Auditor are consistent with those adopted in the ESA.

The Auditor notes that JBS&G did not consider the use of ecological criteria protective of ecological communities within soil to be relevant for the site because the site will be covered in hardstand under the proposed development, and as such, there will be only limited ecological receptors within the land-based portion of the site. The Auditor has assessed the analytical data against ecological criteria, as the proposed development plans included in the DGA were not final plans, with future plans potentially including small areas of landscaping within the land-based portion of the site for which ecological criteria may be applicable.

8. EVALUATION OF SOIL ANALYTICAL RESULTS

Soil samples collected by PB (2009), EIS (2010) and JBS&G (2015a) were analysed for contaminants listed in Table 6.1. The results have been assessed against the environmental quality criteria (Section 7) and are summarised in Table 8.1. Soil sampling locations are shown on Attachment 3, Appendix A.

Soil results from the DGA are presented and discussed in Section 9 of the IAA (Appendix C).

Table 8.1: Evaluation of Soil Analytical Results – Summary Table (mg/kg)

Analyte	n	Detections	Maximum	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
Asbestos (absence/presence)	5	0	-	0 above detection	-
Benzene	17	1	0.2	0 above HSL-D 0-1 m, sand 3 mg/kg	0 above ESL (commercial/industrial) 75 mg/kg
Toluene	17	0	<0.5	0 above HSL-D 0-1 m, sand NL	0 above ESL (commercial/industrial) 135 mg/kg
Ethylbenzene	17	0	<0.5	0 above HSL-D 0-1 m, sand NL	0 above ESL (commercial/industrial) 165 mg/kg
Total Xylenes	17	0	<1.5	0 above HSL-D 0-1 m, sand NL	0 above ESL (commercial/industrial) 180 mg/kg
F1 (TRH C_6–C_{10} minus BTEX)	4	0	<20	0 above HSL-D 0-1 m, sand 260 mg/kg	-
F2 (TRH >C_{10}–C_{16} minus naphthalene)	4	0	<50	0 above HSL-D 0-1 m, sand NL	-
TRH C_6–C_{10}	4	0	<20	0 above ML (commercial/industrial) 700 mg/kg	0 above ESL (commercial/industrial) 215 mg/kg
TRH >C_{10}–C_{16}	4	0	<50	0 above ML (commercial/industrial) 1,000 mg/kg	0 above ESL (commercial/industrial) 170 mg/kg
TRH >C_{16}-C_{34}	4	1	980	0 above ML (commercial/industrial) 3,500 mg/kg	0 above ESL (commercial/industrial) 1,700 mg/kg
TRH >C_{34}-C_{40}	4	1	160	0 above ML (commercial/industrial) 10,000 mg/kg	0 above ESL (commercial/industrial) 3,300 mg/kg
Naphthalene	17	1	0.5	0 above HSL-D 0-1 m, sand NL	0 above EIL (commercial/industrial) 370 mg/kg
Benzo(a)pyrene	17	11	2.0	-	0 above SQG (commercial/industrial) 72 mg/kg
Benzo(a)pyrene TEQ	3	1	2.2	0 above HIL-D 40 mg/kg	-
Total PAHs	17	13	21.6	0 above HIL-D 4,000 mg/kg	-
Arsenic	17	16	15	0 above HIL-D 3,000 mg/kg	0 above EIL (commercial/industrial) 160 mg/kg

Analyte	n	Detections	Maximum	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
Cadmium	17	6	0.4	0 above HIL-D 900 mg/kg	-
Chromium	17	17	25	0 above HIL-D 3,600 mg/kg	0 above EIL (commercial/industrial) 310 mg/kg
Copper	17	17	86	0 above HIL-D 240,000 mg/kg	**1 above EIL (commercial/industrial) 85 mg/kg**
Lead	17	17	559	0 above HIL-D 1,500 mg/kg	0 above EIL (commercial/industrial) 1,800 mg/kg
Mercury (inorganic)	17	16	0.25	0 above HIL-D 730 mg/kg	-
Nickel	17	17	60	0 above HIL-D 6,000 mg/kg	**1 above EIL (commercial/industrial) 55 mg/kg**
Zinc	17	17	201	0 above HIL-D 400,000 mg/kg	**4 above EIL (commercial/industrial) 110 mg/kg**
PCB	3	0	<0.5	0 above HIL-D 7 mg/kg	-
OCP	11	0	<0.1	0 above HIL-D	0 above EIL

n number of samples
- No criteria available/used
NL Non-limiting
<PQL Less than the practical quantitation limit

Laboratory analytical results for soil samples from PB (2009) and JBS&G (2015a) showed that overall the concentrations of inorganic and organic contaminants of concern in soils were generally below the adopted human health and ecological screening level criteria, except for the concentrations of copper at PBBH05 (0.0-0.3 mbgl) (86 mg/kg), nickel at PBHA01 (0.3-0.4 mbgl) (60 mg/kg) and zinc at PBBH04 (4.0-4.1 mbgl) (136 mg/kg), PBBH05 (0.0-0.3 mbgl) (201 mg/kg), PBHA01 (0.0-0.1 mbgl) (153 mg/kg) and PBHA01 (0.3-0.4 mbgl) (181 mg/kg).

Statistical analysis of the data set with respect to copper, nickel and zinc for fill material across the site identified that the maximum concentration of each of these heavy metals was less than 250% of the adopted ecological screening level criteria and that the standard deviation was less than half of the respective criteria. Further, the 95% upper confidence limit (UCL) of the mean concentrations of these heavy metals were less than the adopted ecological screening level criteria, with the exception of zinc (95% UCL: 126 mg/kg, slightly exceeding the ESL of 110 mg/kg). Therefore, the nominated results for copper and nickel were considered in the ESA to be below the adopted site assessment criteria, while zinc concentrations in fill only marginally exceed the ecological assessment criterion.

TRH and BTEX concentrations were reported to be below the laboratory PQL and below the adopted assessment criteria in all analysed soil samples. It was noted in the ESA that the analytical results for TPH reported in PB (2009) were shown in NEPC (1999) fractions, which limits the application of the data to the current adopted criteria. However, all TPH concentrations were below analytical detection limits, with the exception of TPH concentrations in samples from shallow soil auger boreholes PBHA01 and PBHA02 where heavy end TPH fractions (C_{10}-C_{36}) of up to 2,170 mg/kg were detected.

Concentrations of total PAHs and carcinogenic PAHs (reported as B(a)P (TEQ) concentrations) were below the adopted health and ecological criteria.

Concentrations of OCPs and PCBs were below the laboratory PQL in all analysed soil samples and below the adopted site assessment criteria.

The Revised RAP noted that fragments of fibre cement sheeting (suspected ACM) were observed on the ground surface in the eastern portion of the site. No ACM fragments were observed within sampled materials, however it is noted that asbestos quantification was not undertaken and sampling was conducted via boreholes, thereby resulting in limited volumes of drilling spoil for assessment. No asbestos fibres or asbestos fines were reported in five soil samples analysed in the investigation by PB (2009).

The ESA noted that the density of soil sampling locations within the land-based portion of the site (8 within approximate area of 0.72 ha) was below the minimum sampling frequency recommended in the NSW EPA (1995) *Sampling Design Guidelines* (a minimum of 19 locations).

8.1 Auditor's Opinion

In the Auditor's opinion, the limited soil analytical results are consistent with the site history and field observations. Site investigations by PB (2009), EIS (2010) and JBS&G (2015a) did not identify contamination presenting a risk to human health, however data gaps were noted with respect to the sampling methodology, sampling density and asbestos quantification.

Data gaps were further assessed during the DGA (discussed in Appendix C), which did not identify contamination presenting a risk to human health. Elevated concentrations of TRHs, PAHs, metals and trace asbestos (AF/FA <HSL) were identified in fill material. Concentrations of TRHs, copper, nickel and zinc exceeded the ecological screening criteria. Development of site specific EILs would likely result in many of the metals detections being less than criteria.

Fragments of ACM were not observed in sampled materials; however, assessment was undertaken via 150 mm solid flight auger boreholes, which is not the preferred method given the reduced volumes of drilling spoil inspected. The Revised RAP noted that fragments of fibre cement sheeting (suspected ACM) were observed on the ground surface in the eastern portion of the site.

Data gaps remaining following the DGA are discussed further in Section 13 of this SAR.

9. EVALUATION OF SEDIMENT RESULTS

Sediment samples collected by PB (2009) and EIS (2017) were analysed for contaminants listed in Table 6.1. The sediment analytical results have been assessed against the toxicant default guideline values (DGVs) and the upper guideline values (GV-High) for sediment quality (ANZAST, 2018) (Section 7) and are summarised in Table 9.1. Sediment sampling locations are shown on Attachment 3, Appendix A.

Table 9.1: Evaluation of Sediment Analytical Results – Summary Table (mg/kg)

Analyte	n	Detections	Maximum	n > Human Health Screening Criteria	n > Sediment Quality DGV Criteria	n > Sediment Quality GV-High Criteria
TPH >C_{10}-C_{36}	22	22	5,000	-	**22 above DGV 280 mg/kg**	**20 above GV-High 550 mg/kg**
Benzo(a)pyrene TEQ	49	11	21	0 above HIL-D 40 mg/kg	-	-
Total PAHs*	76	37	76.3	0 above HIL-D 4,000 mg/kg	**14 above DGV 10 mg/kg**	**2 above GV-High 50 mg/kg**
Arsenic	76	43	36	0 above HIL-D 3,000 mg/kg	**16 above DGV 20 mg/kg**	0 above GV-High 70 mg/kg
Cadmium	76	29	7	0 above HIL-D 900 mg/kg	**19 above DGV 1.5 mg/kg**	0 above GV-High 10 mg/kg
Chromium (total)	76	76	71	0 above HIL-D 3,600 mg/kg	0 above DGV 80 mg/kg	0 above GV-High 370 mg/kg
Copper	27	27	386	0 above HIL-D 240,000 mg/kg	**21 above DGV 65 mg/kg**	**13 above GV-High 270 mg/kg**
Lead	76	73	1,270	0 above HIL-D 1,500 mg/kg	**34 above DGV 50 mg/kg**	**26 above GV-High 220 mg/kg**
Mercury (inorganic)	76	37	14.8	0 above HIL-D 730 mg/kg	**36 above DGV 0.15 mg/kg**	**28 above GV-High 1 mg/kg**
Nickel	76	60	44	0 above HIL-D 6,000 mg/kg	**18 above DGV 21 mg/kg**	0 above GV-High 52 mg/kg
Zinc	27	27	1,660	0 above HIL-D 400,000 mg/kg	**21 above DGV 200 mg/kg**	**18 above GV-High 410 mg/kg**
TBT*[X]	27	19	27.6	-	**1 above DGV 9 µg Sn/kg**	0 above GV-High 70 µg Sn/kg
PCB*	76	2	<0.0769	-	**2 above DGV 0.034 mg/kg**	0 above GV-High 0.280 mg/kg
Aldrin	27	0	<0.001	0 above HIL-D 45 mg/kg	-	-
Dieldrin*	76	0	<0.1	-	0 above DGV 0.0028 mg/kg	0 above GV-High 0.0070 mg/kg
p.p' DDE*	76	0	<0.1	-	0 above DGV 0.0014 mg/kg	0 above GV-High 0.0070 mg/kg
o.p'-+p.p' DDD*	49	0	<0.1	-	0 above DGV 0.0035 mg/kg	0 above GV-High 0.0090 mg/kg
Total DDT*	76	0	<0.1	-	0 above DGV 0.0012 mg/kg	0 above GV-High 0.0050 mg/kg
Alpha/gamma Chlordane	76	0	<0.1	-	0 above DGV 0.0045 mg/kg	0 above GV-High 0.0090 mg/kg
Endrin*	76	0	<0.1	0 above HIL-D 100 mg/kg	0 above DGV 0.0027 mg/kg	0 above GV-High 0.0600 mg/kg
Heptachlor	27	0	<0.001	0 above HIL-D 50 mg/kg	-	-

Analyte	n	Detections	Maximum	n > Human Health Screening Criteria	n > Sediment Quality DGV Criteria	n > Sediment Quality GV-High Criteria
Methoxychlor	27	0	<0.1	0 above HIL-D 2,500 mg/kg	-	-

n number of samples
- No criteria available/used
NL Non-limiting
*Normalised to 1% TOC for TOC range 0.2% to 10% (applicable to sediment quality DGV and GV-High only)
[x]TBT concentrations in µg Sn/kg dry weight, 1% TOC.

In reviewing the analytical results of the sediment analyses the Auditor notes the following:

- Concentrations of heavy metals and organic contaminants (PAHs, TRHs, OCPs, PCBs) were reported to be below the adopted health-based criteria (HIL-D), where these criteria were available.
- Twenty seven samples from PB (2009) were analysed for total organic carbon (TOC) content. Reported concentrations varied from 0.6% to 7.2%, with an average of 3.9 %, a median value of 3.8% and a standard deviation of 2.2%. The average TOC value for the PB (2009) data set was adopted as an approximation for the normalisation of organic contaminant concentrations from the EIS (2017) data for which individual TOC concentrations were not available.
- A variety of heavy metals were reported to exceed one or both the DGV and GV-High guideline values protective of the environment in the majority of sediment samples collected within the investigation area. The lateral distribution of heavy metal impacts in sediments extends across the investigation area, with the vertical extent of heavy metal impacted sediments reaching to a depth of at least 2.0 mbgl. Elevated metals concentrations were reported in sediment samples at greater depths in a limited number of samples (4 mbgl in BH14).
- TPH (C_{10}-C_{36} fraction) concentrations in all of the 22 analysed sediment samples exceeded the DGV (280 mg/kg), with 20 of the 22 sediment samples exceeding the GV-High (550 mg/kg) and a maximum concentration of 5,000 mg/kg.
- All concentrations of total PAHs and carcinogenic PAHs (reported as B(a)P TEQ) were below the adopted health-based site assessment criteria (HIL-D). Total PAH concentrations were normalised to 1% TOC and then compared to the DGV and GV-High sediment quality guideline values protective of the environment. Fourteen of the 76 normalised total PAH concentrations exceeded the DGV (10 mg/kg), with two samples exceeding the GV-High (50 mg/kg). The highest normalised total PAH concentration was reported as 76.3 mg/kg.
- All individual OCP concentrations were reported to be below the laboratory PQL (EIS 2017: 0.1 mg/kg; PB 2009: 0.001 mg/kg) in all sediment samples. With consideration to the normalised OCP values, all PB (2009) data were reported at concentrations less than the adopted guidelines (DGVs and SG-High). However, the analytical PQLs from EIS (2017) did not allow for a direct comparison with the adopted guideline values, as the PQL of 0.1 mg/kg was higher than the screening criteria.
- Total normalised (to 1% TOC) concentrations of PCBs were reported above the PQL in two samples from the EIS (2017) sediment investigation. The normalised PCB concentrations of 0.0769 mg/kg and 0.0513 mg/kg (based on an assumed average TOC concentration of 3.9%, which represents the average TOC concentration of the 27 sediment sample analyses from the PB (2009) investigation), both exceeded the DGV of 0.034 mg/kg. However, the PQL of 3.0 mg/kg and 0.1 mg/kg in the PB (2009) and EIS (2017) investigations is too high to enable a direct comparison with the adopted PCB screening levels.
- Twenty seven sediment samples from PB (2009) were analysed for tributyltin (TBT). Reported normalised (to 1% TOC) concentrations of TBT varied from concentrations below the

analytical PQL (<0.5 µg Sn/kg) to a maximum of 27.6 µg Sn/kg. The maximum observed normalised TBT concentration was the only sample which exceeded the DGV of 9 µg Sn/kg. No sample exceeded the GV-High value (70 µg Sn/kg).

9.1 Auditor's Opinion

In the Auditor's opinion, the available analytical data indicate that sediments within the water-based portion of the site are impacted with a variety of inorganic and organic contaminants, both spatially and vertically. The assessment of sediment by EIS (2017) included other areas of Blackwattle Bay (outside of the site) and identified heavy metal (copper, lead, zinc, mercury) and PAH impacts above GV-High values as well as TPH impacts, with other contaminants of concern (OCPs, PCBs) also potentially present above adopted screening levels in surface and subsurface sediments across the site.

The Auditor notes that contamination presenting a risk to human health was not identified in sediments, however the contamination impacts in sediments that were identified will require management during development and construction works.

It is noted that the overall sediment analytical data assessment was limited by insufficiently low reporting limits for OCPs and PCBs employed during the previous investigations by PB (2009) and EIS (2017), preventing a direct comparison of the analytical data with the adopted screening levels. It is further noted that the omission of TOC analyses in the EIS (2017) sediment data prevents a direct normalisation of the organic contaminant data on a sample-by-sample basis to assess screening level exceedances.

Further, inconsistent analysis of all sediment samples for the same suite of analytes resulted in an incongruous sediment data set which lacks a homogeneous analytical density for all contaminants of concern. For example, copper, zinc, TPH/TRH and TBT were not assessed in EIS (2017) and chlordane, lindane and toxaphene were not analysed by either PB (2009) or EIS (2017).

The Auditor notes that the need to undertake further data gap assessments has been highlighted in the Revised RAP and in the ESA. The ESA states that "*The existing data set is considered sufficient to characterise conditions with regard to site suitability, however to ensure sediment conditions are suitably understood from a contamination and acid sulfate soils viewpoint, such that appropriate management measures may be employed during the proposed construction works, it is recommended that further characterisation activities be completed prior to the commencement of any activities that may result in disturbance of the sediment bed within the site"*. The Auditor agrees and considers further data gap investigations of sediments in areas of proposed sediment disturbance and relocation within the water-based portion of the site to be necessary in order to enable a more detailed characterisation of COPCs in sediments across the site.

Details of further data gap assessments that are required to address the remaining uncertainties of potential contamination on the site are discussed in the Revised RAP and further reviewed in Section 13.

10. EVALUATION OF GROUNDWATER ANALYTICAL RESULTS

Groundwater samples were collected from four wells in January 2009 (PB, 2009), although only three wells were situated within the perimeter of the site (i.e. PBMW02a, PBMW03a and PBMW04a). One well at location HHBH1/MW1 was sampled in September 2015 (JBS&G, 2015a). Well locations are shown in Attachment 3, Appendix A. The analytical results from the previous groundwater sampling investigations are summarised below in Table 10.1.

The results of groundwater sampling during the DGA are presented and discussed in Section 10 of the IAA (Appendix C).

Table 10.1: Summary of Groundwater Investigation Analytical Results (µg/L)

Analyte	n	Detections	Maximum	Health Screening Levels (NEPM, 2013) n> HSL-D	Recreational Criteria (NHMRC, 2011) n> recreational criteria	Aquatic Ecosystem Criteria (ANZAST, 2018) (n >95% species protection, Marine Waters)
TRH/TPH	4	0	<PQL	0 above HSL	-	-
BTEX	4	0	<PQL	0 above HSL	0 above criteria	0 above criteria
Naphthalene	4	0	<PQL	NL	-	0 above 50 µg/L
Benzo(a)pyrene	4	1	0.1	-	0 above 0.1 µg/L	0 above 0.1 µg/L
Fluoranthene	4	2	**4**	-	-	**1 above 1 µg/L**
Phenanthrene	4	1	**4**	-	-	**1 above 0.6 µg/L**
Arsenic (As V)	4	1	5	-	0 above 100 µg/L	0 above 24 µg/L
Cadmium	4	0	<PQL	-	0 above 20 µg/L	0 above 0.7 µg/L
Chromium (Cr VI)	4	0	<PQL	-	0 above 500 µg/L	1 above 4.4 µg/L
Copper	4	1	**2**	-	0 above 20,000 µg/L	**1 above 1.3 µg/L**
Lead	4	1	2	-	0 above 100 µg/L	0 above 4.4 µg/L
Mercury	4	0	<PQL	-	0 above 10 µg/L	0 above 0.1 µg/L
Nickel	4	1	1	-	0 above 200 µg/L	0 above 7 µg/L
Zinc	4	1	**41**	-	-	**1 above 15 µg/L**
VOCs	1	0	<PQL	-	0 above criteria	0 above criteria

n number of samples
- No criteria available/used
<PQL Less than the practical quantitation limit
NL non limiting

Heavy metal concentrations were reported to be below the site assessment criteria with the exception of copper in MW1 (2 µg/L) and zinc in PBMW03A (41 µg/L). The concentration of copper in MW1 exceeded the marine ecosystem criterion of 1.3 µg/L by less than one order of magnitude. It is noted that MW1, which is located hydraulically up-gradient of the site, recorded the highest zinc concentration, thus indicating that the elevated zinc levels are likely to reflect local urban background conditions and are not representative of past site activities.

PAH concentrations were recorded equal to or below the adopted criteria with the exception of phenanthrene (4 µg/L) and fluoranthene (4 µg/L) in PBMW02A, which marginally exceeded the adopted marine ecosystem criteria. It is noted that the concentration of benzo(a)pyrene in MW1 (0.1 µg/L) is equal to the NHMRC recreational site criterion.

TRH, BTEX and VOC concentrations were reported to be below the laboratory PQL in all samples and these are therefore less than the adopted site assessment criteria.

10.1 Auditor's Opinion

In the Auditor's opinion, the groundwater monitoring undertaken to date was sufficient to identify widespread and significantly elevated contaminant concentrations.

Significant petroleum hydrocarbon impact associated with former USTs (as well as potential unidentified USTs) was not identified during groundwater sampling undertaken during the DGA or previously. Elevated PAH concentrations may be associated with USTs, however are more likely to be associated with ash and slag in fill material.

With respect to elevated metals concentrations (copper, lead and zinc), the DGA states that "*Given that there was no significant change of metal concentrations between up gradient and down gradient monitoring wells in addition to no high levels of metals reported in soils at the site, groundwater metal concentrations are likely to be representative of natural background conditions in the urban environment rather than point source impacts associated with site conditions*." and that "*it is considered unlikely that groundwater metal concentrations at the site are elevated because of previous or current activities at the site*". The Auditor does not agree as fill material contained elevated metals concentrations (Section 8) and was located below the SWL. The elevated metals concentrations in groundwater may therefore be associated with fill material. It is noted however that fill material is more widespread than the immediate site, extending to the southeast into Wentworth Park. Further investigation or remediation of elevated metals concentrations in groundwater would therefore be of limited benefit if limited to the site.

11. EVALUATION OF GROUND GAS RESULTS

Assessment of ground gas data by JBS&G (2015a) indicated that potential ground gas sources may include fill and reclaimed land situated within the Blackwattle Bay precinct, including the following:

- areas of low-lying mud flats where organic rich sediments were subsequently isolated by land reclamation activities resulting in anaerobic decomposition of organic sediment components;
- areas where putrescible waste was buried during land reclamation/filling activities, including potentially waste from land clearing, domestic waste, organic based industrial waste and/or abattoir waste.

Monitoring of HHBH1/MW1 reported concentrations of methane (CH_4) (0.0%), carbon dioxide (CO_2) (5.0%), hydrogen sulphide (H_2S) (0 ppm), and carbon monoxide (CO) (0 ppm), and a flow rate of less than 0.1 L/hr. A Gas Screening Value (GSV) of 0.005 L/h was calculated for carbon dioxide, which falls within 'characteristic gas situation 1' comprising very low risk conditions.

Further assessment of ground gas was undertaken during the DGA from ten groundwater sampling locations (Attachment 3, Appendix A). The results were consistent with previous monitoring and classify the site as very low risk. The results are discussed in Section 11 of the IAA (Appendix C).

11.1 Auditor's Opinion

Ground gas monitoring was undertaken from an adequate number of sampling locations and provided an adequately representative (conservative) assessment of the ground gas conditions. Further assessment of ground gas conditions is not considered to be warranted.

12. EVALUATION OF SOIL VAPOUR RESULTS

Soil vapour probes were installed at 20 sample locations during the DGA (SS01 to SS20) (Attachment 3, Appendix A).

No significant odours or indicators of contamination were observed during the placement of the vapour probes. Stabilised O_2 (range: 1.3% to 20.8%), PID (range: 0.1 to 8.3 ppm), CH_4 (0% at all locations), CO_2 (range: 0.0% to 6.6%) and H_2S (0% in all samples) readings were obtained at each sample location prior to collection of the vapour sample.

VOC analyses of the 21 sub-slab vapour samples, including one duplicate sample, reported concentrations below the PQL.

12.1 Auditor's Opinion

Soil vapour monitoring was undertaken from an adequate number of sampling locations and provides a representative assessment of soil vapour conditions. VOC contamination was not identified, which is consistent with field observations and the site history. Further assessment of soil vapour conditions is not considered to be warranted.

13. EVALUATION OF CONCEPTUAL SITE MODEL

A conceptual site model (CSM) is a representation of the contaminant source, pathway and receptor linkages at a site. The ESA presents a CSM based on the results of previous investigations. The CSM was used in the ESA to identify data gaps and inform decisions around further investigation and management requirements. The DGA and Revised RAP provided a revised CSM based on the results of the additional investigations of soil, groundwater, soil vapour and hazardous ground gas.

Table 13.1 provides the Auditor's review of the CSM presented in the DGA and Revised RAP.

Table 13.1: Review of the Conceptual Site Model

Element of CSM	Consultant	Auditor Opinion
Contaminant source and mechanism	The previous site investigations identified areas of potential environmental concern (APEC) and corresponding COPCs, including: • Fill used during land reclamation activities (COPCs: heavy metals, TPHs, VOCs, PAHs, OCPs, herbicides, PCBs, asbestos, ASS, ground gases) • Former coal wharf (COPCs: heavy metals, TPH, VOCs, PAHs, asbestos, TBT) • Current and former concrete batch plants (COPCs: heavy metals, TPH, VOCs, PAHs, solvents, asbestos, TBT, OPPs) • Current and former industrial areas, including USTs and associated infrastructure, chemical use and building materials (COPCs: heavy metals, TPH, VOCs, PAHs, OCPs, OPPs, herbicides, PCBs, asbestos) • Marina areas where maintenance/storage activities using TBT, creosote and heavy metal containing products/materials have been applied and/or removed, infrastructure, and the wharves themselves as part of site activities (COPCs: heavy metals, TPH, VOCs, PAHs, asbestos, OPPs, TBT, solvents)	The revised CSM in the Revised RAP does not discuss the contaminant sources. The previous site investigations identified and adequately described the known and potential sources of contamination and contaminants of concern including the mechanism(s) of contamination.
Affected media	Each of the APECs and corresponding COPCs previously identified in the ESA have the potential to impact soils, groundwater, surface water and vapours (indoor and ambient air). The Revised RAP identified the following affected media and corresponding COPCs: • Fill used during land reclamation activities: *"no identified impacts to site soils that require management or remediation…"*. Elevated concentrations of metals and TPHs were identified in fill material exceeding ecological criteria • Natural soils: ASS • Groundwater: copper, lead and zinc exceeding ecological criteria, however these were considered to be natural background conditions of an urban environment • Ground gas: considered very low risk	I agree with the affected media identified, with the exception of the characterisation of fill. The site is largely sealed with hardstand, the sampling methodology adopted during the DGA limited the ability to visually inspect fill materials, and quantification of ACM was not undertaken. There is therefore considered to remain a reasonable potential for asbestos to be present in fill material at concentrations of concern.

Element of CSM	Consultant	Auditor Opinion
	• Soil vapour: VOC concentrations were less than the detection limit and was therefore not considered to be affected • Sediment: TRHs, PAHs, metals, TBT and PCB. The Revised RAP reported that contaminant concentrations in sediment were generally consistent with sediments across the broader Blackwattle Bay area. Sediment is anticipated to be ASS.	
Receptor identification	The Revised RAP summarised potential receptors and associated exposure pathways for the site based on exposure scenarios that may occur under the proposed redevelopment of the site. The potential receptors are as follows: • Patron (adult or child) and commercial worker (adult). Location: commercial building and land area of the site. • Construction worker or intrusive maintenance worker (short duration). Location: excavations. • The site will be sealed as a result of building and/or accessway construction. 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.	The potential human and ecological receptors have been adequately identified. It is however noted that disturbance of in situ sediment during development or site use may impact ecological receptors. Should the development plans be revised, there may be a requirement to revise the receptors. Particularly if landscaping with site soils is proposed.
Exposure pathways	No current ecological or human health risks have been identified within soils or groundwater under the proposed development. The primary pathway of concern for the site is gas/vapour intrusion. Gases from the subsurface can potentially migrate into buildings and gases can potentially accumulate in buildings due to reduced ventilation. However, concentrations of VOCs in sub-slab vapour were shown to be below laboratory detection limits, indicating an incomplete pathway for these contaminants. Review of the ground gas data indicated that the maximum GSV for the site falls within 'characteristic gas situation 1' comprising very low risk conditions. Available soil and sediment data were previously compared to direct contact criteria (where available), and results were below the adopted criteria under a recreational land use scenario.	Direct contact pathways (oral and dermal) will be limited for most site users. The majority of the site will be sealed, and as such direct contact to contaminated soils, groundwater or sediment would be limited for site users. Construction workers may be exposed to impacted materials during development works. Inhalation of soil vapour or ground gases is a potential exposure pathway, however is not considered to present a risk based on the results of the DGA. With regard to potentially complete ecological exposure pathways on-site, the majority of the site will be sealed as a result of building and/or accessway construction. Limited vegetation will be present in raised planter beds or similar, rather than within site soils. As such there are no direct exposure pathways for ecological receptors to soil. The proposed development may result in changes in sediment bed levels and in the movement of vessels within the Bay. This may lead to changes in hydrodynamic flow conditions, such that surficial sediments may at times be disturbed/re-suspended in different areas of the Bay, resulting in localised changes in sediment/water chemistry and ecosystem conditions. Further consideration as to the potential environmental impacts of such changes were beyond the scope of the previous assessments and will require further

Element of CSM	Consultant	Auditor Opinion
		consideration during the broader design of the development.
Presence of preferential pathways for contaminant movement	The Revised RAP did not discuss preferential pathways.	Preferential pathways are typically associated with soil vapour and ground gas. Impact was not identified during the DGA therefore further consideration of preferential pathways is not considered necessary.
Potentially complete source-pathway-receptor (SPR) linkages requiring remediation or management	The Revised RAP concluded that *"No current ecological or human health risks have been identified within site soils or groundwater under the proposed development scheme"*. The SPR linkage for gas/vapour intrusion was considered to be incomplete based on the contaminant concentrations identified during the DGA.	The available investigation data has not identified complete SPR linkages, however there is the potential for some to be present based on the identified data gaps (discussed in Section 13.1 below).
Evaluation of data gaps	The Revised RAP noted the following data gaps: • Waste classification of material requiring offsite disposal, in particular leachability analysis. The DGA noted that this was to be assessed when service plans were available. • Soil in the eastern land-based portion of the site has not been assessed at an adequate density. • The footprint of the electrical substation requires assessment for PCBs and PAHs following demolition. • Characterisation of fill materials for the presence of asbestos was limited. • There is the potential for additional USTs to be present. • Further characterisation of sediments is required to inform management during excavation and construction.	The remaining data gaps have been identified by the Revised RAP. The remaining data gaps can be addressed during demolition of existing structures, excavation of the basement area and construction of the Fish Market building. Processes and procedures defined in the Revised RAP address the remaining data gaps. The proposed remediation environmental management plan (REMP) and Dewatering Plan will provide further confidence that data gaps can be adequately addressed.

13.1 Auditor's Opinion

The CSM presented in the Revised RAP is considered an adequate basis for assessing remedial requirements and to inform management requirements during the proposed development works.

14. EVALUATION OF REMEDIATION

14.1 Remediation Required

Based on the investigations completed, the extent of remediation and/or management required has been outlined in the Revised RAP and is summarised in Table 14.1 below.

The identified environmental impacts at the site that require management generally comprise fill material and natural soil identified during the early works and future main works as excess to site requirements. This material is anticipated to generally comprise basement material, piling spoil, trenching spoil associated with foundations, services infrastructure, or other works requiring below ground activities to achieve construction objectives. Based on general site observations and testing, it is anticipated that natural soil will require treatment in accordance with the ASSMP prior to off-site disposal.

No areas requiring remediation have been identified, however some data gaps were identified in the Revised RAP that will require further assessment following demolition of buildings and structures and during excavation of the basement. The data gaps are identified in the CSM (Section 13).

The Revised RAP has assumed that soil and sediment conditions at the site may require some remediation and/or management where disturbed during development activities. It is envisaged in the Revised RAP 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. It is assumed that the REMP will be prepared at this time.

Sediments across the water-based portion of the site are impacted with heavy metals, total PAHs, PCBs and TRHs. The elevated contaminant concentrations in sediments are considered to be reflective of conditions throughout the wider extent of Blackwattle Bay as a result of historical industrial activities along the foreshore. Sediment located within the envelope of the proposed new Sydney Fish Market building will require adjustment for basement construction and to facilitate continued discharge from existing stormwater culverts. These works will require management, from both a contamination and ASS perspective. The management measures will primarily control 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 and that associated short-term ecological risks are appropriately mitigated. Best-practice management procedures will be informed by development of a site-specific REMP, based on management principles provided in the ASSMP.

The Revised RAP includes an unexpected finds protocol (UFP) and a contingency plan for small scale issues that may arise during demolition, excavation and redevelopment of the site. The UFP may not be adequate if an unexpected find resulted in a change in the remedial strategy (for example, if onsite containment was proposed). In this instance, an addendum to the RAP would be required.

Table 14.1: Remediation Required and Preferred Options

Description	Extent of Remediation Required	Preferred Option
Contaminated soils and sediments	Fill material, natural soil and sediment generated from development works (piling, trenching, basement excavation). The areas of excavation are to be determined pending further modifications of the development plans. Excavated material is required to be transported to a facility that is lawfully able to accept the classified waste. Natural soil and sediment will also require management in accordance with the ASSMP requirements.	Excavation and Offsite Removal.

14.2 Evaluation of RAP

The Auditor has assessed the Revised RAP by comparison with the checklist included in NSW EPA (2020) *Consultants Reporting on Contaminated Land*. The Revised RAP was found to address the required information, as detailed in Table 14.2, below.

Table 14.2: Evaluation of Remedial Action Plan

Remedial Action Plan	Auditor Comments
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 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 regulations and relevant EPA guidelines.* • *Removal of potential ongoing sources of environmental contamination (unexpected finds such as historical sub-surface petroleum storage, if encountered).* • *Validation of site management and remedial works in accordance with the relevant EPA guidelines.* • *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".*	In the Auditor's opinion, these goals are considered appropriate. It is noted that the site is intended to be made suitable for ongoing commercial/industrial use.
Discussion of the extent of remediation required Remediation required was discussed within the Revised RAP (see Table 14.1 above)	Given the results of the investigations and the preliminary nature of in ground design activities to date, no specific identified areas of the site requiring management have been identified. Sediment has been found to be impacted, however is considered to be representative of more widespread impact within Blackwattle Bay. Sediment requiring excavation should be managed in accordance with the Revised RAP, however undisturbed sediment in not considered to require remediation. The Auditor understands that subsequent changes in the development plans and designs will be reflected in the ASSMP and REMP.
Remedial Options Remedial options were assessed and included in Section 5.5 of the RAP. A number of other options were listed as potential contingencies.	The Auditor considers that an appropriate range of options were considered.
Selected Preferred Option The preferred option was offsite disposal, which was discussed within Section 5.5 of the RAP.	The Auditor considers the preferred option to be appropriate given the proposed excavation of a large portion of the site for a basement.
Rationale Only limited information was provided as rationale for the preferred option.	Given that excavation of a basement is proposed, the overall rationale for the preferred option (offsite disposal) is acceptable.
Proposed Validation Criteria Site validation criteria are stipulated in Section 7.3 of the Revised RAP:	Appropriate. Criteria for sediment are not discussed, however would require offsite disposal in

Remedial Action Plan	Auditor Comments
"*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.* - *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."*	accordance with the waste classification guidelines. Excavated sediment proposed for reuse on the site should be assessed against ANZAST (2018).
Proposed Validation Testing The Validation Plan in Section 7 of the Revised RAP states that: "*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…"*. <u>Excavation:</u> Site investigations have not identified impacts requiring remediation and validation. The Revised RAP includes a plan to validate the removal of impacted materials should they be identified during demolition, excavation or development works. 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 of the Revised RAP 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. • 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. <u>Re-use of Excavated Material:</u> 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:	The sampling density and analytes for excavated material reused onsite were not specified in the Revised RAP (fill material, natural soil or sediment). The proposed sampling for exported materials would be appropriate to demonstrate suitability of material for reuse onsite. The Auditor notes that imported material must either be VENM, ENM or be classified under a Resource Recovery Exemption. The density of testing would need to be commensurate with the documentation provided and the consistency of the results.

Remedial Action Plan	Auditor Comments
• required to be removed from the site as a result of contaminant characteristics identified during the data gap investigation and/or unexpected finds. Such material is characterised as having contaminant concentrations in exceedance of site validation criteria for the proposed land use and so will require disposal to a lawful waste facility; or • required to be removed to achieve site development objectives (i.e. piling spoil, foundations, services installation etc.), that could potentially be reused within the broader development site should material be required, but will otherwise require disposal offsite as waste. 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. <u>Imported Material:</u> Based on the scope of remedial works described in the Revised RAP, 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 require select materials, potentially including trench backfill aggregate, pavement backfill, growing media, etc. Appropriate assessment must be completed to demonstrate the material is fit for purpose and suitable from a contamination viewpoint prior to importation. The sampling frequency and analytical suite for imported VENM, quarried products and material classified under the Resource Recovery Framework (Order/Exemption) are detailed in Table 7.3 of the Revised RAP. Material tracking records for material disposed offsite, reused or imported are required to be included in the final validation report. The Revised RAP requires the preparation of a Materials Compliance Management System (MCM) to document material movement and use. Details of the MCM are provided in Section 8.5 of the Revised RAP.	
Interim Site Management Plan (before remediation) Not stated.	Interim site management is not considered to be required based on the results of investigations undertaken to date.
Unexpected Finds Section 7.6 of the Revised RAP details a process for handling unexpected finds. This includes ceasing work, barricading the area, inspection and sampling of the find by an environmental consultant, assessment of results against the criteria, and remediation as required.	Appropriate.
Site Management Plan (operation phase) including stormwater, soil, noise, dust, odour and OH&S The Revised RAP requires that a REMP is prepared documenting the environmental monitoring and management measures required to be implemented during remediation and construction. The required elements of the REMP are provided in Table 8.1 of the Revised RAP. The REMP is to be reviewed by the environmental consultant and Auditor.	Appropriate.
Contingency Plans Section 7.5 of the Revised RAP provides a contingency plan as follows: "*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*	In the Auditor's opinion, offsite disposal has a low risk of failure. The contingency plan is appropriate and practical and can be implemented within the proposed remediation strategy.

Remedial Action Plan	Auditor Comments
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." Contingency procedures are provided for USTs, oily material, material storage breach, emissions complaints, dewatering and excavation validation failure.	
Remediation Schedule and Hours of Operation The Revised RAP provides typical hours of operation.	The schedule and hours of operation should be in accordance with the development consent and guidelines.
Licence and Approvals In addition to the requirements of SEPP55, consideration of the regulatory requirements under NSW legislation will also be necessary, as stated in Section 6.3.2 of the Revised RAP.	Appropriate.
Contacts/Community Relations Contacts were not provided but will be displayed on signs located adjacent to the site access throughout the remediation program. Details will include company/personnel details, including names/phone numbers for: • Principal Contractor • Site Auditor (if involved) • Environmental Consultant • Contractor • OH&S Compliance • Environmental Compliance	Appropriate.
Staged Progress Reporting Not applicable.	Not applicable.
Long Term Site Management Plan Long term management is not proposed in the Revised RAP. A REMP is proposed which will document the environmental monitoring and management measures required to be implemented during remediation of the site.	Appropriate.

14.3 Auditor's Opinion

In the Auditors' opinion, the proposed remediation works should ensure that the site is suitable for the proposed commercial/industrial land use through the removal of waste materials generated during the construction and development works, including unexpected finds. Successful validation and waste classification, as well as potential treatment for ASS, will be required.

The proposed methodology for assessment of data gaps is considered adequate. Reporting of the results of the data gap investigations to the Auditor (and other interested parties) is recommended.

An addendum to the RAP (or revised RAP) would be required should the proposed remedial strategy change (for example, onsite containment of contamination) in response to the assessment of data gaps, unexpected finds or a change in the proposed development.

15. CONTAMINATION MIGRATION POTENTIAL

Contaminants generally migrate from site via a combination of windblown dusts, rainwater infiltration, groundwater migration, lateral vapour/gas migration and surface water runoff. The contaminants of concern identified as part of the site history review, site inspection and site assessment are in soil (primarily asbestos, metals, PAHs) and groundwater (metals and PAHs). No vapour or gas impact was identified.

The ground surface of the land area of the site was largely covered in hardstand prior to demolition. Development plans submitted with the Stage 1 Development Application indicate that the majority of the site will be sealed with hardstand with minor areas of landscaping in the eastern and western promenades. As such, there is a low potential for windblown contaminants or entrainment in surface runoff to migrate from the site, or for contaminants to leach through the soil profile and impact and subsequently migrate via groundwater.

The groundwater encountered during the previous investigations is inferred to comprise a shallow system in which all wells contained groundwater with total dissolved solids consistent with marine levels. The SWLs were observed to be influenced by tidal movements of Blackwattle Bay, where site groundwater is anticipated to ultimately discharge.

Groundwater with elevated levels of copper, lead, zinc and PAH compounds have been recorded at the site. Contaminant concentrations were not considered to be significantly elevated and are not considered to present a risk to ecological receptors. The elevated concentrations are likely to be associated with fill material located on the site and within Wentworth Park to the southeast of the site. Further investigation or remediation of elevated metals concentrations in groundwater would therefore be of limited benefit if limited to the site.

In-situ sediment has previously been considered generally consistent in contaminant character to sediments across the broader Blackwattle Bay area. It is anticipated that the potential for migration of sediments will primarily occur via suspension as a result of disturbance during construction works, which will require addressing during development works.

In the Auditor's opinion, there is no evidence of significant migration of contamination having occurred or currently occurring. Completion of the remediation works as described in Section 14 will minimise the potential for future offsite migration of contamination from the site. A REMP and ASSMP are to be prepared to manage material during remediation and redevelopment of the site.

16. ASSESSMENT OF RISK

There are several areas of uncertainty that were identified as part of the assessment of data gaps, and which represent a risk to the development activities to be undertaken at the site. While the Revised RAP identifies the data gaps and presents a plan for addressing them, it is necessary to further discuss these areas of risk.

a) Disturbance of sediments: The proposed sediment adjustment and piling activities will result in resuspension of material into the overlying waters of Blackwattle Bay and potential transport of impacted materials. However, the proposed management activities (e.g. coffer dam, surface water monitoring) during the development are likely to substantially reduce the potential risk of re-suspended material transport. Further details should be provided in the REMP.

b) ASS risks: The magnitude and extent of ASS in soils and sediments across the site is not well characterised. Management of ASS is proposed by the ASSMP, however the volume and extent of material requiring treatment or management is uncertain. The Revised RAP assumes that all natural soils and sediments are ASS and will require management during remediation and redevelopment of the site.

c) Risks to human health from elevated concentrations of contaminants with respect to the proposed land use, given the exposure pathways and toxicity of the contaminants: Assessment of data gaps will be required to inform management decisions regarding the proposed development works.

d) Undetected contamination: The risks of undetected and unidentified contamination across the site has been adequately addressed by the UFP in the Revised RAP.

17. COMPLIANCE WITH REGULATORY GUIDELINES AND DIRECTIONS

17.1 General

The Auditor has used guidelines currently made and approved by the EPA under section 105 of the NSW *Contaminated Land Management Act 1997*.

The investigations were generally conducted in accordance with SEPP 55 Planning Guidelines and reported in accordance with the NSW EPA (2020) *Consultants Reporting on Contaminated Land*.

17.2 Development Approvals

State Significant Development (SSD) application 8924 was approved by the Minister of Planning and Public Spaces on 12 June 2020 for demolition of existing structures and approval of the proposed development envelope for use as a fish market. Condition B26 requires a site audit as follows:

> *"Prior to the commencement of works, the Applicant must engage an EPA-accredited auditor to prepare a Section B Site Audit Statement that confirms that the remediation action plan is appropriate for the site and that the site can be made suitable for the proposed use".*

This SAR and accompanying Section B SAS (Appendix B) have been completed in order to comply with this condition.

17.3 Conflict of Interest

The Auditor has considered the potential for a conflict of interest in accordance with the requirements of section 3.2.3 of the NSW EPA (2017) *Guidelines for the NSW Site Auditor Scheme*.

The Auditor considers that there are no conflicts of interest, given that:

1. The Auditor is not related to a person by whom any part of the land is owned or occupied.
2. The Auditor does not have a pecuniary interest in any part of the land or any activity carried out on any part of the land.
3. The Auditor has not reviewed any aspect of work carried out by, or a report written by, the site auditor or a person to whom the site auditor is related.

18. CONCLUSIONS AND RECOMMENDATIONS

JBS&G concluded in the Revised RAP that:

> "*Subject to the successful implementation of the measures described in this RAP …, 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*."

Based on the information presented in JBS&G reports and observations made on site, and following the Decision-making process for assessing urban redevelopment sites in NSW EPA (2017) *Guidelines for the NSW Site Auditor Scheme (3rd Edition)*, the Auditor concludes that the site can be made suitable for the purposes of commercial/industrial land use (fish market) if remediated in accordance with the following RAP:

> 'Remedial Action Plan, The New Sydney Fish Market, 1A to 1C Bridge Road, Glebe and part 56-60 Pyrmont Bridge Road, Pyrmont, NSW', Report No. 54162/113808 (Rev 4) 8 July 2020, JBS&G Australia Pty Ltd

Subject to compliance with the following conditions:

- Assessment of data gaps in accordance with the Revised RAP. Reporting of the results of the data gap investigations to the Auditor (and other interested parties) is recommended.
- Preparation of a Remediation Environmental Management Plan (REMP) prior to remediation commencing. The REMP is to be provided to the Auditor for review.
- Preparation of a Site Audit Statement certifying suitability for the proposed use at the completion remediation and validation.

19. OTHER RELEVANT INFORMATION

This Audit was conducted on the behalf of Infrastructure NSW for the purpose of the suitability and appropriateness of a remedial action plan (RAP), i.e. a “Site Audit” as defined in Section 4 (definition of a ‘site audit’ (b)(v)) of the CLM Act.

This summary report may not be suitable for other uses. PB, EIS, Jacobs, JK Geotechnics and JBS&G included limitations in their reports. The Audit must also be subject to those limitations. The Auditor has prepared this document in good faith, but is unable to provide certification outside of areas over which the Auditor had some control or is reasonably able to check.

The Auditor has relied on the documents referenced in Section 1 of the Site Audit Report in preparing the Auditors’ opinion. If the Auditor is unable to rely on any of those documents, the conclusions of the audit could change.

It is not possible in a Site Audit Report to present all data which could be of interest to all readers of this report. Readers are referred to the referenced reports for further data. Users of this document should satisfy themselves concerning its application to, and where necessary seek expert advice in respect to, their situation.

APPENDIX A
ATTACHMENTS

Attachment 1: Site Location
Attachment 2: Site Layout
Attachment 3: Sample Locations

Attachment 1: Site Location

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

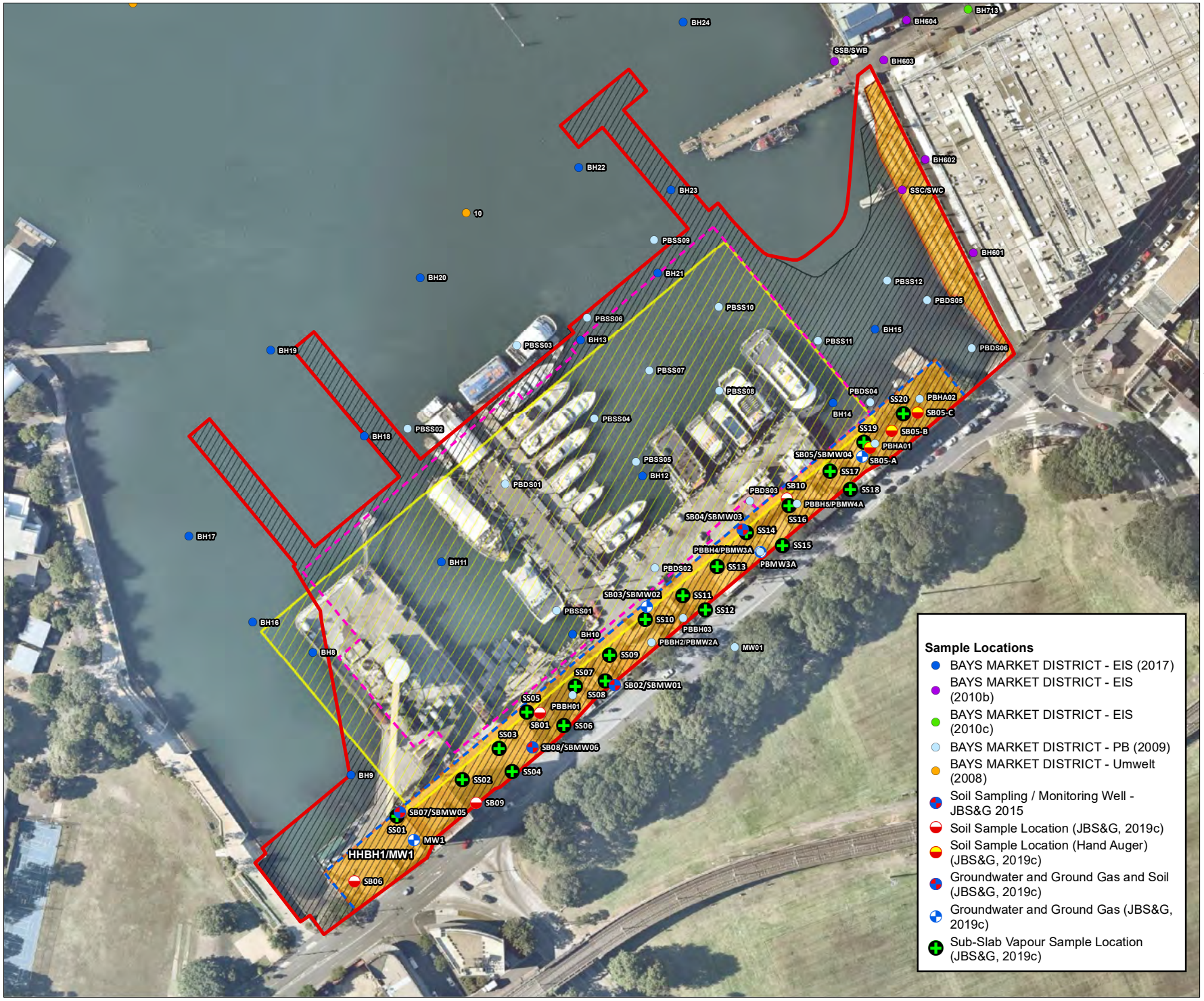
Coor. Sys. GDA 1994 MGA Zone 56

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.



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
- Soil Sample Location (JBS&G, 2019c)
- Soil Sample Location (Hand Auger) (JBS&G, 2019c)
- Groundwater and Ground Gas and Soil (JBS&G, 2019c)
- Groundwater and Ground Gas (JBS&G, 2019c)
- Sub-Slab Vapour Sample Location (JBS&G, 2019c)

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 B
SITE AUDIT STATEMENT

NSW Site Auditor Scheme

Site Audit Statement

A site audit statement summarises the findings of a site audit. For full details of the site auditor's findings, evaluations and conclusions, refer to the associated site audit report.

This form was approved under the *Contaminated Land Management Act 1997* on 12 October 2017.

For information about completing this form, go to Part IV.

Part I: Site audit identification

Site audit statement no. TO-054-B

This site audit is a:

☒ statutory audit

☐ non-statutory audit

within the meaning of the *Contaminated Land Management Act 1997*.

Site auditor details

(As accredited under the *Contaminated Land Management Act 1997*)

Name	Tom Onus
Company	Ramboll Australia Pty Ltd
Address	Level 3, 100 Pacific Highway, North Sydney
	Postcode 2060
Phone	02 9954 8133
Email	tonus@ramboll.com

Site details

Address: 1A to 1C Bridge Road, Glebe, NSW 2037 and part of 56-60 Pyrmont Bridge Road, Pyrmont, NSW 2009.

Postcode: 2037 and 2009

Property description

(Attach a separate list if several properties are included in the site audit.)

Lots 3-5 in DP 1064339; Part Lot 107 in DP1076596; Part Lot 1 in DP835794 (shown on attachment at the end of Part I of this statement).

Local government area: City of Sydney Council

Area of site (include units, e.g. hectares): 3.7 ha, of which 0.7 ha consists of land above the high tide level.

Current zoning: 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

Regulation and notification

To the best of my knowledge:

☐ **the site is** the subject of a declaration, order, agreement, proposal or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985,* as follows: (provide the no. if applicable)

- ☐ Declaration no.
- ☐ Order no.
- ☐ Proposal no.
- ☐ Notice no.

☒ **the site is not** the subject of a declaration, order, proposal or notice under the *Contaminated Land Management Act 1997* or the *Environmentally Hazardous Chemicals Act 1985*.

To the best of my knowledge:

☐ the site **has** been notified to the EPA under section 60 of the *Contaminated Land Management Act 1997*

☒ the site **has not** been notified to the EPA under section 60 of the *Contaminated Land Management Act 1997*.

Site audit commissioned by

Name: Jennifer Chang

Company: Infrastructure NSW (formerly UrbanGrowth NSW Development Corporation)

Address: Level 12, 19 Martin Place, Sydney, NSW

Postcode: 2000

Phone: (02) 9216 5790

Email: jennifer.chang@infrastructure.nsw.gov.au

Contact details for contact person (if different from above)

Name:

Phone:

Email:

Nature of statutory requirements (not applicable for non-statutory audits)

☐ Requirements under the *Contaminated Land Management Act* 1997 (e.g. management order; please specify, including date of issue)

☐ Requirements imposed by an environmental planning instrument (please specify, including date of issue)

☒ Development consent requirements under the *Environmental Planning and Assessment Act 1979* (please specify consent authority and date of issue)

SSD 8924 approved by the Minister for Planning and Public Spaces on 12 June 2020

☐ Requirements under other legislation (please specify, including date of issue)

Purpose of site audit

☐ **A1** To determine land use suitability

Intended uses of the land:

OR

☐ **A2** To determine land use suitability subject to compliance with either an active or passive environmental management plan

Intended uses of the land:

OR

(Tick all that apply)

☒ **B1** To determine the nature and extent of contamination

☒ **B2** To determine the appropriateness of:

- ☐ an investigation plan
- ☒ a remediation plan
- ☐ a management plan

☐ **B3** To determine the appropriateness of a **site testing plan** to determine if groundwater is safe and suitable for its intended use as required by the *Temporary Water Restrictions Order for the Botany Sands Groundwater Resource 2017*

☐ **B4** To determine the compliance with an approved:

- ☐ **voluntary management proposal** or
- ☐ **management order** under the *Contaminated Land Management Act 1997*

☒ **B5** To determine if the land can be made suitable for a particular use (or uses) if the site is remediated or managed in accordance with a specified plan.

Intended uses of the land: Fish Market

Information sources for site audit

Consultancies which conducted the site investigations and/or remediation:

Parsons Brinkerhoff Australia Pty Ltd (PB)

Environmental Investigation Services (EIS)

Jacobs Group (Australia) Pty Ltd (Jacobs)

City Plan Heritage Pty Ltd (CPH)

JK Geotechnics

JBS&G Australia Pty Ltd (JBS&G)

Titles of reports reviewed:
'Environmental Site Investigation Blackwattle Bay Maritime Precinct, Blackwattle Bay Maritime Precinct, NSW'. Report No. 2116954A PR_9459 RevB dated 9 March 2009. PB

'Preliminary Environmental Site Assessment for Proposed Redevelopment – Waterfront at Sydney Fish Markets, 56-60 Pyrmont Bridge Road, Pyrmont, NSW'. Report No. E24125Krpt dated August 2010. EIS

'Geotechnical Desktop Review'. Report No. NB00046-300-ESG-RP-0001 / B dated 6 August 2014. Jacobs

'Environmental Site Assessment - The Bays Precinct Urban Transformation Area'. Report No. 50460-101699 (Rev 1) dated 18 November 2015. JBS&G

'Site Wide Remedial Concept Plan – The Bays Precinct Urban Transformation Area'. Dated 4 December 2015. JBS&G

'Contamination Investigation, The Bays Precinct – Separable Portion 1, Blackwattle Bay, Pyrmont, NSW'. Report No. E29245KletRev1-SP1 dated 12 July 2017. EIS

'Bays Market Precinct: Blackwattle Bay & Wentworth Park - History, Built Heritage, Archaeology & Landscape Study'. Report No. H-16-237 (Rev 02) dated 17 July 2017. CPH

'Revised Geotechnical Report to UrbanGrowth NSW on Geotechnical Investigation for Proposed Bays Market District at Blackwattle Bay & Wentworth Park, Pyrmont, NSW'. Report No. 29245SrptRev2 dated 14 September 2017, JK Geotechnics

'Data Gap Assessment, The New Sydney Fish Market, 1A to 1C Bridge Rd, Glebe NSW'. Report No. 54162/119400 dated 12 March 2019. JBS&G

'Acid Sulfate Soil Management Plan, The New Sydney Fish Market, 1A to 1C Bridge Road, Glebe, NSW'. Report No. 54162/113896 (Rev 2) dated 4 April 2019. JBS&G

'Environmental Site Assessment, The new Sydney Fish Market, 1A to 1C Bridge Road, Glebe and part 56-60 Pyrmont Bridge Road, Pyrmont, NSW'. Report No. 54162 – 112239 (Rev 3) dated 4 April 2019. JBS&G

'Remedial Action Plan, The New Sydney Fish Market, 1A to 1C Bridge Road, Glebe and part 56-60 Pyrmont Bridge Road, Pyrmont, NSW'. Report No. 54162/113808 (Rev 4) dated 8 July 2020. JBS&G

'Hazardous Materials Removal Management Plan, The New Sydney Fish Market, 1A to 1C Bridge Road, Glebe and Part 56-60 Pyrmont Bridge Road, Pyrmont, NSW'. Report No. 54162/114239 (Rev 4) dated 12 August 2020. JBS&G

Other information reviewed, including previous site audit reports and statements relating to the site:

'Site Audit Report – Site Wide Remedial Concept Plan, The Bays Precinct Urban Transformation Area' and Site Audit Statement GN 510 dated 28 January 2016 prepared by Graeme Nyland of Ramboll Environ Australia Pty Ltd

'Site Audit Report – The New Sydney Fish Market, 1A to 1C Bridge Road, Glebe and Part of 56-60 Pyrmont Bridge Road, Pyrmont, NSW' and Site Audit Statement TO-054-A dated 25 September 2019 prepared by Tom Onus of Ramboll Australia Pty Ltd

Site audit report details

Title	Site Audit Report – Revised Remedial Action Plan, The New Sydney Fish Market, Pyrmont NSW	
Report no.	TO-054-B (Ramboll Ref: 318000632)	Date 13 August 2020

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.

Part II: Auditor's findings

Please complete either Section A1, Section A2 or Section B, not more than one section. (Strike out the irrelevant sections.)

- Use **Section A1** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **without the implementation** of an environmental management plan.
- Use **Section A2** where site investigation and/or remediation has been completed and a conclusion can be drawn on the suitability of land uses **with the implementation** of an active or passive environmental management plan.
- Use **Section B** where the audit is to determine:
  - (B1) the nature and extent of contamination, and/or
  - (B2) the appropriateness of an investigation, remediation or management plan[1], and/or
  - (B3) the appropriateness of a site testing plan in accordance with the *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2017*, and/or
  - (B4) whether the terms of the approved voluntary management proposal or management order have been complied with, and/or
  - (B5) whether the site can be made suitable for a specified land use (or uses) if the site is remediated or managed in accordance with the implementation of a specified plan.

[1] For simplicity, this statement uses the term 'plan' to refer to both plans and reports.

Section A1

I certify that, in my opinion:

The **site is suitable** for the following uses:

(Tick all appropriate uses and strike out those not applicable.)

☐ Residential, including substantial vegetable garden and poultry

☐ Residential, including substantial vegetable garden, excluding poultry

☐ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry

☐ Day care centre, preschool, primary school

☐ Residential with minimal opportunity for soil access, including units

☐ Secondary school

☐ Park, recreational open space, playing field

☐ Commercial/industrial

☐ Other (please specify):

_____

OR

☐ I certify that, in my opinion, the **site is not suitable** for any use due to the risk of harm from contamination.

Overall comments:

_____

_____

_____

_____

_____

_____

Section A2

I certify that, in my opinion:

Subject to compliance with the **attached** environmental management plan[2] (EMP), the site is suitable for the following uses:

(Tick all appropriate uses and strike out those not applicable.)

☐ Residential, including substantial vegetable garden and poultry

☐ Residential, including substantial vegetable garden, excluding poultry

☐ Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry

☐ Day care centre, preschool, primary school

☐ Residential with minimal opportunity for soil access, including units

☐ Secondary school

☐ Park, recreational open space, playing field

☐ Commercial/industrial

☐ Other (please specify):

EMP details

Title:

Author:

Date: No. of pages:

EMP summary

This EMP (attached) is required to be implemented to address residual contamination on the site.

The EMP: (Tick appropriate box and strike out the other option.)

☐ requires operation and/or maintenance of **active** control systems[3]

☐ requires maintenance of **passive** control systems only[3].

[2] Refer to Part IV for an explanation of an environmental management plan.
[3] Refer to Part IV for definitions of active and passive control systems.

~~Purpose of the EMP:~~

~~Description of the nature of the residual contamination:~~

~~Summary of the actions required by the EMP:~~

~~How the EMP can reasonably be made to be legally enforceable:~~

~~How there will be appropriate public notification:~~

~~Overall comments:~~

Section B

Purpose of the plan[4] which is the subject of this audit:

To establish a suitable framework for remediation of potentially contaminated media such that upon completion of works, the site will be considered suitable for use as a fish market comprising land and water-based structures. The building will include three above ground levels and one basement level. The basement will comprise a car park, plant and storage, waste management facilities, and bathrooms. The building will include wholesale services (storage, processing and sales), retail premises, waste management facilities, office space, amenities, plant and storage. Surrounding areas will include wharves and public domain (landscaping and promenade).

I certify that, in my opinion:

(B1)

☒ The nature and extent of the contamination **has** been appropriately determined

☐ ~~The nature and extent of the contamination **has not** been appropriately determined~~

AND/OR (B2)

☒ The investigation, remediation or management plan **is** appropriate for the purpose stated above

☐ ~~The investigation, remediation or management plan **is not** appropriate for the purpose stated above~~

~~AND/OR (B3)~~

☐ ~~The site testing plan:~~

- ☐ ~~**is** appropriate to determine~~
- ☐ ~~**is not** appropriate to determine~~

~~if groundwater is safe and suitable for its intended use as required by the *Temporary Water Restrictions Order for the Botany Sands Groundwater Resource 2017*~~

~~AND/OR (B4)~~

☐ ~~The terms of the approved voluntary management proposal* or management order** (strike out as appropriate):~~

- ☐ ~~**have** been complied with~~
- ☐ ~~**have not** been complied with.~~

~~*voluntary management proposal no.~~

~~**management order no.~~

AND/OR (B5)

☒ The site **can be made suitable** for the following uses:

[4] For simplicity, this statement uses the term ‘plan’ to refer to both plans and reports.

(Tick all appropriate uses and strike out those not applicable.)

☐ ~~Residential, including substantial vegetable garden and poultry~~

☐ ~~Residential, including substantial vegetable garden, excluding poultry~~

☐ ~~Residential with accessible soil, including garden (minimal home-grown produce contributing less than 10% fruit and vegetable intake), excluding poultry~~

☐ ~~Day care centre, preschool, primary school~~

☐ ~~Residential with minimal opportunity for soil access, including units~~

☐ ~~Secondary school~~

☐ ~~Park, recreational open space, playing field~~

☒ Commercial/industrial

☐ ~~Other (please specify):~~

IF the site is remediated~~/managed~~* in accordance with the following plan (**attached**):

*Strike out as appropriate

Plan title: 'Remedial Action Plan, The New Sydney Fish Market, 1A to 1C Bridge Road, Glebe and part 56-60 Pyrmont Bridge Road, Pyrmont, NSW'. Report No. 54162/113808 (Rev 4).

Plan author: JBS&G Australia Pty Ltd

Plan date: 8 July 2020 No. of pages: 124

SUBJECT to compliance with the following condition(s):

1. Assessment of data gaps in accordance with the RAP dated 8 July 2020. Reporting of the results of the data gap investigations to the Auditor (and other interested parties) is recommended.
2. Preparation of a Remediation Environmental Management Plan (REMP) prior to remediation commencing. The REMP is to be provided to the Auditor for review.
3. Preparation of a Site Audit Statement certifying suitability for the proposed use at the completion of remediation and validation.

Overall comments:

The site investigations undertaken to date have identified low level contamination in soil and groundwater (including some metals, polycyclic aromatic hydrocarbons and total recoverable hydrocarbons). Higher contaminant concentrations were identified in sediment samples, including metals, polycyclic aromatic hydrocarbons, pesticides, tributyltin and polychlorinated biphenyls exceeding the ecological screening criteria.

Some data gaps were identified, which can be addressed during demolition of existing structures, excavation of the basement area and construction of the Fish Market building. Processes and procedures to address the data gaps are defined in the remedial action plan (RAP).

Based on the data available, the preferred remedial option is offsite disposal of any fill that is excess to requirements. In the Auditor's opinion, the RAP is adequate for remediation of the site. Should investigation following demolition or development excavation works uncover conditions different to those anticipated in the RAP, an addendum or revised RAP will require preparation.

Further guidance regarding site management during the construction phase of the proposed development is provided in an Acid Sulfate Soil Management Plan (JBS&G Australia Pty Ltd, 4 April 2019), an Hazardous Materials Removal Management Plan (JBS&G Australia Pty Ltd, 12 August 2020) and a Remediation Environmental Management Plan (to be prepared), which is to be provided to the Auditor for review.

Part III: Auditor's declaration

I am accredited as a site auditor by the NSW Environment Protection Authority (EPA) under the *Contaminated Land Management Act 1997.*

Accreditation no. 1505

I certify that:

- I have completed the site audit free of any conflicts of interest as defined in the *Contaminated Land Management Act 1997,* and
- with due regard to relevant laws and guidelines, I have examined and am familiar with the reports and information referred to in Part I of this site audit, and
- on the basis of inquiries I have made of those individuals immediately responsible for making those reports and obtaining the information referred to in this statement, those reports and that information are, to the best of my knowledge, true, accurate and complete, and
- this statement is, to the best of my knowledge, true, accurate and complete.

I am aware that there are penalties under the *Contaminated Land Management Act 1997* for wilfully making false or misleading statements.

Signed:

Date: 13 August 2020

Part IV: Explanatory notes

To be complete, a site audit statement form must be issued with all four parts.

How to complete this form

Part I

Part I identifies the auditor, the site, the purpose of the audit and the information used by the auditor in making the site audit findings.

Part II

Part II contains the auditor's opinion of the suitability of the site for specified uses or of the appropriateness of an investigation, or remediation plan or management plan which may enable a particular use. It sets out succinct and definitive information to assist decision-making about the use or uses of the site or a plan or proposal to manage or remediate the site.

The auditor is to complete either Section A1 or Section A2 or Section B of Part II, **not** more than one section.

Section A1

In Section A1 the auditor may conclude that the land is *suitable* for a specified use or uses OR *not suitable* for any beneficial use due to the risk of harm from contamination.

By certifying that the site is *suitable*, an auditor declares that, at the time of completion of the site audit, no further investigation or remediation or management of the site was needed to render the site fit for the specified use(s). **Conditions must not be** imposed on a Section A1 site audit statement. Auditors may include **comments** which are key observations in light of the audit which are not directly related to the suitability of the site for the use(s). These observations may cover aspects relating to the broader environmental context to aid decision-making in relation to the site.

Section A2

In Section A2 the auditor may conclude that the land is *suitable* for a specified use(s) subject to a condition for implementation of an environmental management plan (EMP).

Environmental management plan

Within the context of contaminated sites management, an EMP (sometimes also called a 'site management plan') means a plan which addresses the integration of environmental mitigation and monitoring measures for soil, groundwater and/or hazardous ground gases throughout an existing or proposed land use. An EMP succinctly describes the nature and location of contamination remaining on site and states what the objectives of the plan are, how contaminants will be managed, who will be responsible for the plan's implementation and over what time frame actions specified in the plan will take place.

By certifying that the site is suitable subject to implementation of an EMP, an auditor declares that, at the time of completion of the site audit, there was sufficient information satisfying guidelines made or approved under the *Contaminated Land Management Act 1997*

(CLM Act) to determine that implementation of the EMP was feasible and would enable the specified use(s) of the site and no further investigation or remediation of the site was needed to render the site fit for the specified use(s).

Implementation of an EMP is required to ensure the site remains suitable for the specified use(s). The plan should be legally enforceable: for example, a requirement of a notice under the CLM Act or a development consent condition issued by a planning authority. There should also be appropriate public notification of the plan, e.g. on a certificate issued under s.149 of *the Environmental Planning and Assessment Act 1979*.

Active or passive control systems

Auditors must specify whether the EMP requires operation and/or maintenance of active control systems or requires maintenance of passive control systems only. Active management systems usually incorporate mechanical components and/or require monitoring and, because of this, regular maintenance and inspection are necessary. Most active management systems are applied at sites where if the systems are not implemented an unacceptable risk may occur. Passive management systems usually require minimal management and maintenance and do not usually incorporate mechanical components.

Auditor's comments

Auditors may also include **comments** which are key observations in light of the audit which are not directly related to the suitability of the site for the use(s). These observations may cover aspects relating to the broader environmental context to aid decision-making in relation to the site.

Section B

In Section B the auditor draws conclusions on the nature and extent of contamination, and/or suitability of plans relating to the investigation, remediation or management of the land, and/or the appropriateness of a site testing plan in accordance with the *Temporary Water Restrictions Order for the Botany Sands Groundwater Source 2017*, and/or whether the terms of an approved voluntary management proposal or management order made under the CLM Act have been complied with, and/or whether the site can be made suitable for a specified land use or uses if the site is remediated or managed in accordance with the implementation of a specified plan.

By certifying that a site *can be made suitable* for a use or uses if remediated or managed in accordance with a specified plan, the auditor declares that, at the time the audit was completed, there was sufficient information satisfying guidelines made or approved under the CLM Act to determine that implementation of the plan was feasible and would enable the specified use(s) of the site in the future.

For a site that *can be made suitable*, any **conditions** specified by the auditor in Section B should be limited to minor modifications or additions to the specified plan. However, if the auditor considers that further audits of the site (e.g. to validate remediation) are required, the auditor must note this as a condition in the site audit statement. The condition must not specify an individual auditor, only that further audits are required.

Auditors may also include **comments** which are observations in light of the audit which provide a more complete understanding of the environmental context to aid decision-making in relation to the site.

Part III

In **Part III** the auditor certifies their standing as an accredited auditor under the CLM Act and makes other relevant declarations.

Where to send completed forms

In addition to furnishing a copy of the audit statement to the person(s) who commissioned the site audit, statutory site audit statements must be sent to

- the **NSW Environment Protection Authority**: nswauditors@epa.nsw.gov.au or as specified by the EPA

  AND

- the **local council** for the land which is the subject of the audit.

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

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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.

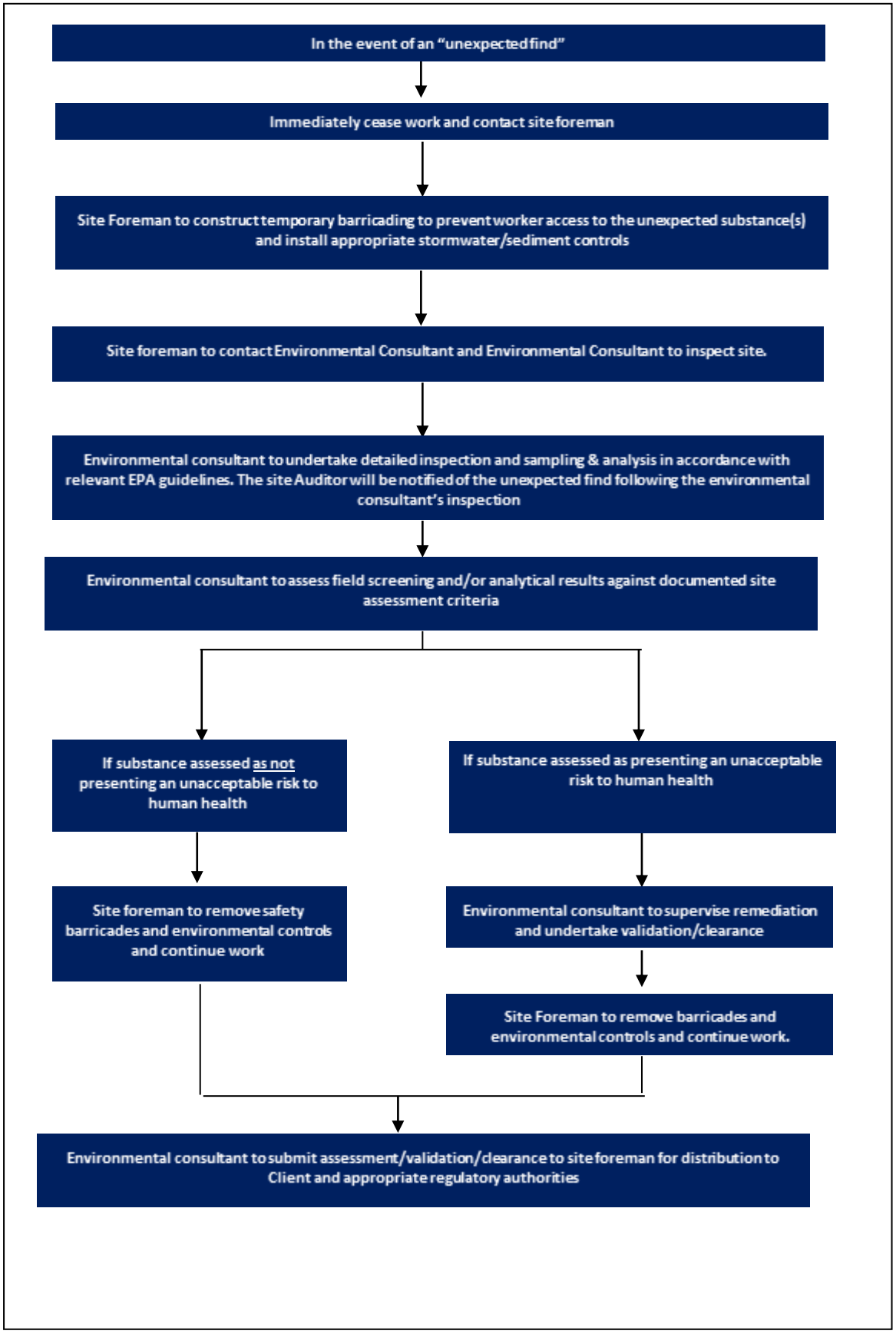
As a precautionary measure to ensure the protection of the workforce and surrounding community, should any of the abovementioned substances be identified (or any other unexpected potentially hazardous substance), the procedure summarised in **Flowchart 7.1** is to be followed.

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

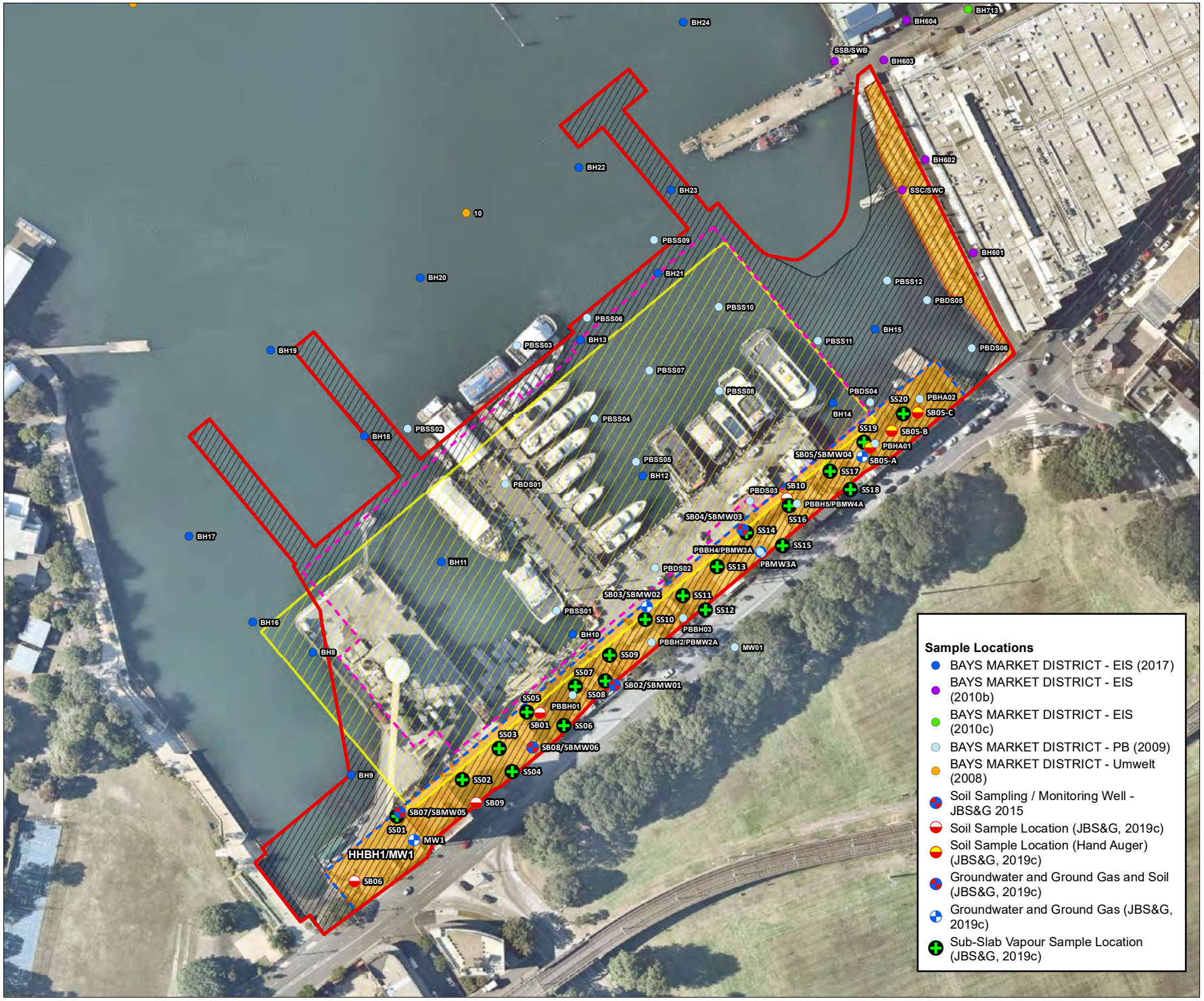
Coor. Sys. GDA 1994 MGA Zone 56

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.



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
- Soil Sample Location (JBS&G, 2019c)
- Soil Sample Location (Hand Auger) (JBS&G, 2019c)
- Groundwater and Ground Gas and Soil (JBS&G, 2019c)
- Groundwater and Ground Gas (JBS&G, 2019c)
- Sub-Slab Vapour Sample Location (JBS&G, 2019c)

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

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Scale 1:2,000

0 25 50
metres

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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

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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

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Granted on the.....12 June 2020.....

Signed.....Rodger Roppolo.....

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D	15/04/19	ISSUE FOR SSD-DA
E	27/08/19	ISSUED FOR REVIEW
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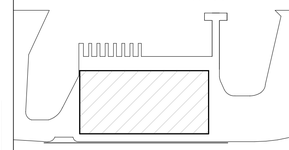

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RL +2.55

WATTLE STREET

RL +2.50

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:

- DEVELOPEMENT FOOTPRINT
- SEA WALL
- CADASTRAL BOUNDARY
- EXTENT OF BRIDGE ROAD WORK
- BASEMENT OUTLINE
- PROPOSED DATUM
- BUILDING ENVELOPE
- PUBLIC DOMAIN

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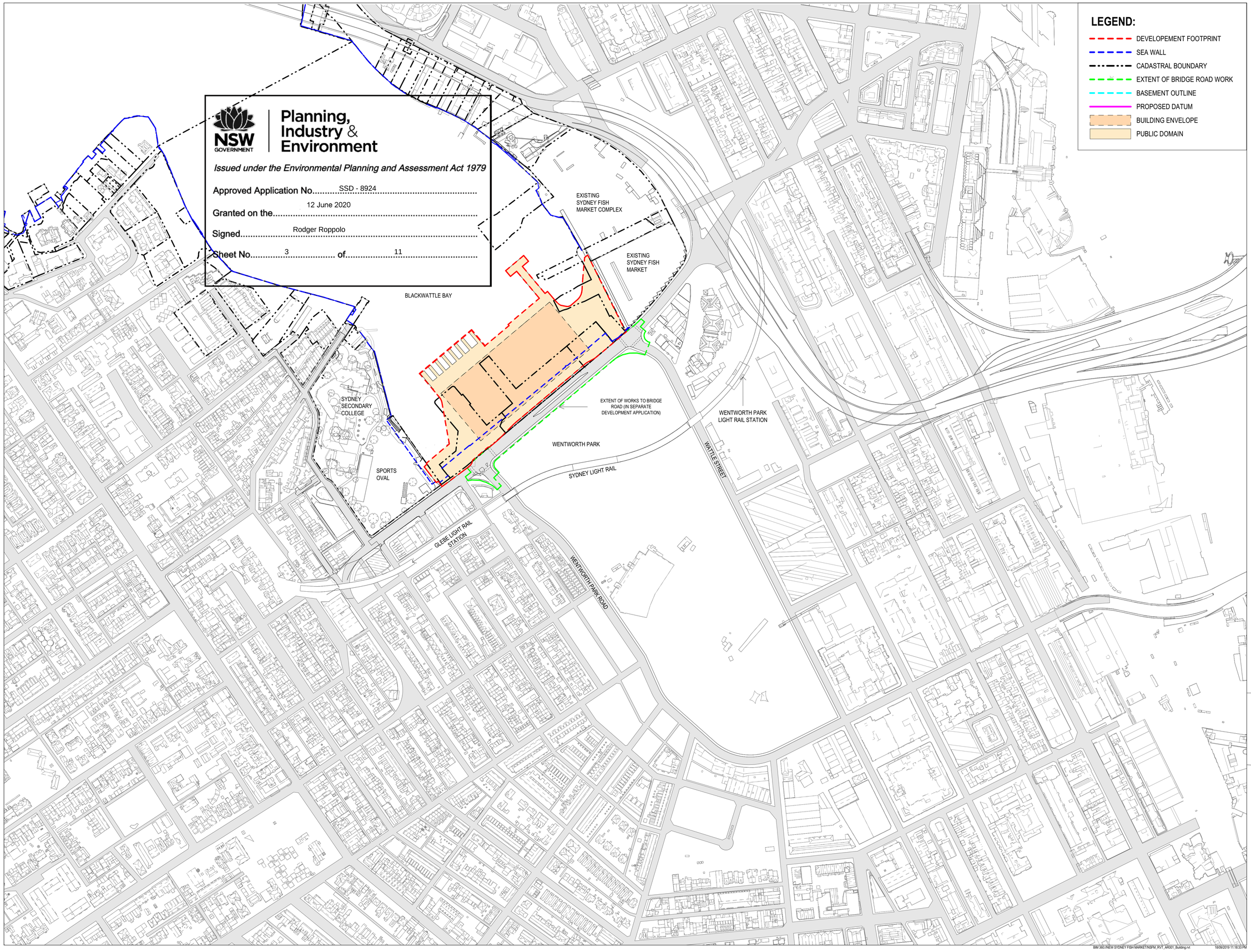

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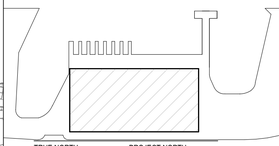

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Signed Rodger Roppolo

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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:

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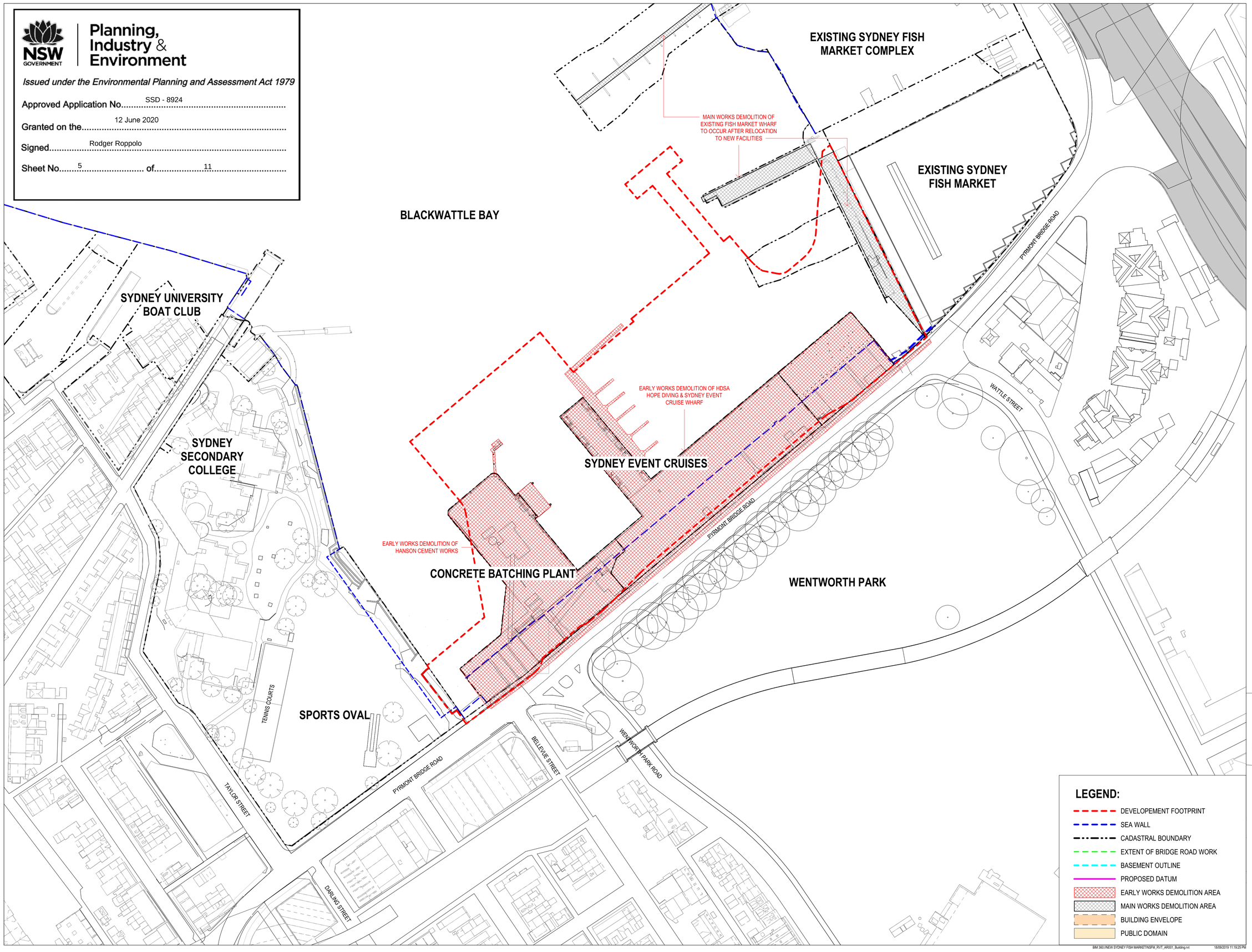
Signed..... Rodger Roppolo

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

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E	27/08/19	ISSUED FOR REVIEW
F	18/09/19	ISSUE FOR SSDA

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CLIENT NUMBER

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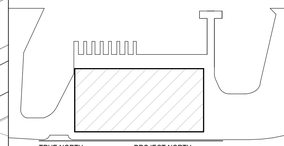
PROJECT

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

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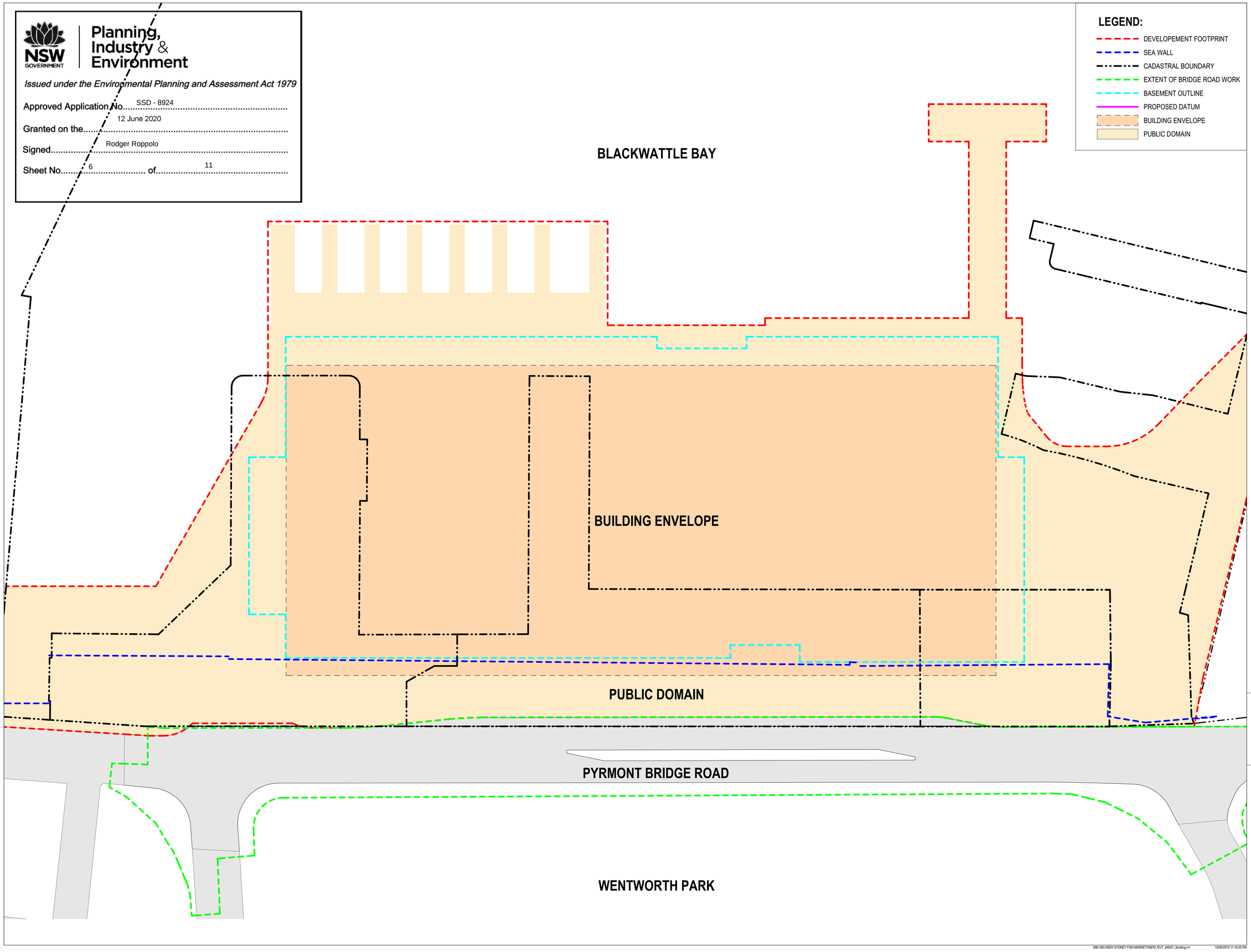
Approved Application No. SSD - 8924

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 6 of 11



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- SEA WALL
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- BASEMENT OUTLINE
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PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

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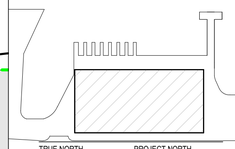

TRUE NORTH PROJECT NORTH

GRAPHIC SCALE
0 10000 25000
SCALE

As indicated@A1
STATUS

DRAWING

FLOOR PLAN GROUND

AR-S1-B10 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

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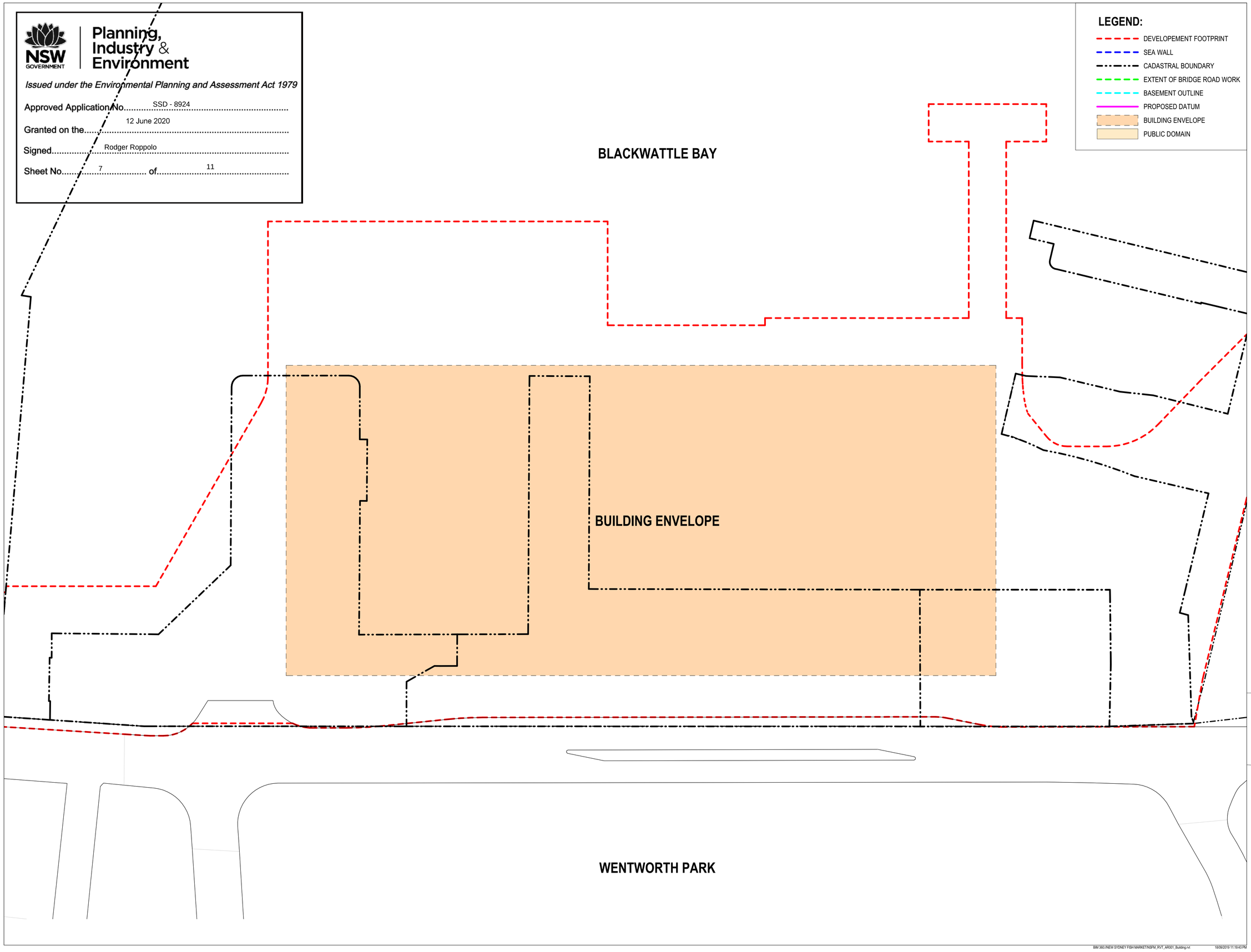
Sheet No. 7 of 11



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- SEA WALL
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NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

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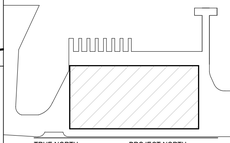

TRUE NORTH PROJECT NORTH

GRAPHIC SCALE
0 10000 25000
SCALE

As indicated@A1
STATUS

DRAWING

FLOOR PLAN UPPER GROUND

AR-S1-B10 L01-01 | ISSUE F

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Signed Rodger Roppolo

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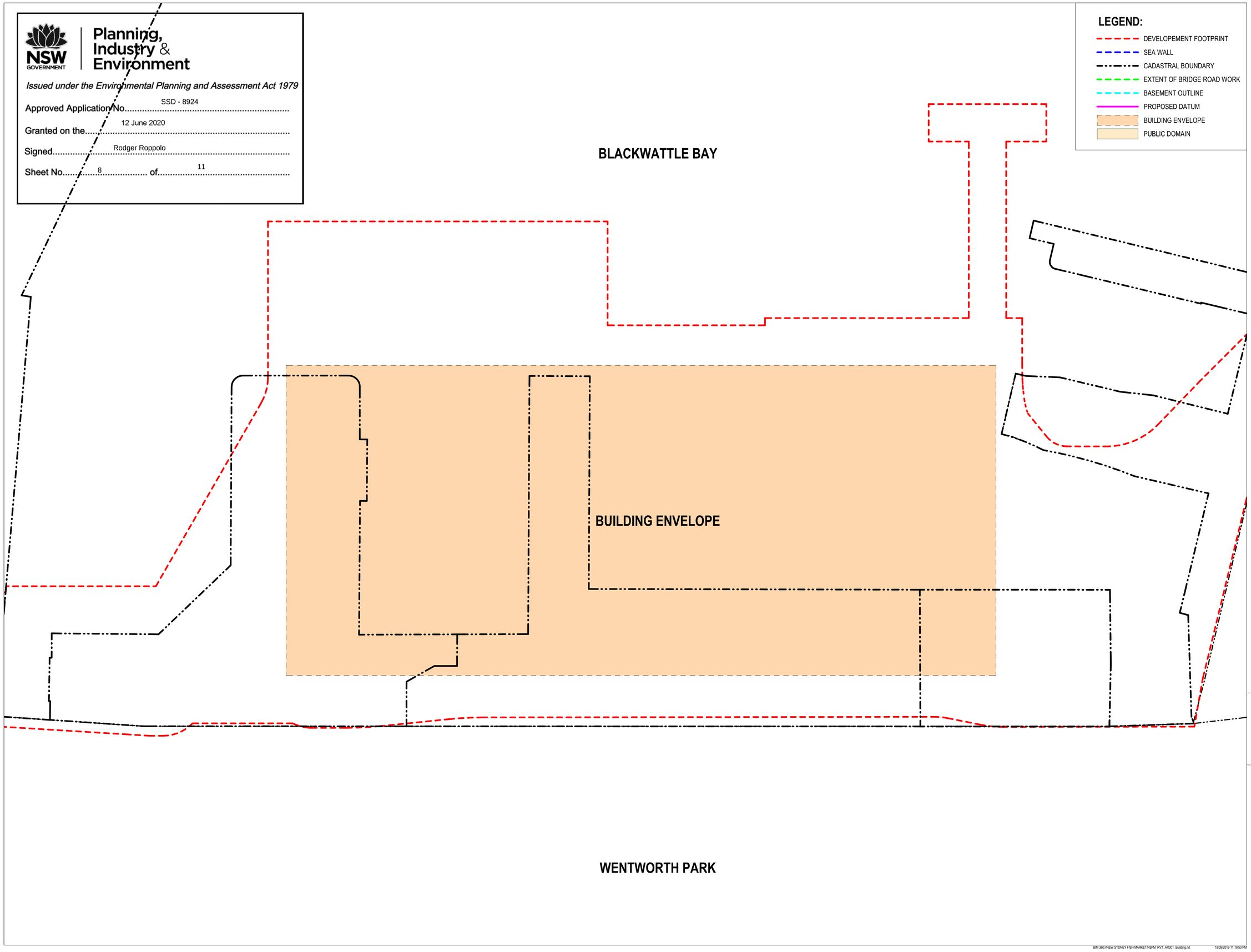

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CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

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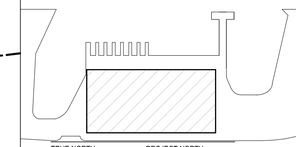

TRUE NORTH PROJECT NORTH

GRAPHIC SCALE
0 10000 25000
SCALE

As indicated@A1
STATUS

DRAWING

FLOOR PLAN MEZZANINE

AR-S1-B10 L02-01 | ISSUE F

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Approved Application No. SSD - 8924

Granted on the 1 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

3XN BVN

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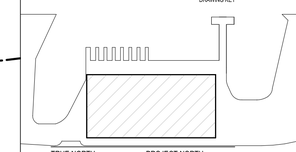

TRUE NORTH PROJECT NORTH

GRAPHIC SCALE

0 10000 25000

SCALE

As indicated@A1

STATUS

DRAWING

TOP OF BUILDING ENVELOPE

AR-S1-B10 L10-01 | ISSUE F

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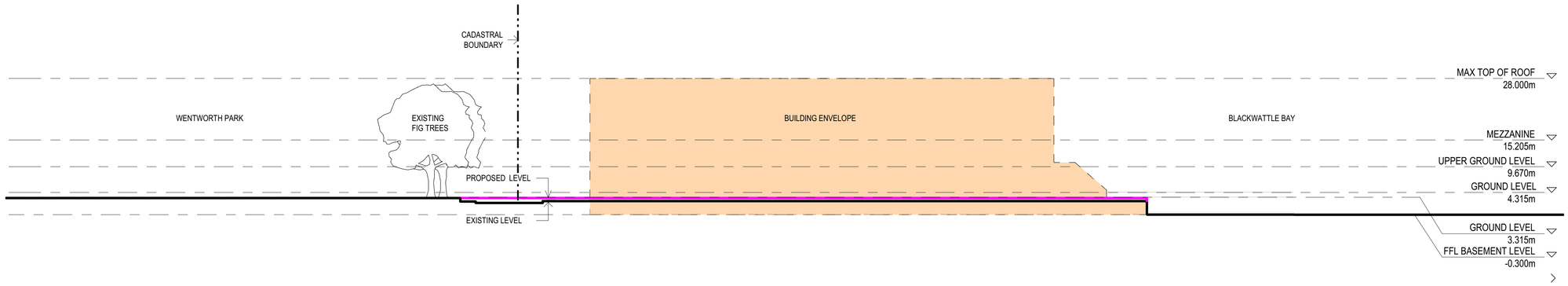
Approved Application No. SSD - 8924

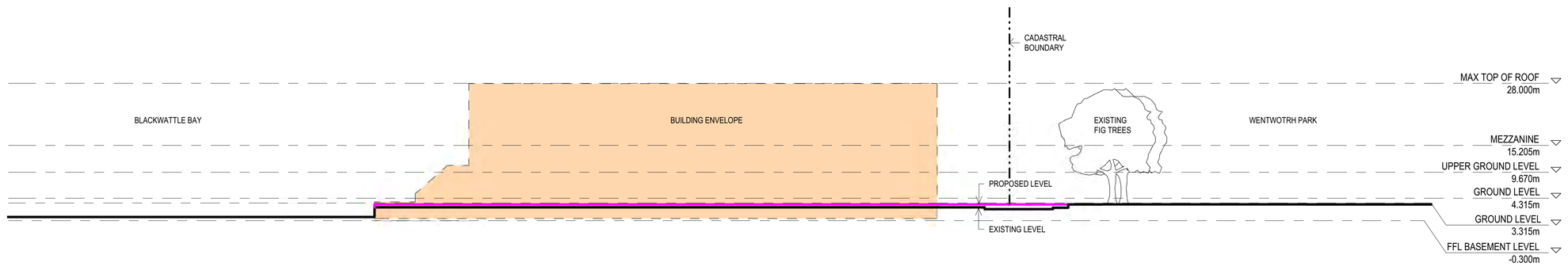
Granted on the 12 June 2020

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
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BVN PROJECT NUMBER

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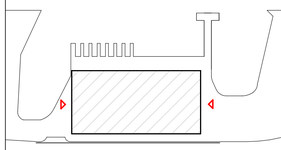
DRAWING KEY



GRAPHIC SCALE

0 10000 25000

SCALE

As indicated@A1

STATUS

DRAWING

EAST & WEST ELEVATION

ISSUE

AR-S1-C10 AAA-01 F

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Sheet No. 11 of 11

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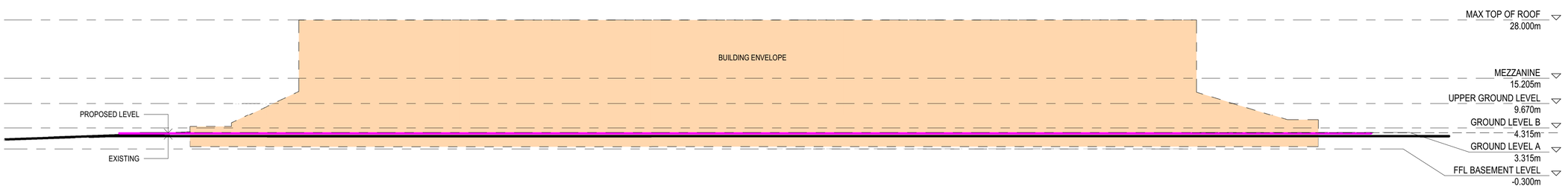
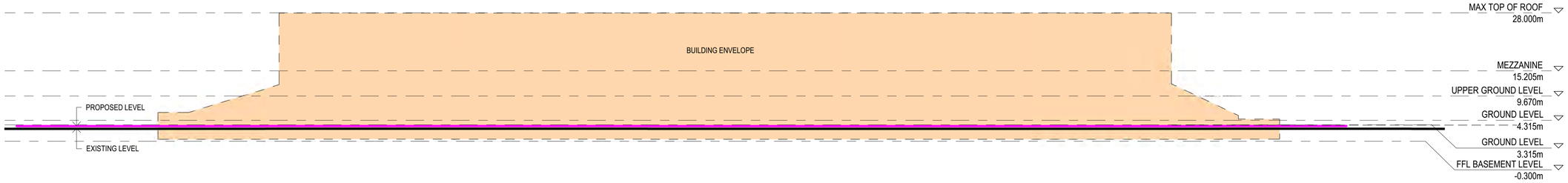


1 NORTH ELEVATION



2 SOUTH ELEVATION

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F	18/09/19	ISSUE FOR SSDA

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CLIENT NUMBER

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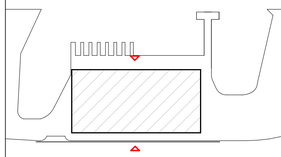
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



GRAPHIC SCALE

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SCALE

As indicated@A1

STATUS

DRAWING

NORTH & SOUTH ELEVATION

ISSUE

AR-S1-C10 AAA-02 F

BIM 360:\NEW SYDNEY FISH MARKET\NSFM_RVT_AR001_Building.rvt 18/09/2019 11:20:36 PM

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

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Approved Application No.....SSD - 8925.....

Granted on the.....12 June 2020.....

Signed.....Rodger Rappolo.....

Sheet No.....1..... of.....44.....

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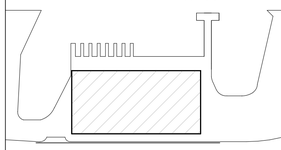
PROJECT

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

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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

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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
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STATUS

DRAWING

SITE SURVEY

AR-S2-A20 AAA-01 | ISSUE H

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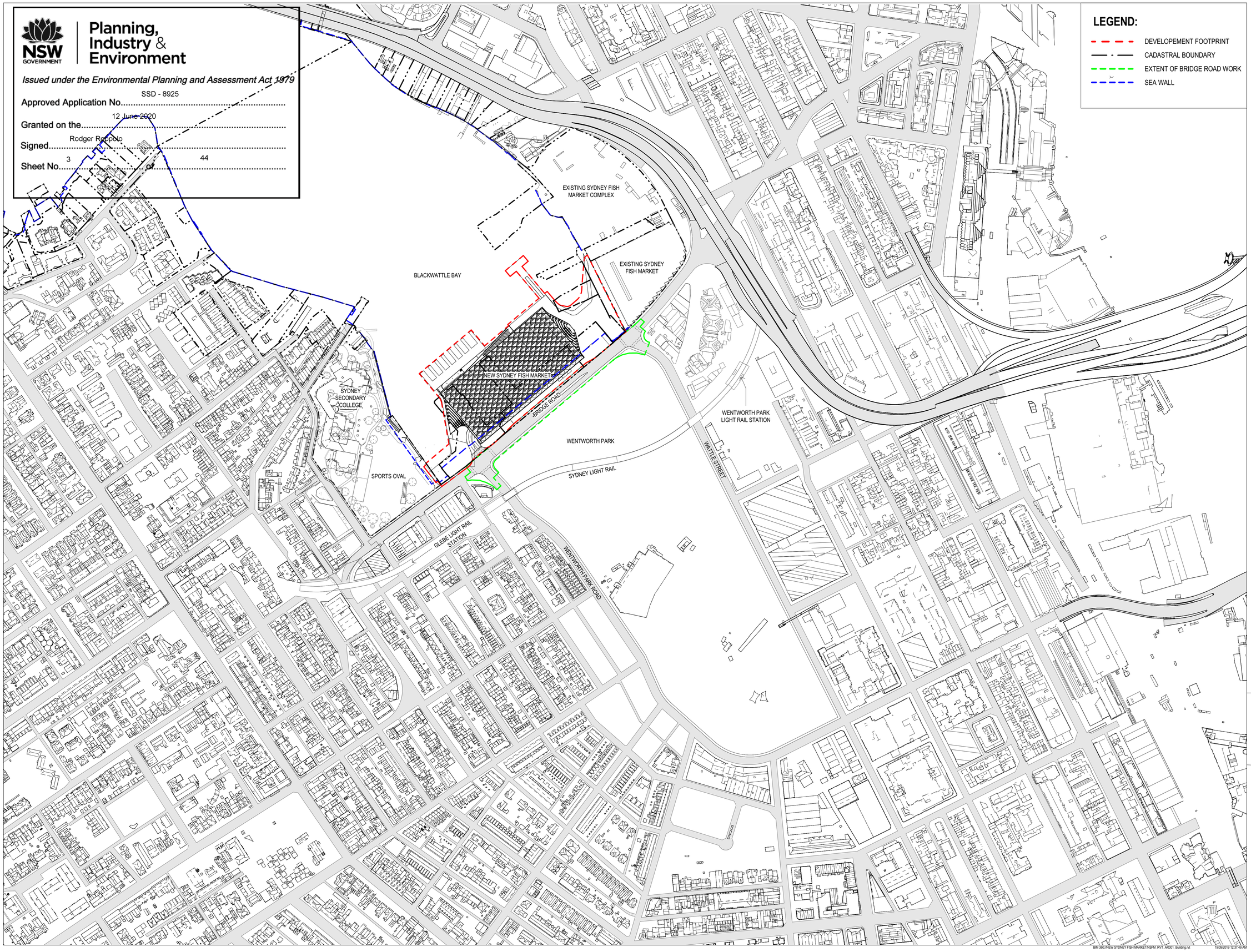

LEGEND:

- DEVELOPEMENT FOOTPRINT
- CADASTRAL BOUNDARY
- EXTENT OF BRIDGE ROAD WORK
- SEA WALL

3XN BVN

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BVN PROJECT NUMBER

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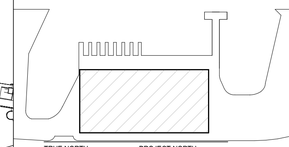

TRUE NORTH PROJECT NORTH

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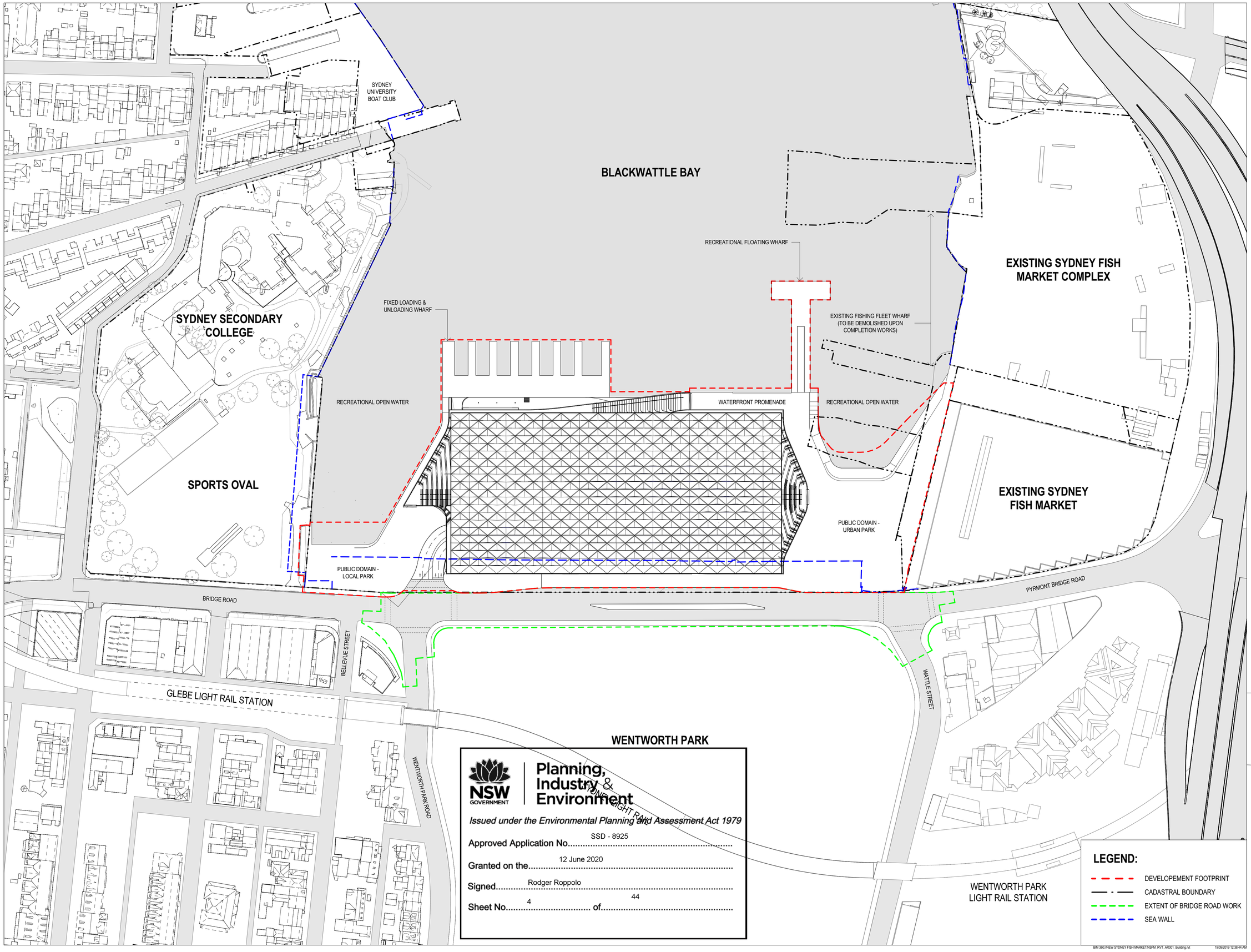
LOCALITY / CONTEXT PLAN

ISSUE

AR-S2-A20 AAA-02 H



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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

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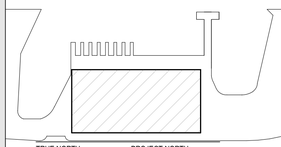

TRUE NORTH PROJECT NORTH

GRAPHIC SCALE
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SCALE

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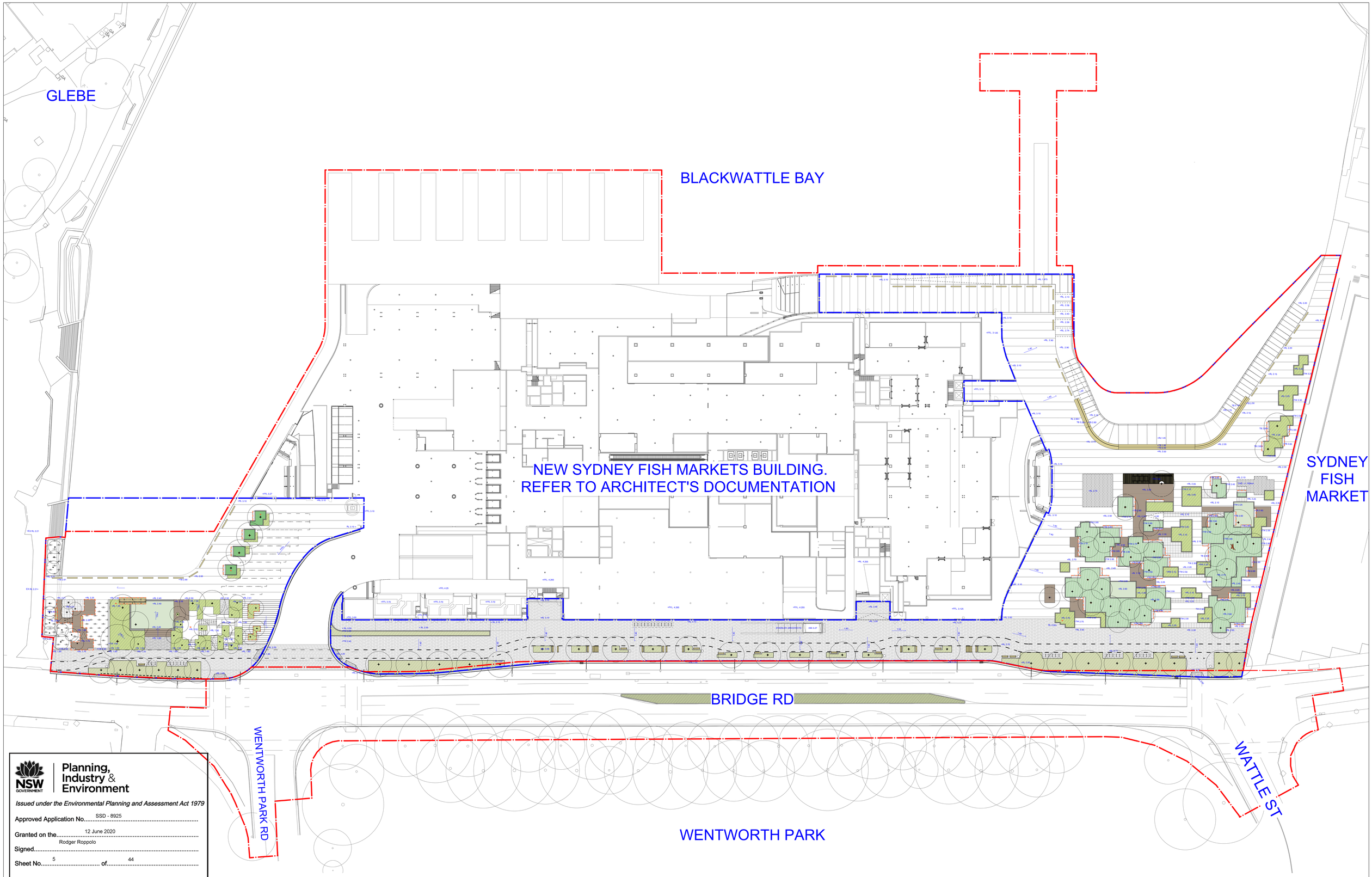
STATUS

DRAWING

SITE PLAN

AR-S2-A20 AAA-03 | ISSUE H



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Rodger Roppolo

Signed.....

Sheet No. 5 of 44

WARNING

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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.

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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 coordination with Bridge Road upgrade.
- 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 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
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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

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AECOM — SERVICES, 420 George St, Sydney NSW 2000, T +61 2 8934 0000

Cardno — HYDRAULICS, 515 St Paul's Tce, Brisbane QLD 4006, T +61 7 3369 9822

ASPECT Studios

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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
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.

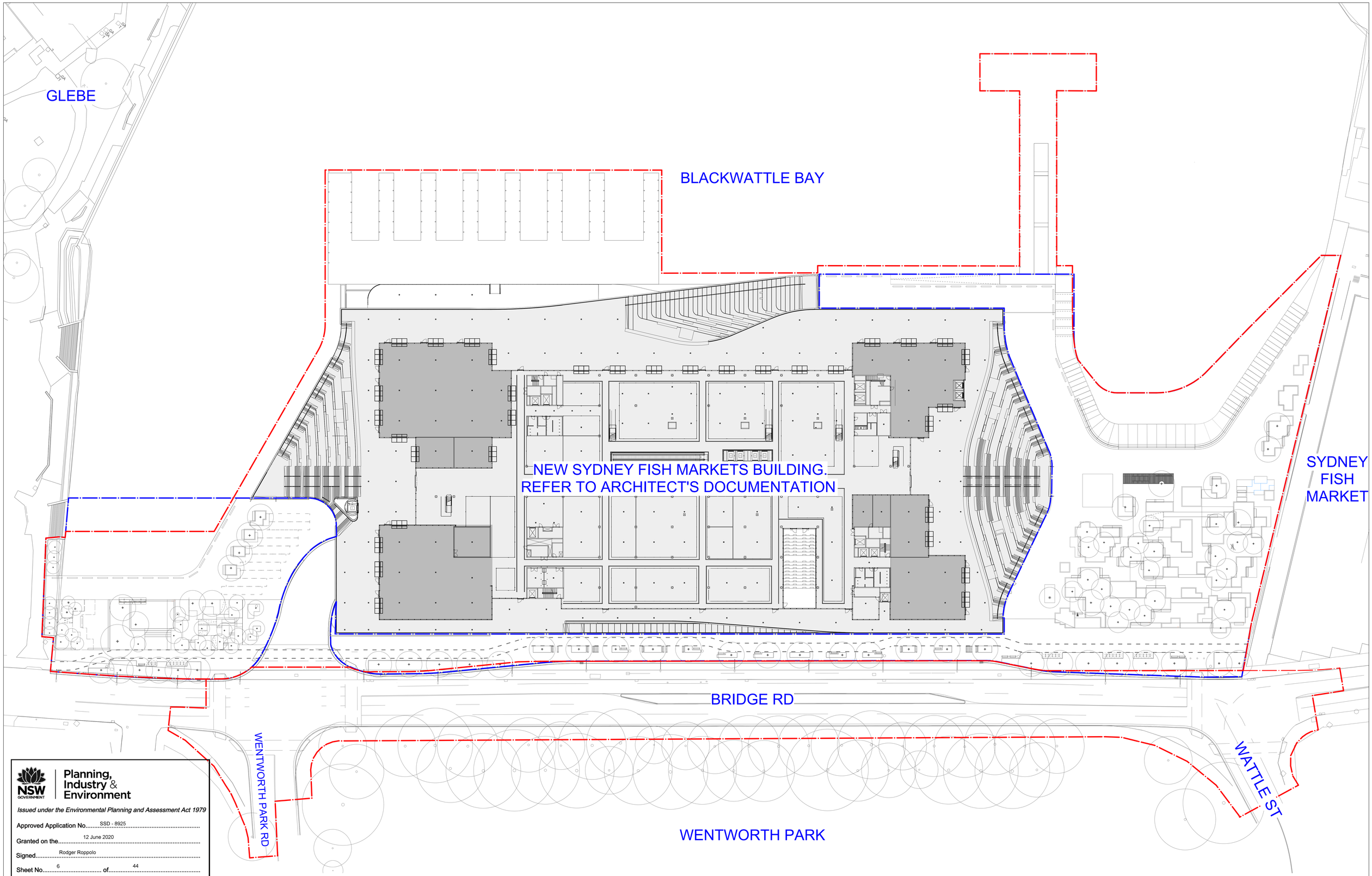
STATUS
Tender Documentation
PRELIMINARY
NOT FOR CONSTRUCTION

DRAWING
MASTERPLAN

DRAWING NO. AR-S2-A20 L01-01

REVISION G

S17004S5_PRODUCTION\01_Phase01_CAD\Package Files\



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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 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

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ABN 11 120 219 561

PROJECT S17004
NEW SYDNEY FISH MARKET
1B Bridge Road, Glebe, NSW

CLIENT
Infrastructure New South Wales

NORTH

SCALE A0 | SCALE A2
NOT TO SCALE

DRAWN | CHECKED
AT | TL | 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

S17004S5_PRODUCTION\01_Phase01_CAD\Package Files\

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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	
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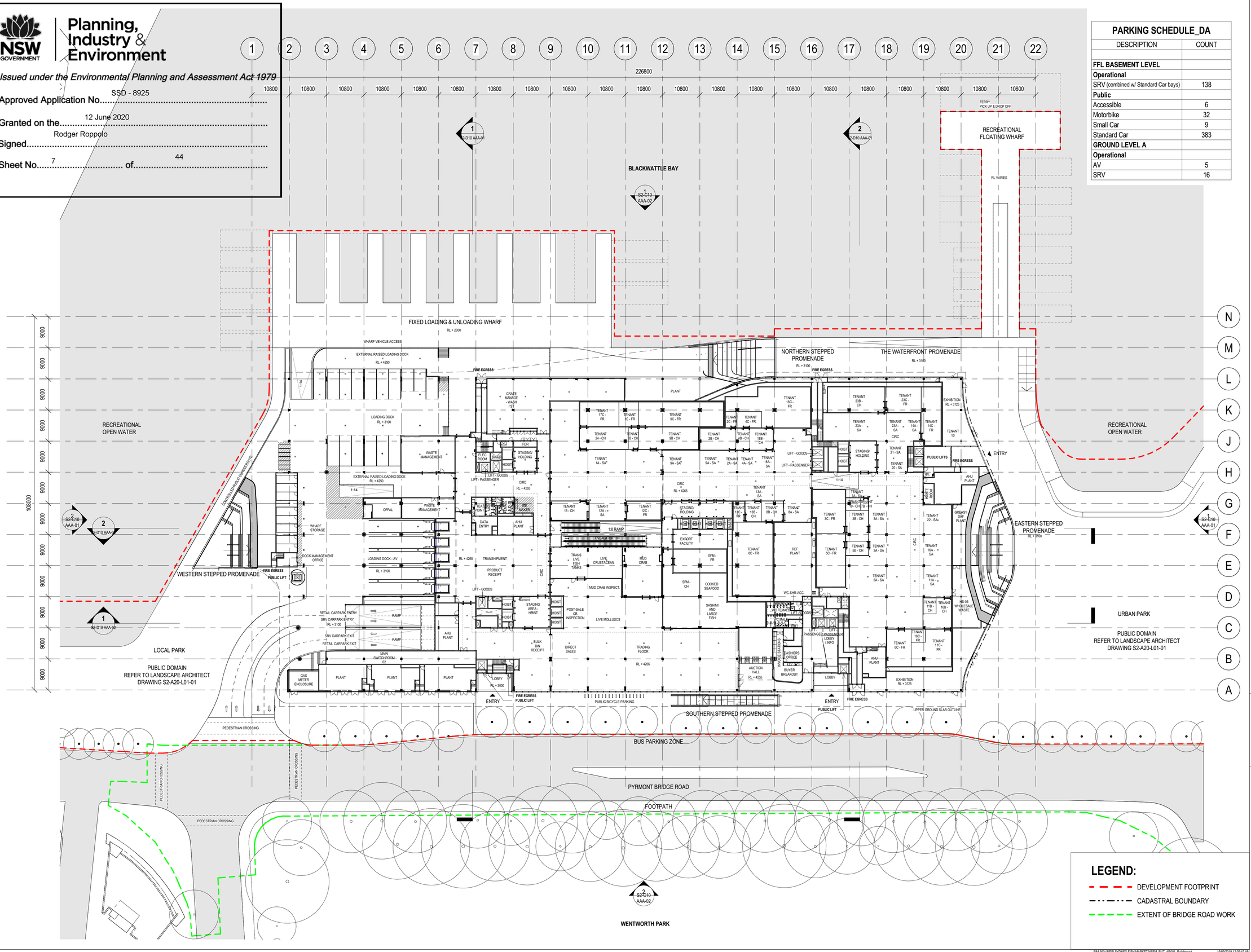
SRV (combined w/ Standard Car bays)	138
Public	
Accessible	6
Motorbike	32
Small Car	9
Standard Car	383
GROUND LEVEL A	
Operational	
AV	5
SRV	16



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

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G	27/08/19	ISSUED FOR REVIEW
H	18/09/19	ISSUE FOR SSDA

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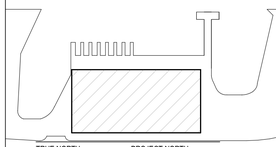
NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



TRUE NORTH PROJECT NORTH

GRAPHIC SCALE

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SCALE

As indicated@A1

STATUS

DRAWING

FLOOR PLAN GROUND

ISSUE

AR-S2-B10 L00-01 H

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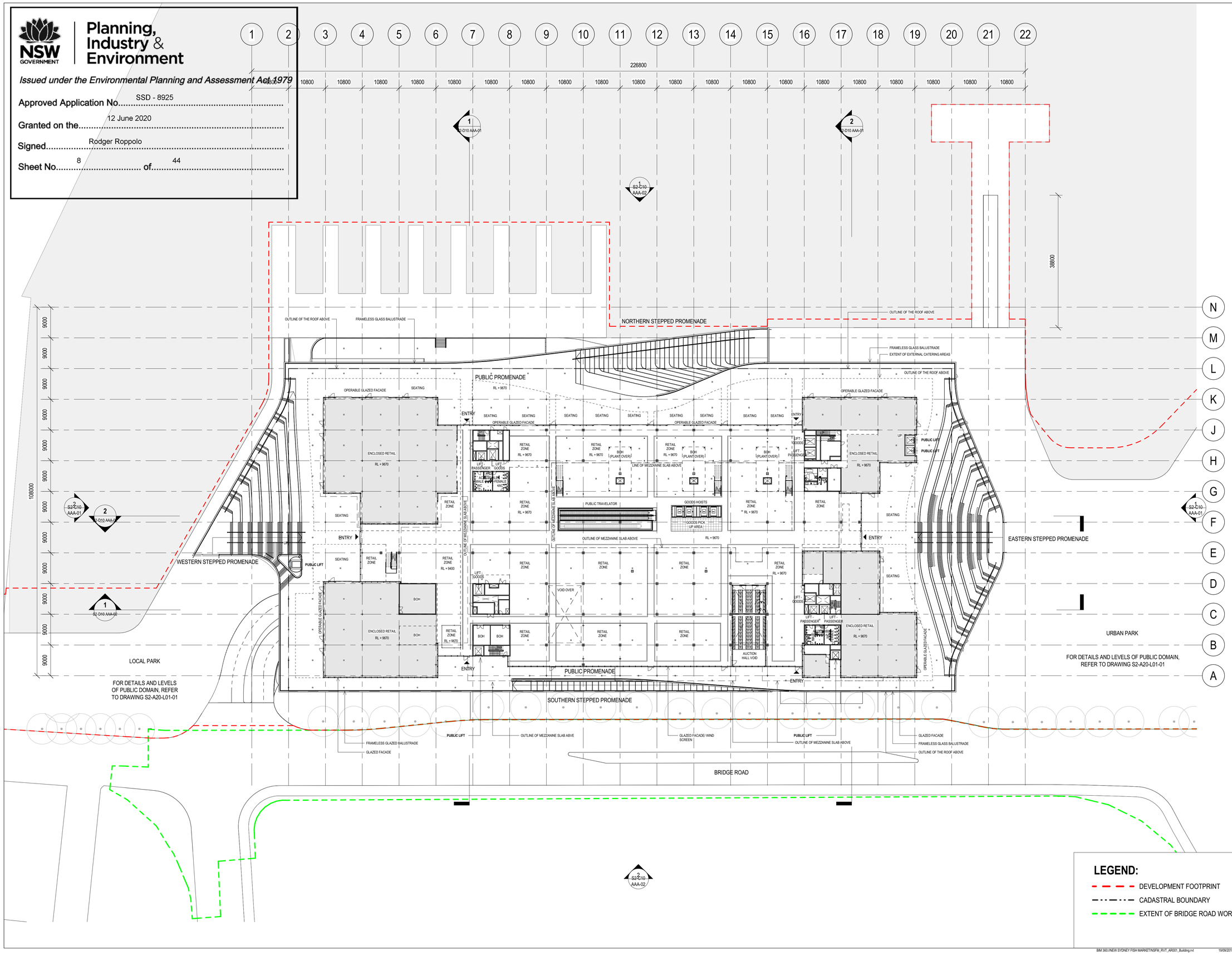

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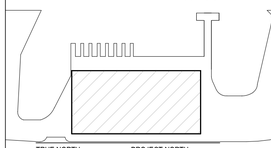

TRUE NORTH PROJECT NORTH

GRAPHIC SCALE

0 10000 25000

SCALE

As indicated@A1

STATUS

DRAWING

FLOOR PLAN UPPER GROUND

	ISSUE
AR-S2-B10 L01-01	H

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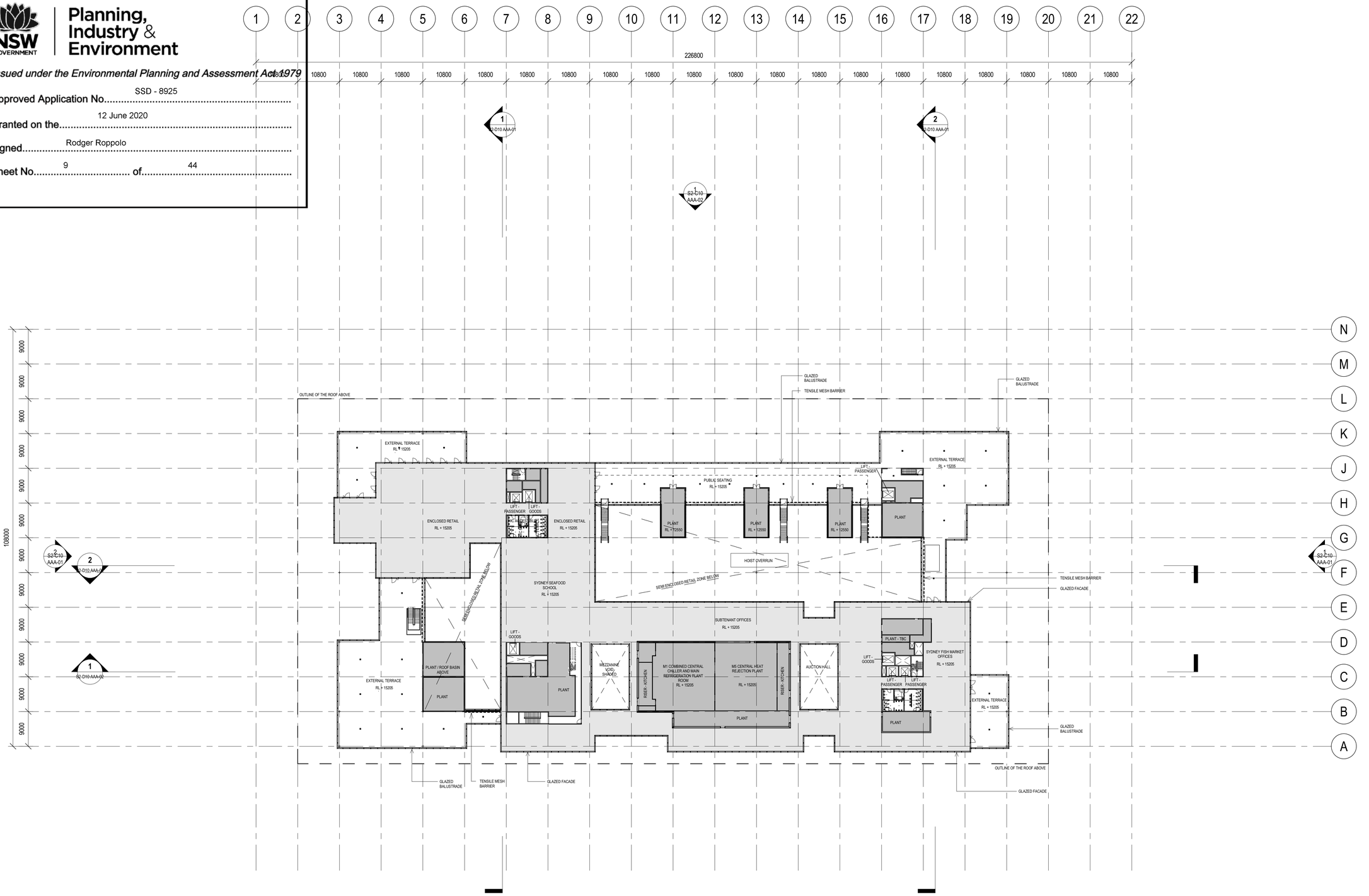

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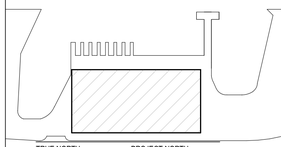

TRUE NORTH PROJECT NORTH

GRAPHIC SCALE

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SCALE

1 : 500@A1

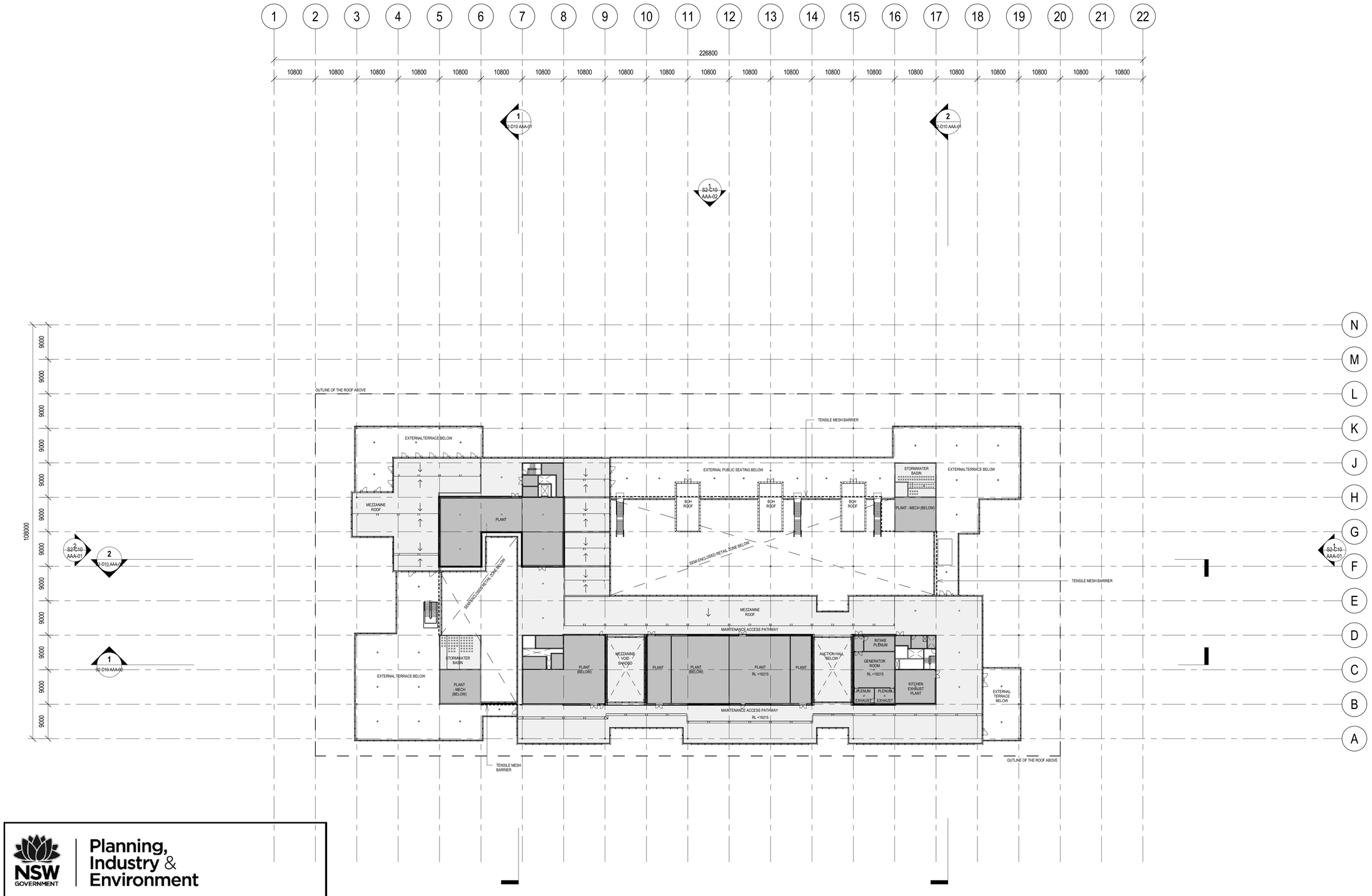
STATUS

DRAWING

FLOOR PLAN MEZZANINE

ISSUE

AR-S2-B10 L02-01 H



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Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 10 of 44

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CONSULTANT

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PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

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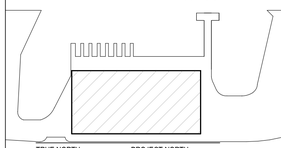

TRUE NORTH PROJECT NORTH

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SCALE

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STATUS

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ISSUE

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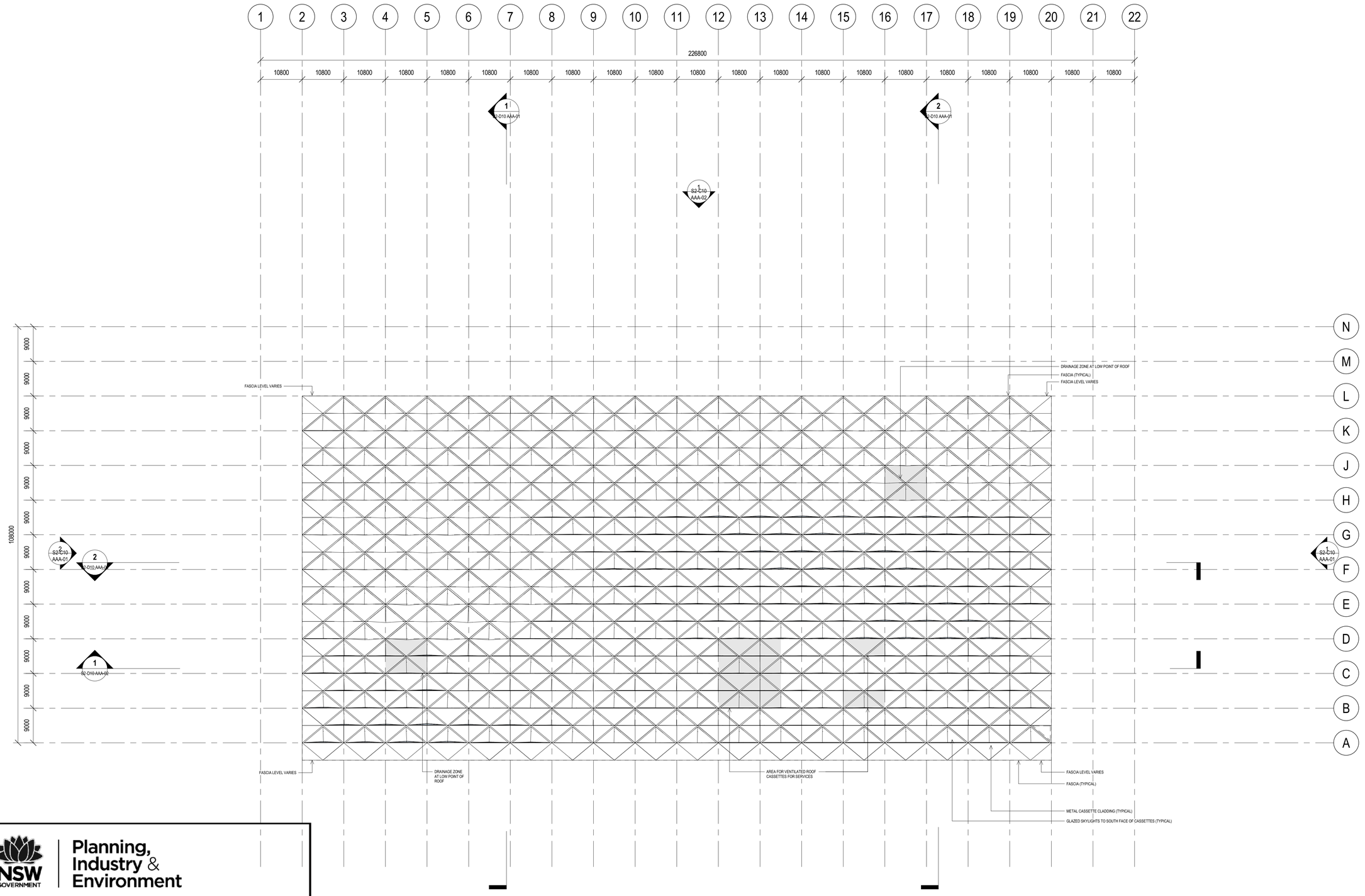

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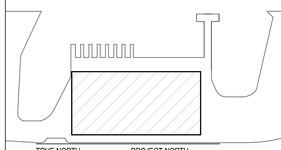

TRUE NORTH PROJECT NORTH

GRAPHIC SCALE
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SCALE
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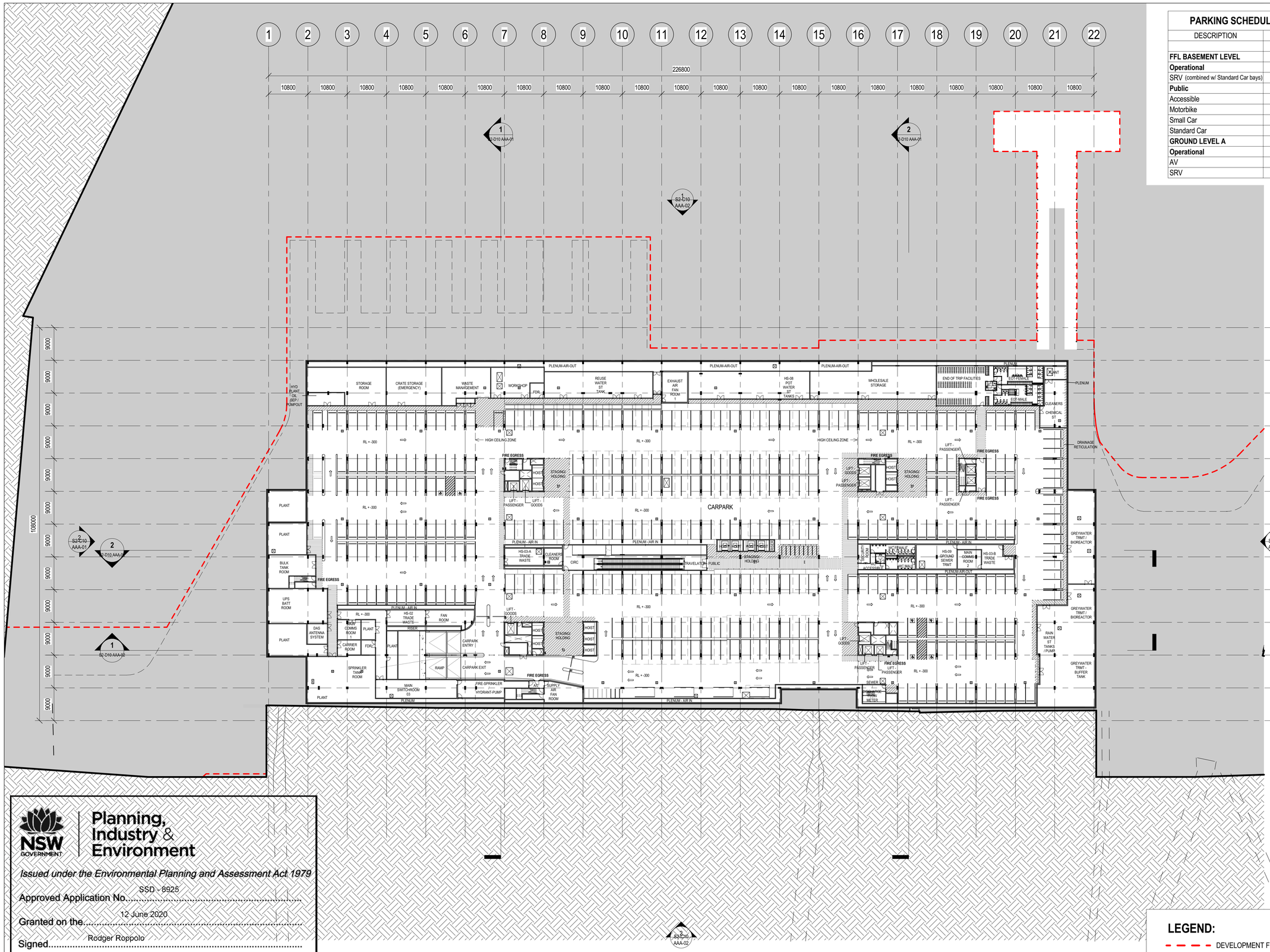
STATUS

DRAWING

ROOF PLAN

AR-S2-B10 L10-01 | ISSUE H



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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

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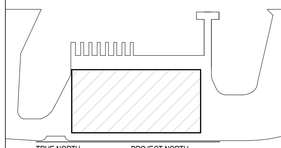
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



TRUE NORTH PROJECT NORTH

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SCALE
As indicated@A1

STATUS

DRAWING

FLOOR PLAN BASEMENT

AR-S2-B10 LB1-01 | ISSUE H

NSW GOVERNMENT | Planning, Industry & Environment

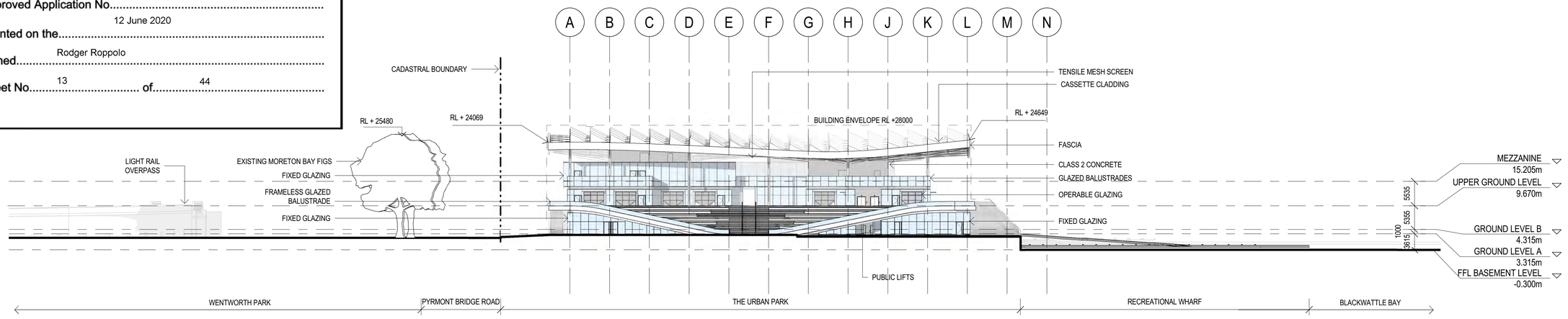
Issued under the Environmental Planning and Assessment Act 1979

Approved Application No. SSD - 8925

Granted on the. 12 June 2020

Signed. Rodger Roppolo

Sheet No. 13 of 44



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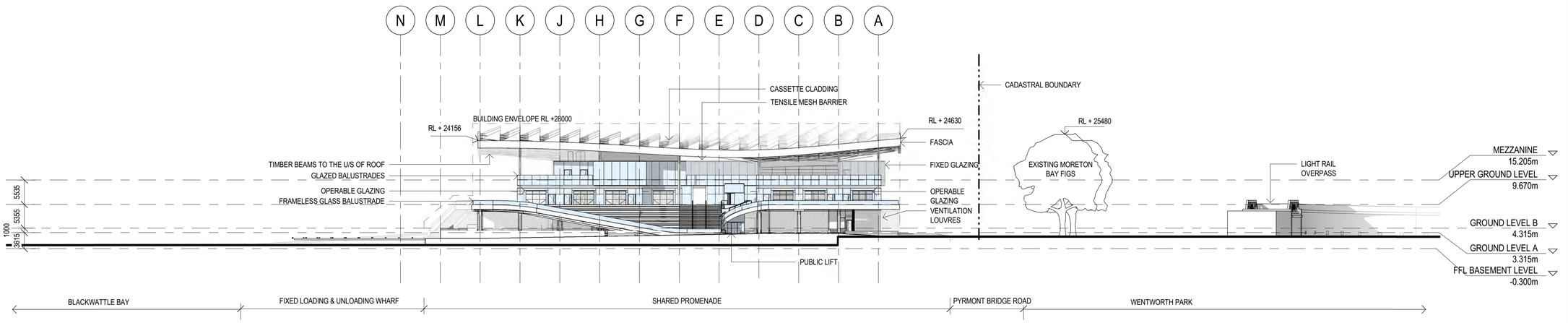

2 S2 - WEST ELEVATION

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
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WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
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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

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CONSULTANT

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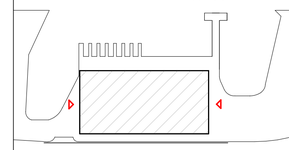
INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

DRAWING KEY



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STATUS

DRAWING

EAST AND WEST ELEVATION

ISSUE

AR-S2-C10 AAA-01 H

BIM 360:/NEW SYDNEY FISH MARKET/NSFM_RVT_AR001_Building.rvt 19/09/2019 11:51:31 AM

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SSD - 8925

Approved Application No......

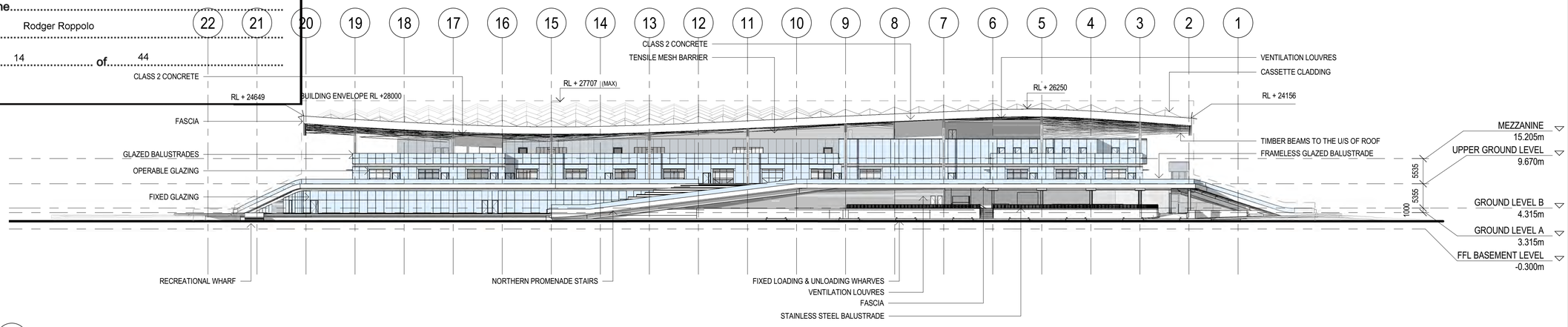
12 June 2020

Granted on the.....

Rodger Roppolo

Signed.....

Sheet No. 14 **of.** 44



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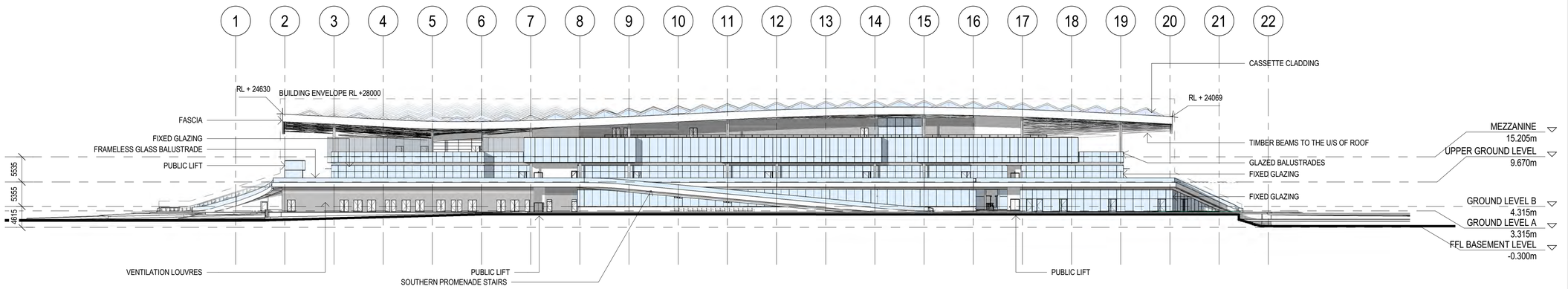

2 S2 - SOUTH ELEVATION

3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
DARLINGHURST, NSW 2010

BVN
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WWW.BVN.COM.AU
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FACADE ENGINEER - APEX
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PROJECT MANAGER

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INFRASTRUCTURE NSW
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PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

1611013

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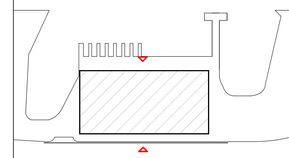

GRAPHIC SCALE

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SCALE

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STATUS

DRAWING

NORTH AND SOUTH ELEVATION

ISSUE

AR-S2-C10 AAA-02 H

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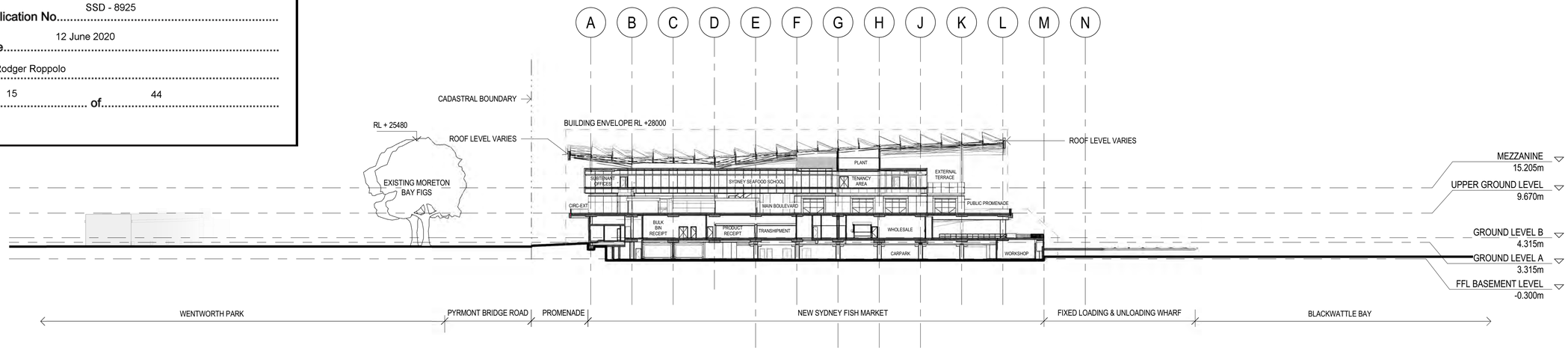
Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 15 of 44



1 S2_SECTION BB

2 S2_SECTION DD

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3XN BVN

3XN
TEL +45 7026 2648
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1B BRIDGE RD, GLEBE NSW
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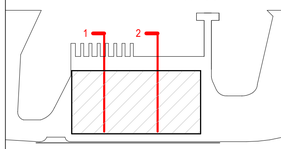

GRAPHIC SCALE

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STATUS

DRAWING

CROSS SECTIONS

	ISSUE
AR-S2-D10 AAA-01	H

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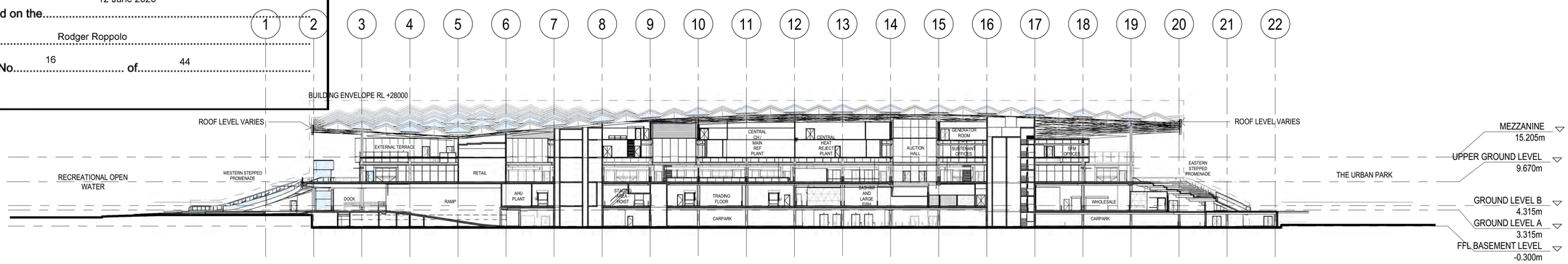
Signed Rodger Roppolo

Sheet No. 16 of 44



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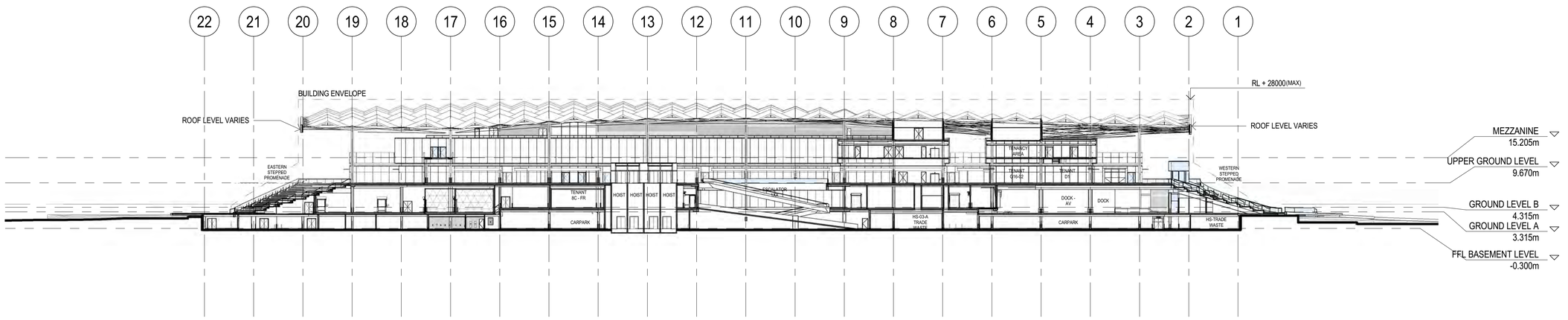

2 S2_SECTION CC

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3XN BVN

3XN
TEL +45 7026 2648
WWW.3XN.COM
ADD 19A BOUNDARY STREET SUITE 509,
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WWW.BVN.COM.AU
ADD LEVEL 11, 255 PITT STREET,
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INFRASTRUCTURE NSW
CLIENT NUMBER

TEL +61 (0) 2 9216 5700
PROJECT

NEW SYDNEY FISH MARKET
1B BRIDGE RD, GLEBE NSW
BVN PROJECT NUMBER

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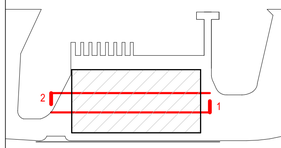

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LONG SECTIONS

ISSUE

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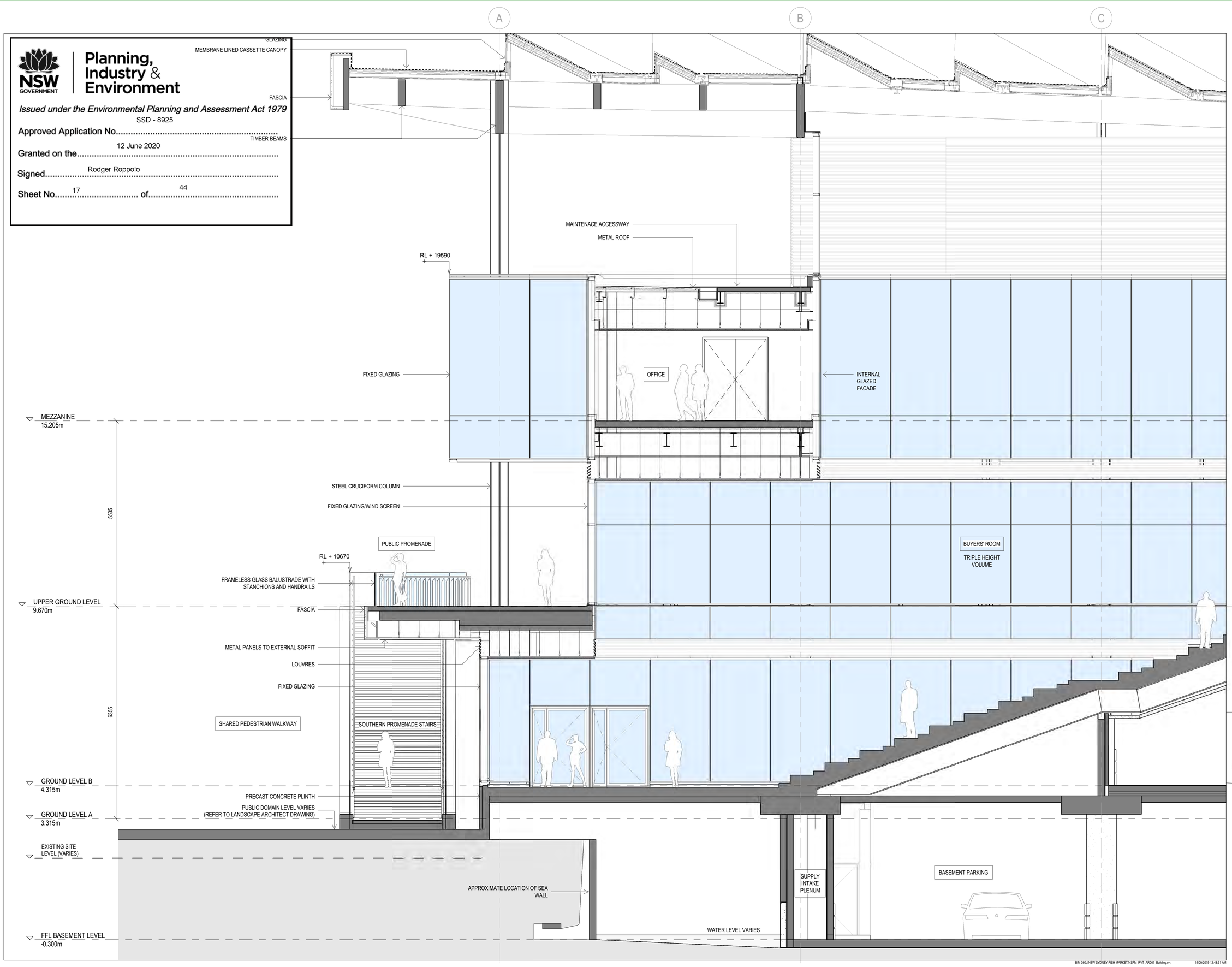

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Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

SSD - 8925

Approved Application No.....

Granted on the..... 12 June 2020

Signed..... Rodger Roppolo

Sheet No..... 17 of..... 44

3XN BVN

3XN
TEL +45 7026 2648
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ADD 19A BOUNDARY STREET SUITE 509,
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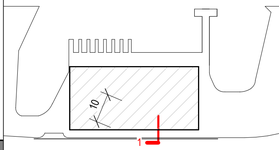

GRAPHIC SCALE

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SCALE

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STATUS

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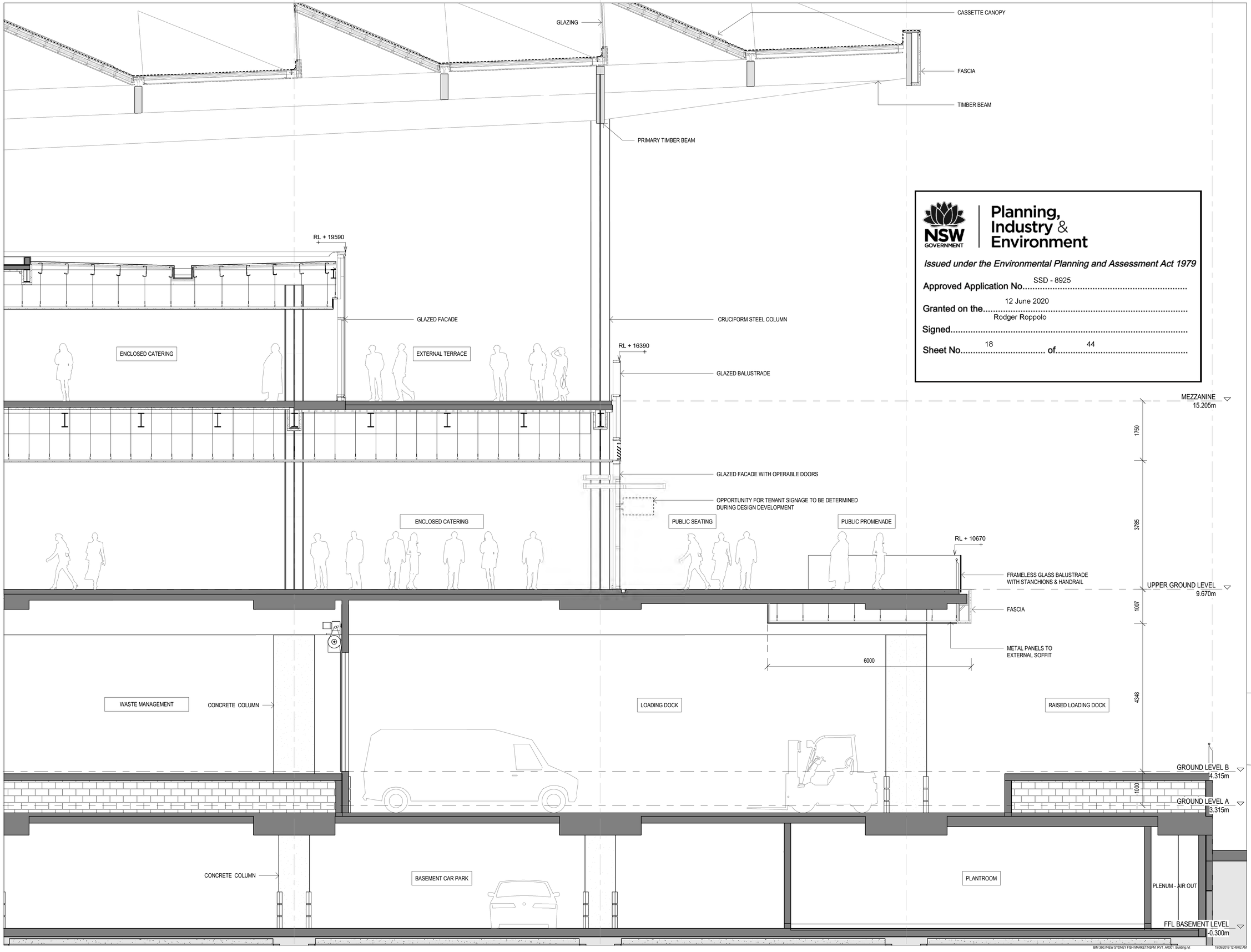
AUCTION & OFFICE SECTION

AR-S2-E43 AAA-01 | ISSUE H

J K L M



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Sheet No. 18 of 44

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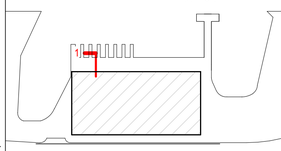

GRAPHIC SCALE

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

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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

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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
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CONSULTANT

BCA/DDA - GROUP DLA
TEL +61 (0) 2 8355 3160
PROJECT MANAGER

THELEM CONSULTING
TEL +61 (0) 2 9188 9606
CLIENT

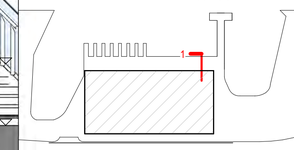
INFRASTRUCTURE NSW
CLIENT NUMBER

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

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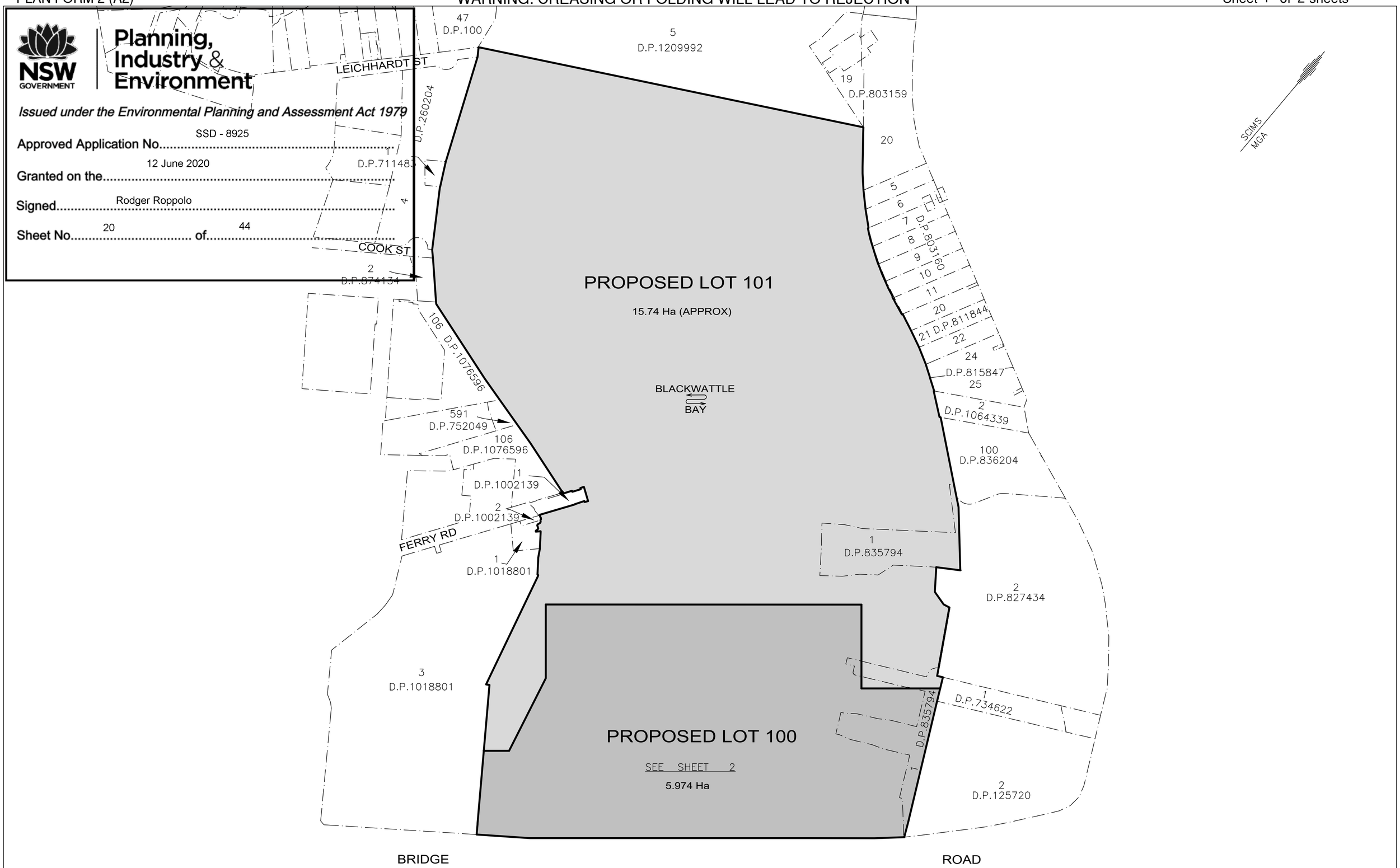
Sheet No. 20 of 44



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

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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

BLACKWATTLE BAY

100
D.P.836204

1
D.P.835794

2
D.P.827434

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

2.86

9.95

BRIDGE

ROAD

THIS PLAN HAS BEEN PREPARED FOR CONCEPT PURPOSES ONLY.
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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

PLAN FORM 2 (A2)

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

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Sheet No. 22 of 44

106
D.P.1076596

FERRY RD

2 D.P.1002139

1 D.P.1002139

1 D.P.1018801

3
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

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

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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

1
D.P.835794

2
D.P.827434

NSW GOVERNMENT | Planning, Industry & Environment

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Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 23 of 44

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.
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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

101
D.P.

SCIMS
MGA

100
D.P.836204

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Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 24 of 44

D.P.835794

2
D.P.827434

BLACKWATTLE BAY

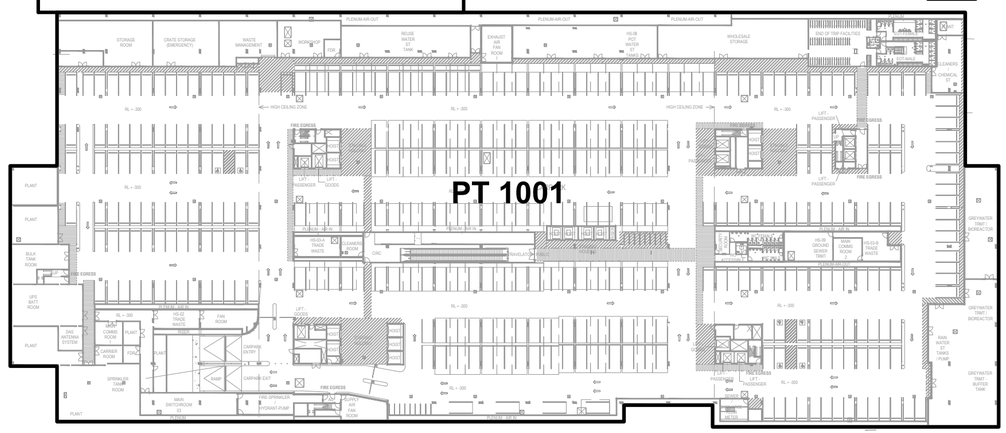
1001 - PREMISES
1002 - LOADING WHARF
1003 - RECREATIONAL WHARF
1004 - RESIDUE
1005 - PREMISES RESIDUE
1006 - LOADING WHARF RESIDUE
1007 - RECREATIONAL WHARF RESIDUE

3
D.P.1018801

PT 1004

PT 1007

PT 1006



1 D.P.835794

1
D.P.734622

2
D.P.125720

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 WHARF ABOVE & IS LIMITED IN DEPTH TO THE SLAB OF THE FLOOR THEREOF

LOT 1007 IS LIMITED IN HEIGHT TO THE WHARF ABOVE & IS LIMITED IN DEPTH TO THE SLAB OF THE FLOOR THEREOF

BRIDGE ROAD

BASEMENT FLOOR

THIS PLAN HAS BEEN PREPARED FOR CONCEPT PURPOSES ONLY.
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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

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

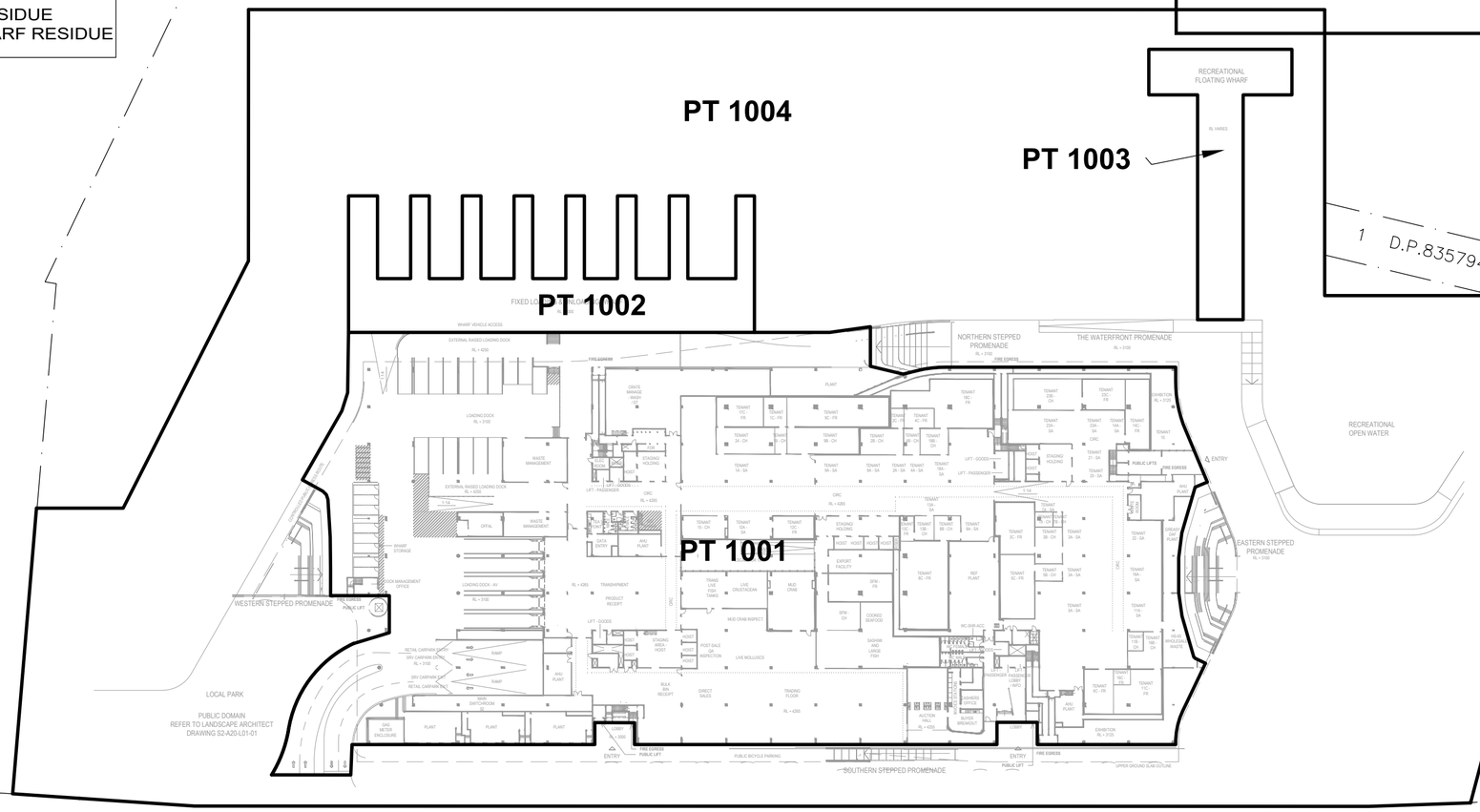
3
D.P.1018801

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



BRIDGE

ROAD

GROUND FLOOR

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Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 25 of 44

1
D.P.835794

1
D.P.734622

2
D.P.125720

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

3
D.P.1018801

101
D.P.

BLACKWATTLE
BAY

SCIMS
MGA

100
D.P.836204

D.P.835794

2
D.P.827434

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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

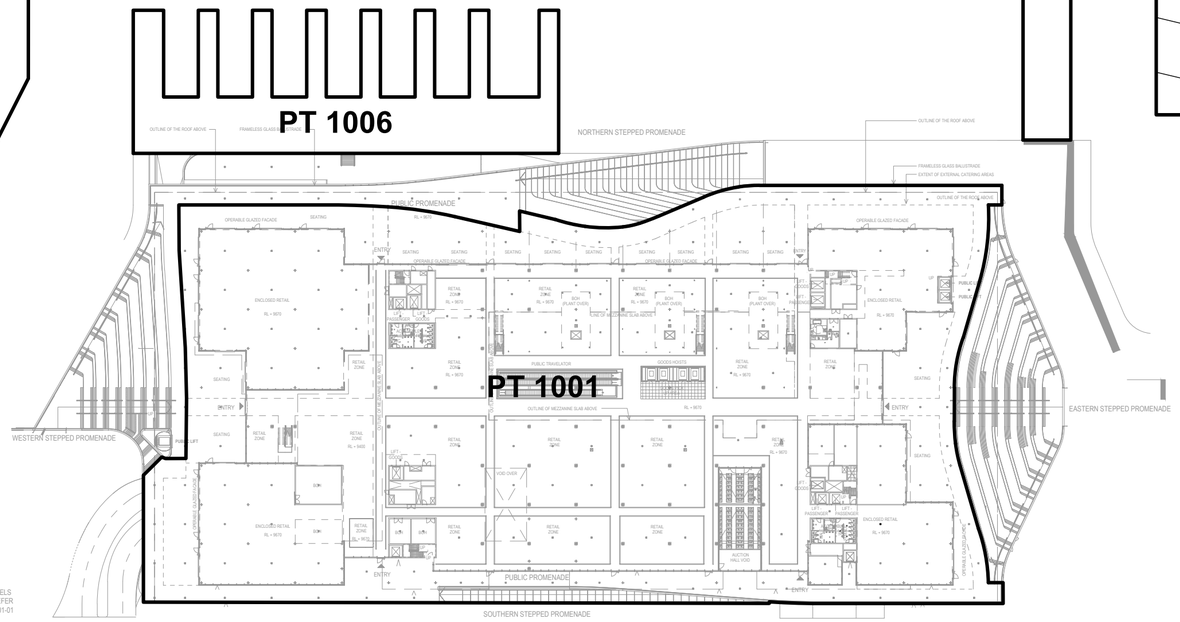
LOT 1007 IS LIMITED IN HEIGHT TO THE SLAB OF THE FLOOR ABOVE & IS LIMITED IN DEPTH TO THE SLAB OF THE FLOOR THEREOF

PT 1004

PT 1007

PT 1006

PT 1001



1
D.P.835794

1
D.P.734622

2
D.P.125720

BRIDGE

ROAD

UPPER GROUND FLOOR

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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

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

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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

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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

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Sheet No. 28 of 44

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

1 D.P.835794

1
D.P.734622

PT 1005

2
D.P.125720

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

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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

Planning, Industry & Environment

NSW GOVERNMENT

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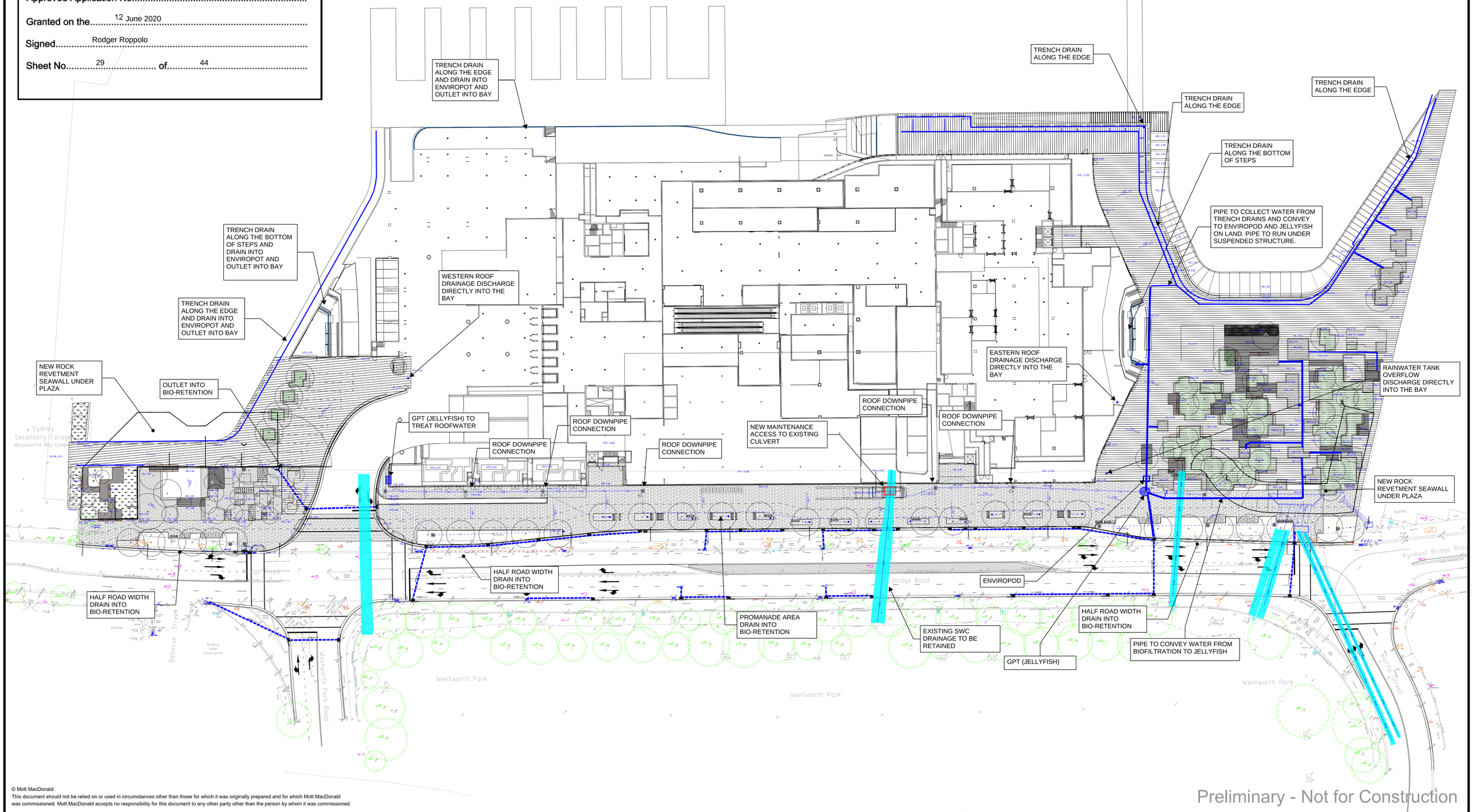
Approved Application No. SSD - 8925

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



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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

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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

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Granted on the 12 June 2020

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Sheet No. 30 of 44

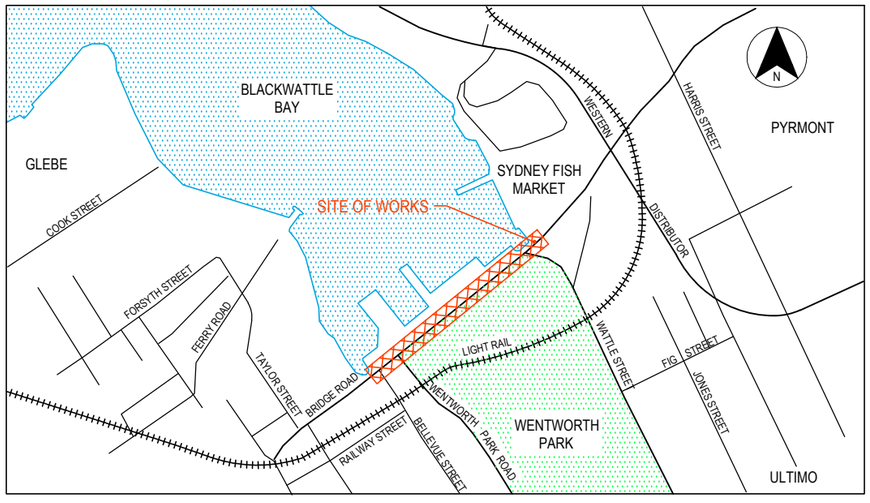
UrbanGrowth NSW Development Corporation

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

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DRAWING FILE LOCATION / NAME
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LINEAR REFERENCING
START: END:

PLOT DATE / TIME 9/25/2019 5:22:45 PM
PLOT BY JED64037

CLIENT
UrbanGrowth NSW Development Corporation

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

ULTIMO - CITY OF SYDNEY
MR 00000 - BRIDGE STREET
SYDNEY FISH MARKET
BRIDGE ROAD UPGRADE
FROM WATTLE STREET TO WENTWORTH PARK ROAD
COVER SHEET

A3

RMS REGISTRATION No. DS2018/XXXXXX
PART 01
ISSUE STATUS CONCEPT DESIGN
EDMS No.
SHEET No. GE-0001
ISSUE 1

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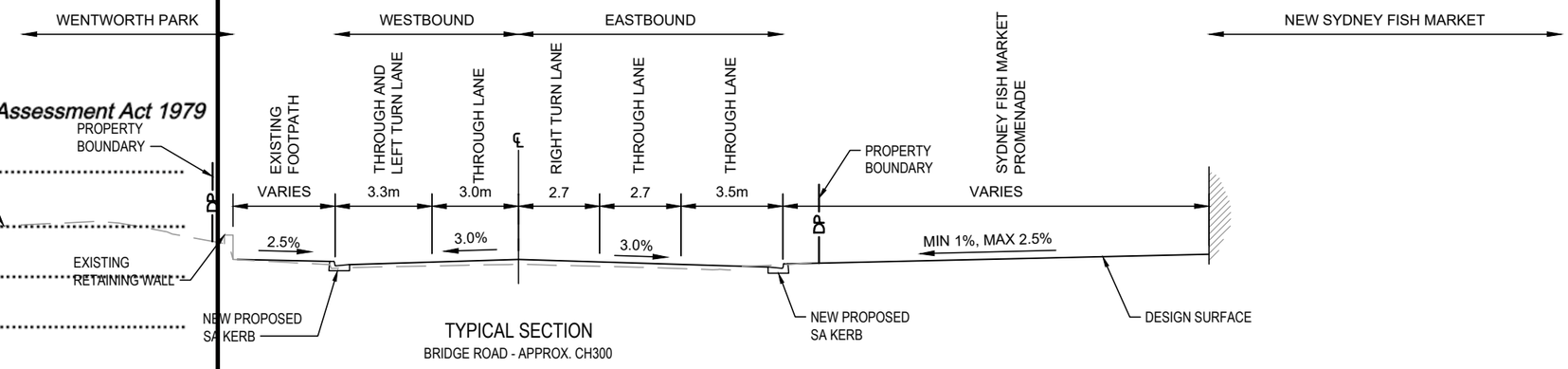
Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 31 of 44



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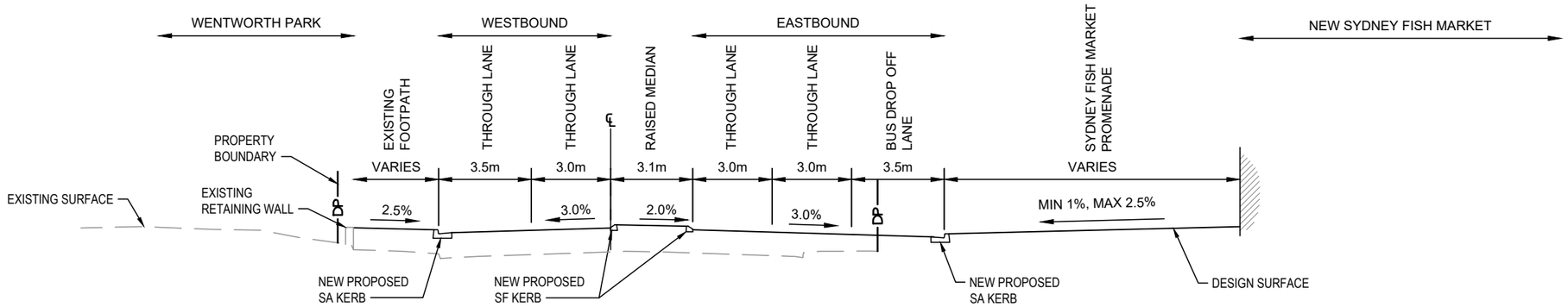
BRIDGE ROAD - APPROX. CH300



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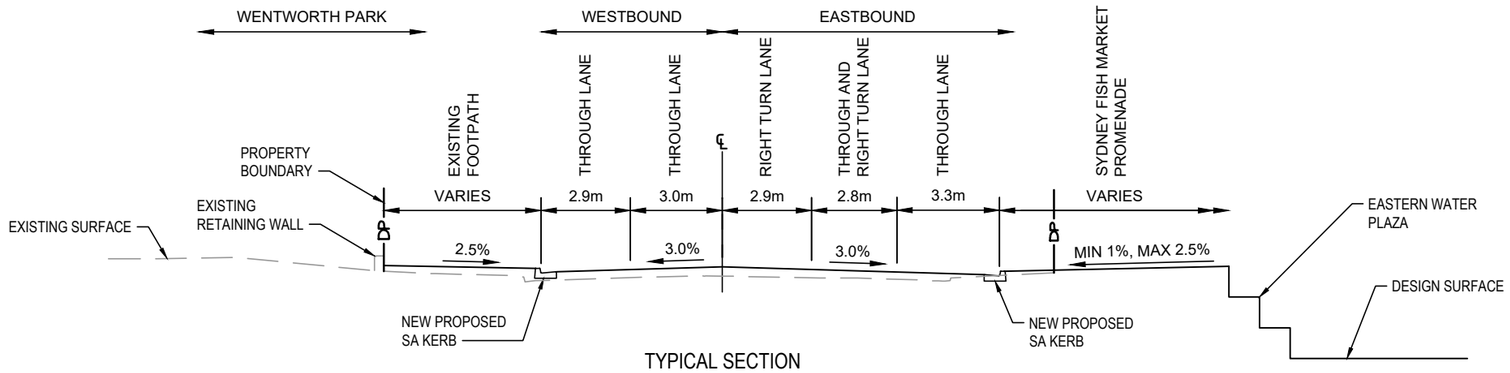

TYPICAL SECTION
BRIDGE ROAD - APPROX. CH80

SSD -

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50mm ON A3 SIZE ORIGINAL

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EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL	SCALES ON A3 SIZE DRAWING	DRAWINGS / DESIGN PREPARED BY	TITLE	NAME	DATE	PREPARED FOR: URBAN GROWTH	A3
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	1	25.09.2019	RE-ISSUED FOR CONCEPT DESIGN		B.SOO			DRG CHECK	B.SOO	25.09.19		
						CO-ORDINATE SYSTEM: MGA ZONE 56 — HEIGHT DATUM: AHD	MM DRAWING NUMBER: CI-RD1-D10 RD-0011	DESIGN	GA.PACIBEN	25.09.19		ISSUE STATUS: CONCEPT DESIGN — EDMS No. — SHEET No.: RD-0011 — ISSUE: 1
								DESIGN CHECK	V.SOFREVSKI	25.09.19		
								DESIGN MNGR	B.SOO	25.09.19		
								PROJECT MNGR	G.BABCOCK	25.09.19		

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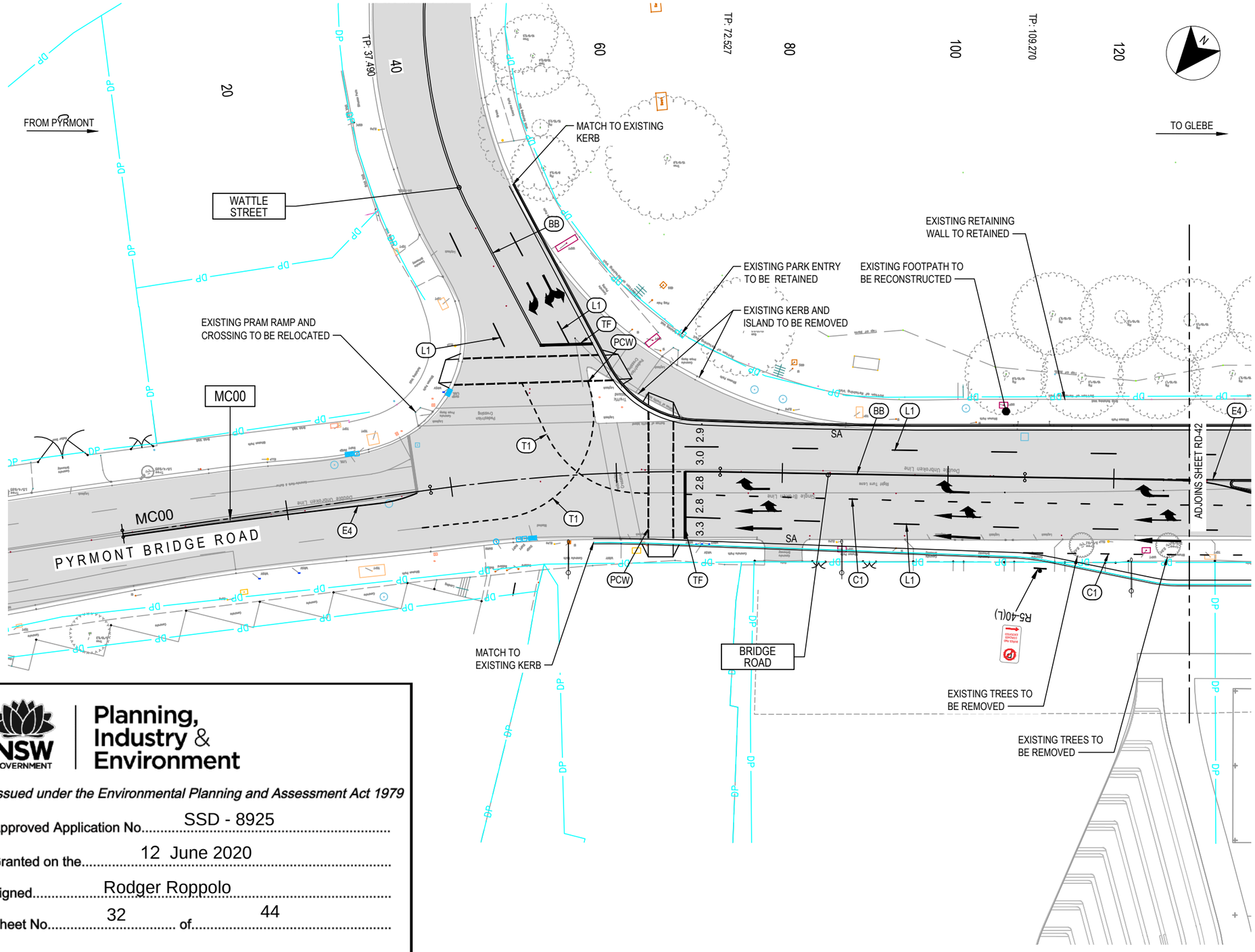

GENERAL ARRANGEMENT LEGEND

- 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

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Approved Application No..... SSD - 8925

Granted on the..... 12 June 2020

Signed..... Rodger Roppolo

Sheet No..... 32 of..... 44

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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	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 PLAN SHEET 1 OF 3 — A3
EXTERNAL REFERENCE FILES	REV	DATE	AMENDMENT / REVISION DESCRIPTION	WVR No.	APPROVAL	SCALES ON A3 SIZE DRAWING	DRAWINGS / DESIGN PREPARED BY	TITLE	NAME	DATE	PREPARED FOR: URBAN GROWTH	RMS REGISTRATION No.: DS2018/XXXXXX — PART: 01
	0	9.10.2018	ISSUED FOR CONCEPT DESIGN		B.SOO	0 5 10 15 20 PLAN 1:500	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	DRAWN	GA.PACIBEN	25.09.19		
	1	25.09.2019	RE-ISSUED FOR CONCEPT DESIGN		B.SOO			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		
						CO-ORDINATE SYSTEM: MGA ZONE 56 — HEIGHT DATUM: AHD	MM DRAWING NUMBER: CI-RD3-B20 RD-0301	PROJECT MNGR	G.BABCOCK	25.09.19		ISSUE STATUS: CONCEPT DESIGN — EDMS No. — SHEET No.: RD-0301 — ISSUE: 1

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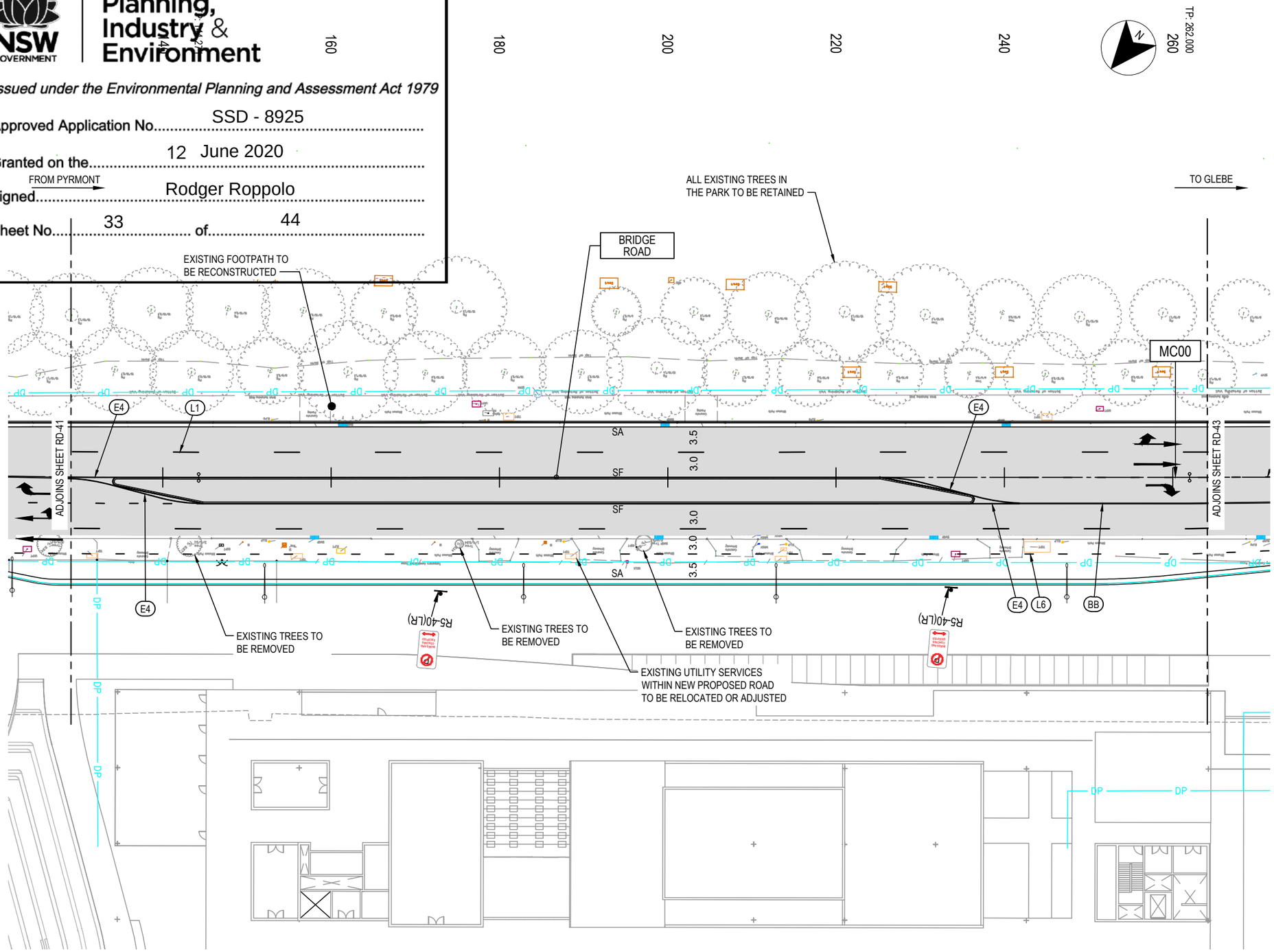
Signed Rodger Roppolo

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

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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-0302.dwg

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DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING:

PLOT DATE / TIME: 25/9/2019 5:30:40 PM

PLOT BY: PAC82679

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	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

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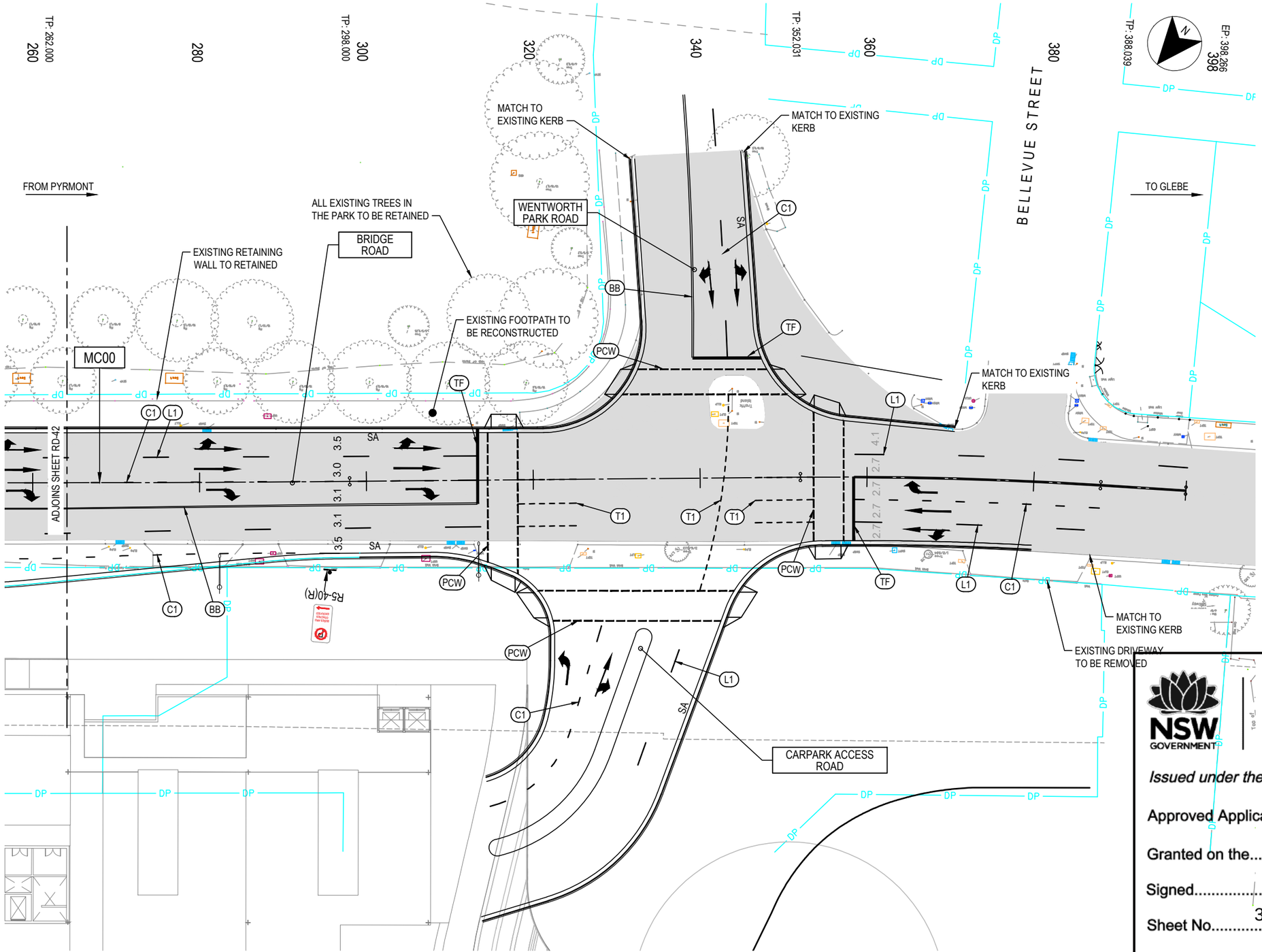

GENERAL ARRANGEMENT LEGEND

- DP — EXISTING DP BOUNDARY
- EXISTING TREE
- eWC — EXISTING WATER COURSE
- EXISTING EDGE OF GARDEN
- EXISTING FENCE
- EXISTING MANPROOF FENCE
- EXISTING GATE
- EXISTING PAVEMENT
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- NEW STREET LIGHT
- PAVEMENT ARROW AR1
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- PAVEMENT ARROW AR4 (L OR R)
- PAVEMENT ARROW ARU5
- PAVEMENT ARROW AR9
- EXISTING PAVEMENT ARROW
- C1 — PAVEMENT MARKING INDICATOR

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Approved Application No. SSD - 8925

Granted on the 12 June 2020

Signed Rodger Roppolo

Sheet No. 34 of 44

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DRAWING FILE LOCATION / NAME	DESIGN LOT CODE	DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING	PLOT DATE / TIME	PLOT BY	CLIENT
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	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

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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
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

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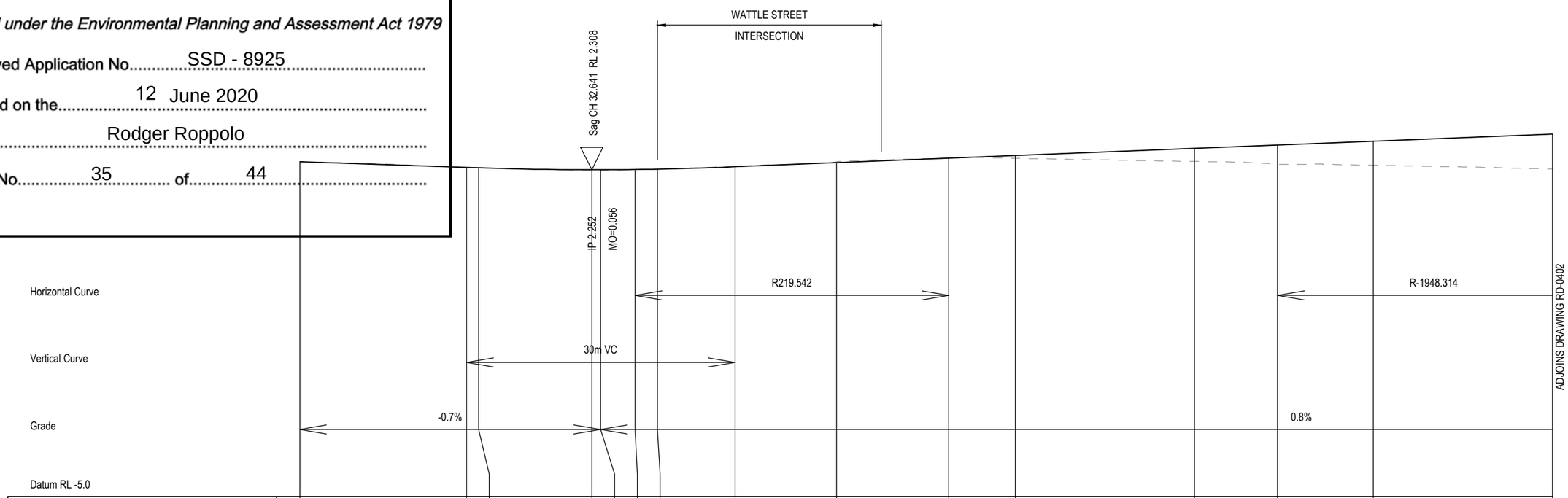
Sheet No. 35 of 44



| | | |

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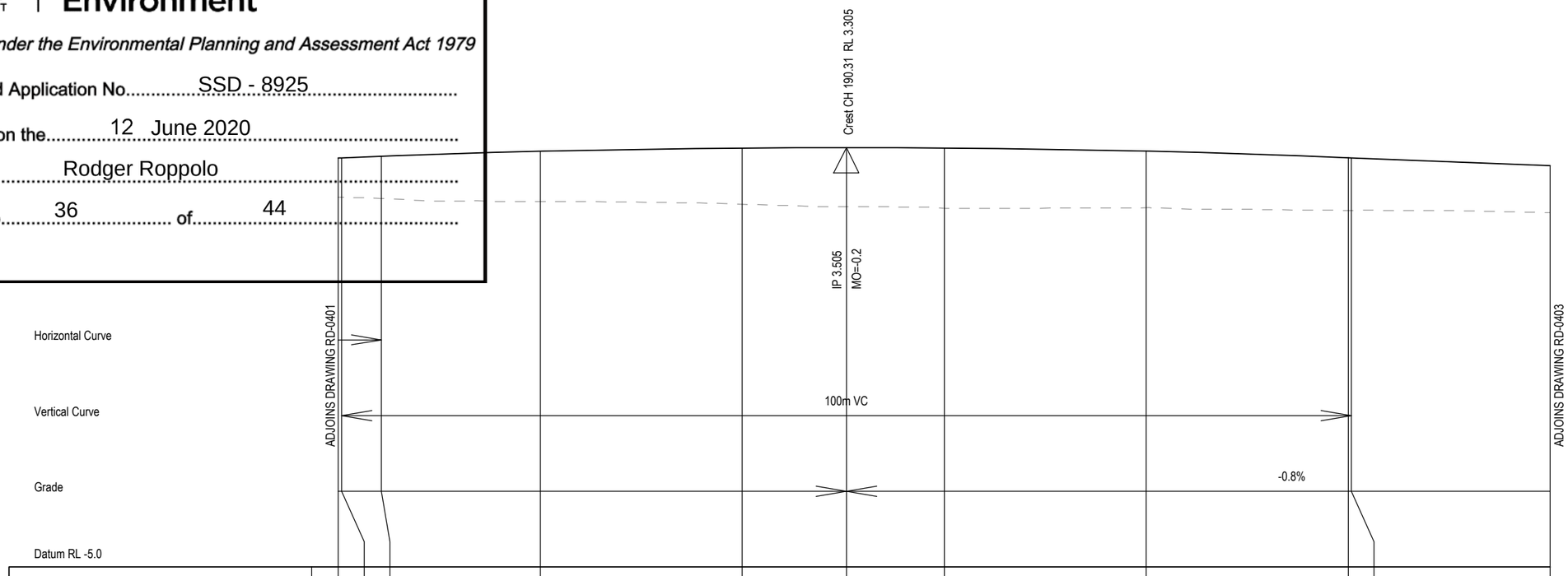
Sheet No. 36 of 44



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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

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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
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	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-0402

	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-0402 | ISSUE: 1

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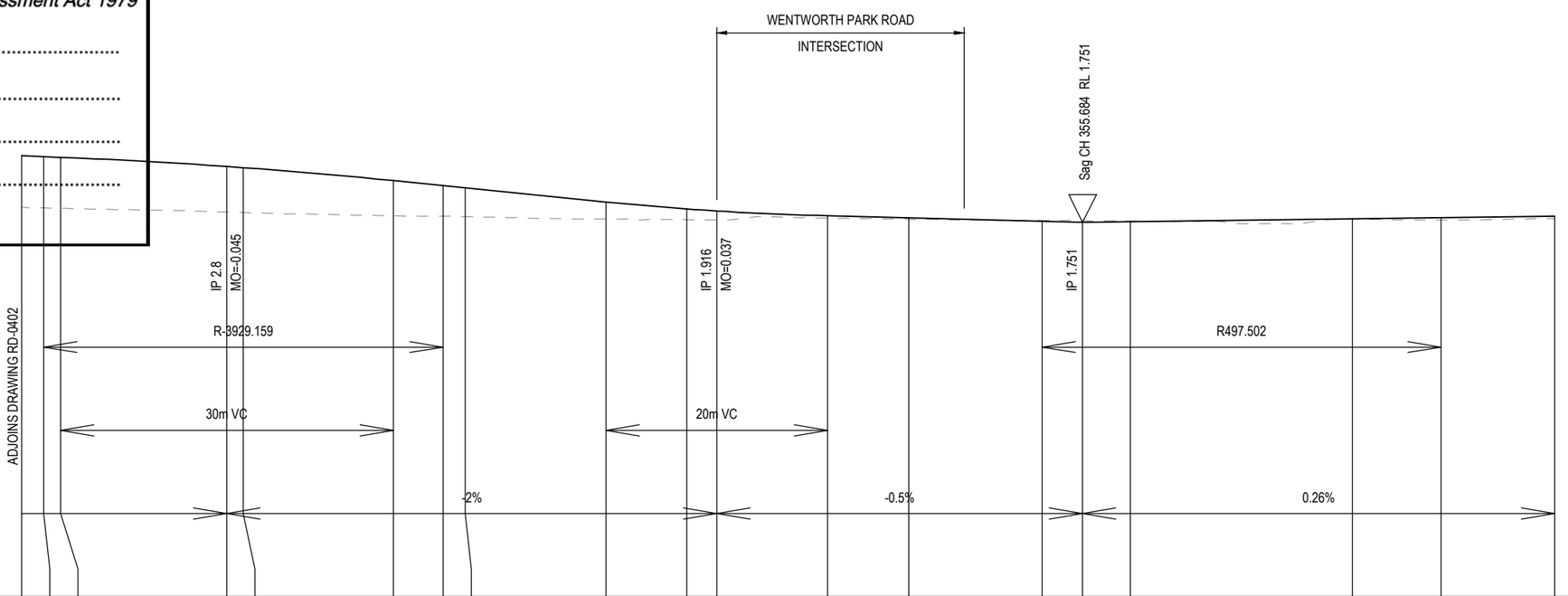
Sheet No. 37 of 44



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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

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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:

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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

A3

SHEET 3 OF 3

RMS REGISTRATION No.: DS2018/XXXXXX

PART: 01

ISSUE STATUS: CONCEPT DESIGN

EDMS No.:

SHEET No.: RD-0403

ISSUE: 1

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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

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PLOT BY: PAC82679

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	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

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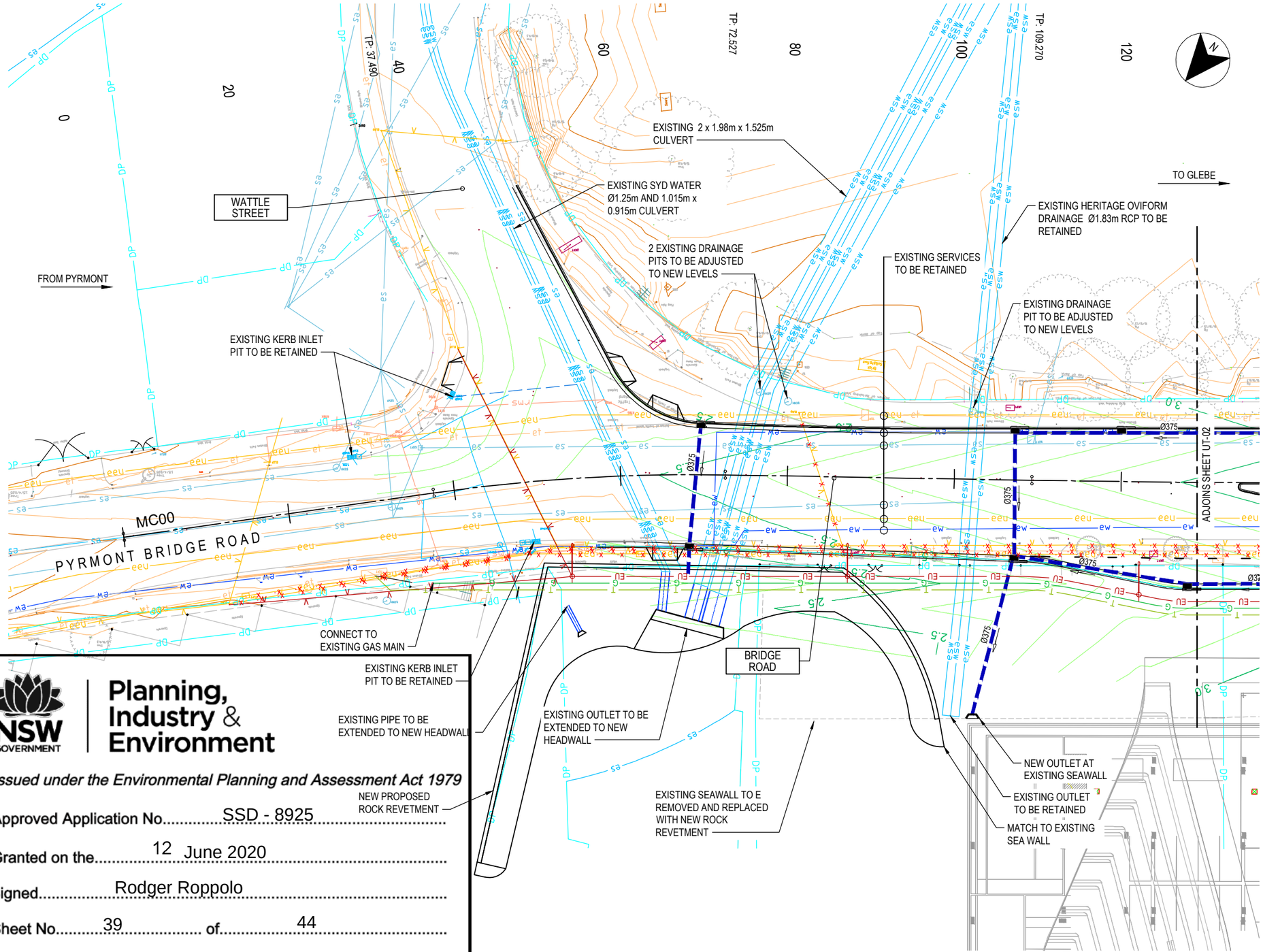

UTILITIES LEGEND

- NEW UNDERGROUND DISTRIBUTION (11kV)
- NEW OVERHEAD POWER LINE
- NEW TELSTRA COMMUNICATIONS TRENCH WITH PIT
- NEW GAS MAIN
- PROPOSED NEW STORMWATER DRAINAGE PIT AND PIPE
- EXISTING SERVICE TO BE REMOVED
- EXISTING WATER COURSE
- EXISTING STORMWATER PIPE (DBYD)
- EXISTING SURFACE CONTOURS MAJOR
- EXISITNG SURFACE CONTOURS MINOR
- DESIGN SURFACE CONTOURS MAJOR
- DESIGN SURFACE CONTOURS MINOR
- NEW LIGHT POLE

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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

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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

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PLOT BY: PAC82679

EXTERNAL REFERENCE FILES:

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0	9.10.2018	ISSUED FOR CONCEPT DESIGN		B.SOO
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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

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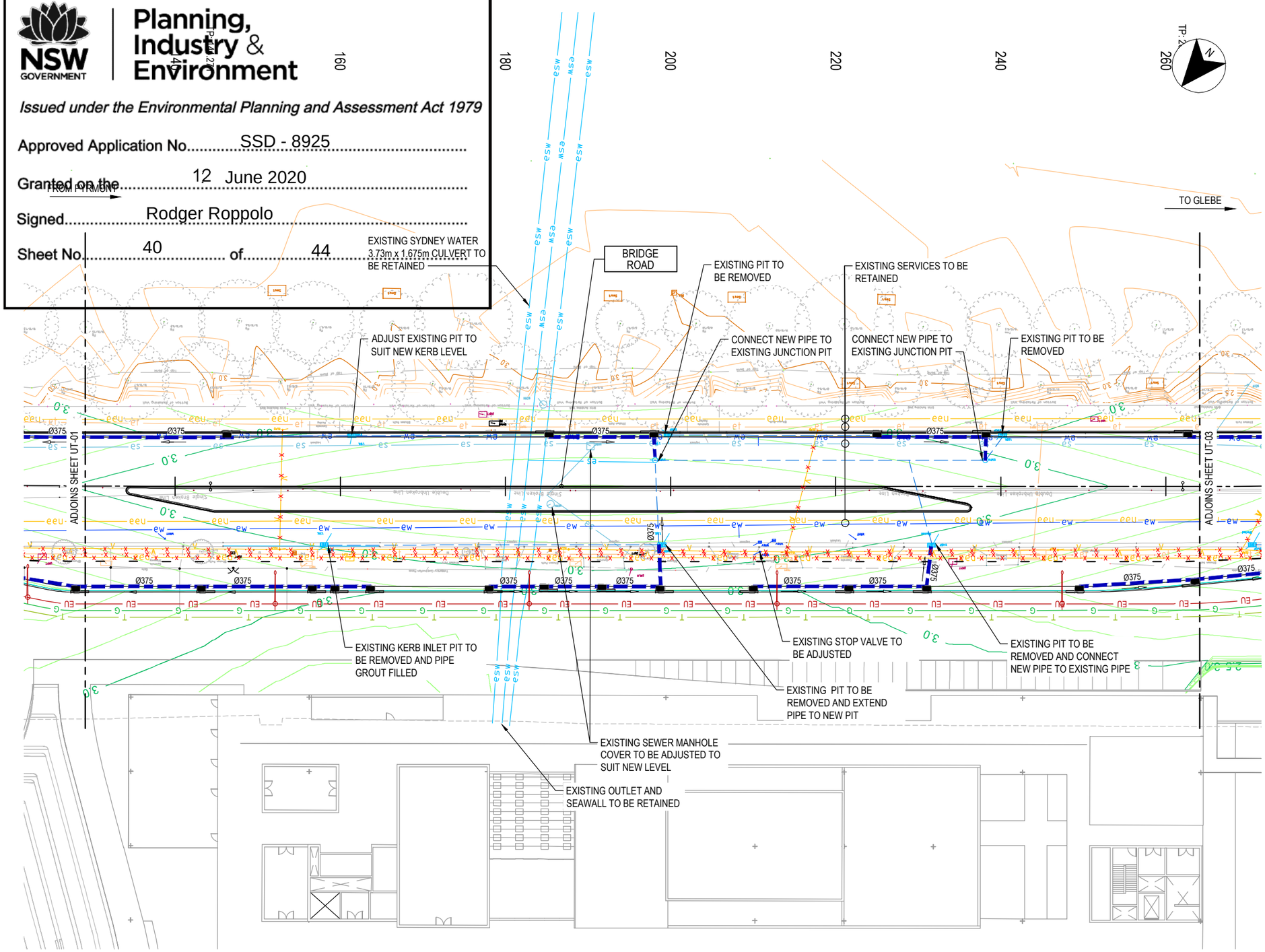
Signed Rodger Roppolo

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

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DESIGN LOT CODE:

DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING:

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EXTERNAL REFERENCE FILES:

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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:

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	NAME	DATE
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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

CO-ORDINATE SYSTEM: MGA ZONE 56 HEIGHT DATUM: AHD

MM DRAWING NUMBER: CI-UT1-B20 UT-0302

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

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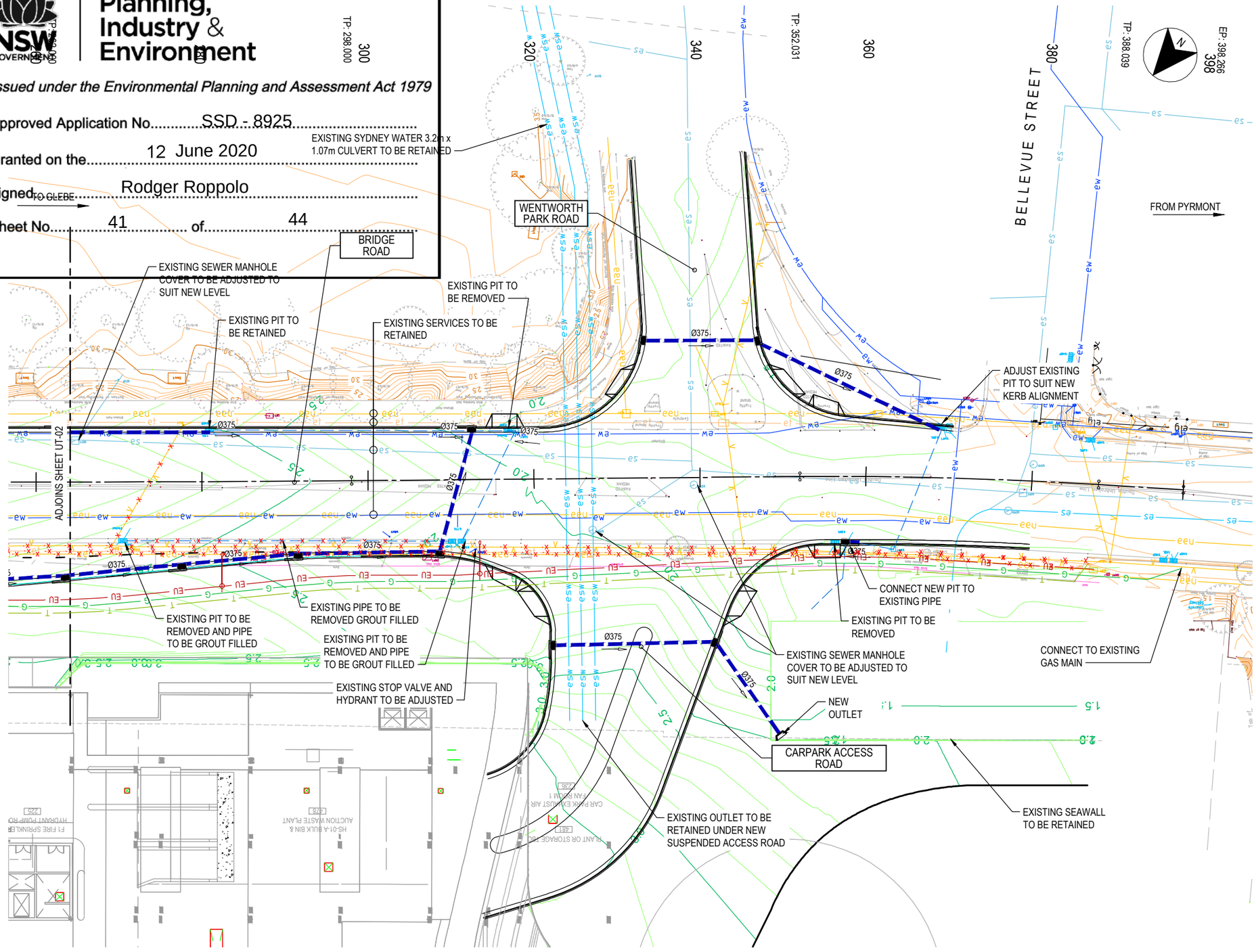
Sheet No. 41 of 44



UTILITIES LEGEND

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DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING:

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	1	25.09.2019	RE-ISSUED FOR CONCEPT DESIGN		B.SOO

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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
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TITLE	NAME	DATE
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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.: DS2018/XXXXXX | PART: 01

ISSUE STATUS: CONCEPT DESIGN | EDMS No. | SHEET No.: UT-0303 | ISSUE: 1

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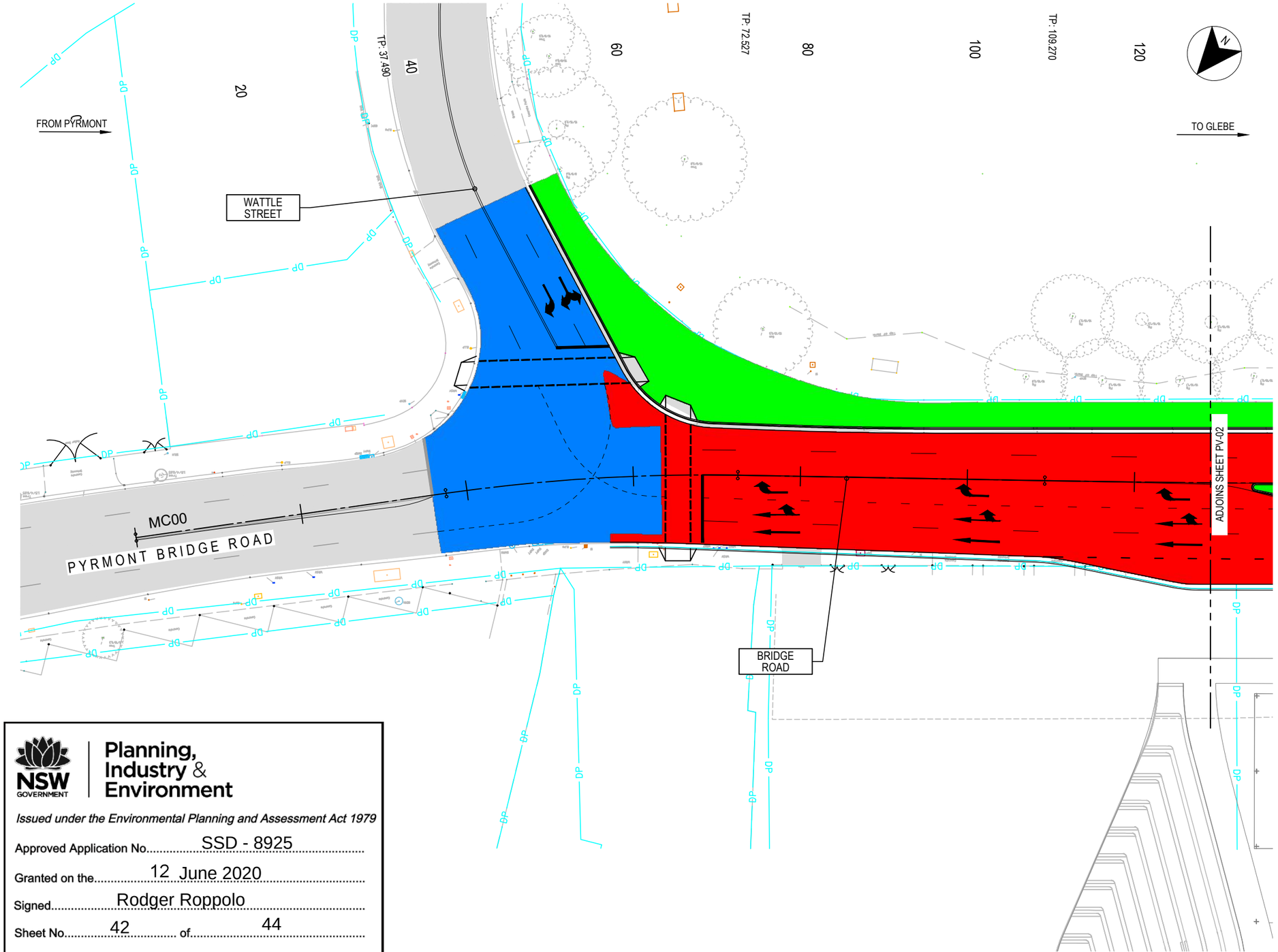

PAVEMENT LEGEND

- EXISTING DP BOUNDARY
- PAVEMENT TYPE 1 - NEW FULL DEPTH PAVEMENT
- PAVEMENT TYPE 2 - AC CORRECTIVE OVERLAY
- PAVEMENT TYPE 3 - CONCRETE PAVEMENT
- EXISTING PAVEMENT

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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

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DESIGN MODEL FILE(S) USED FOR DOCUMENTATION OF THIS DRAWING

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
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PO Box Q1678, QVB Sydney
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W www.mottmac.com

MM DRAWING NUMBER: CI-PV1-B20 PV-0301

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TITLE	NAME	DATE
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DRG CHECK	B.SOO	25.09.19
DESIGN	GA.PACIBEN	25.09.19
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DESIGN MNGR	B.SOO	25.09.19
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PREPARED FOR: URBAN GROWTH

ULTIMO - CITY OF SYDNEY
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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

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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
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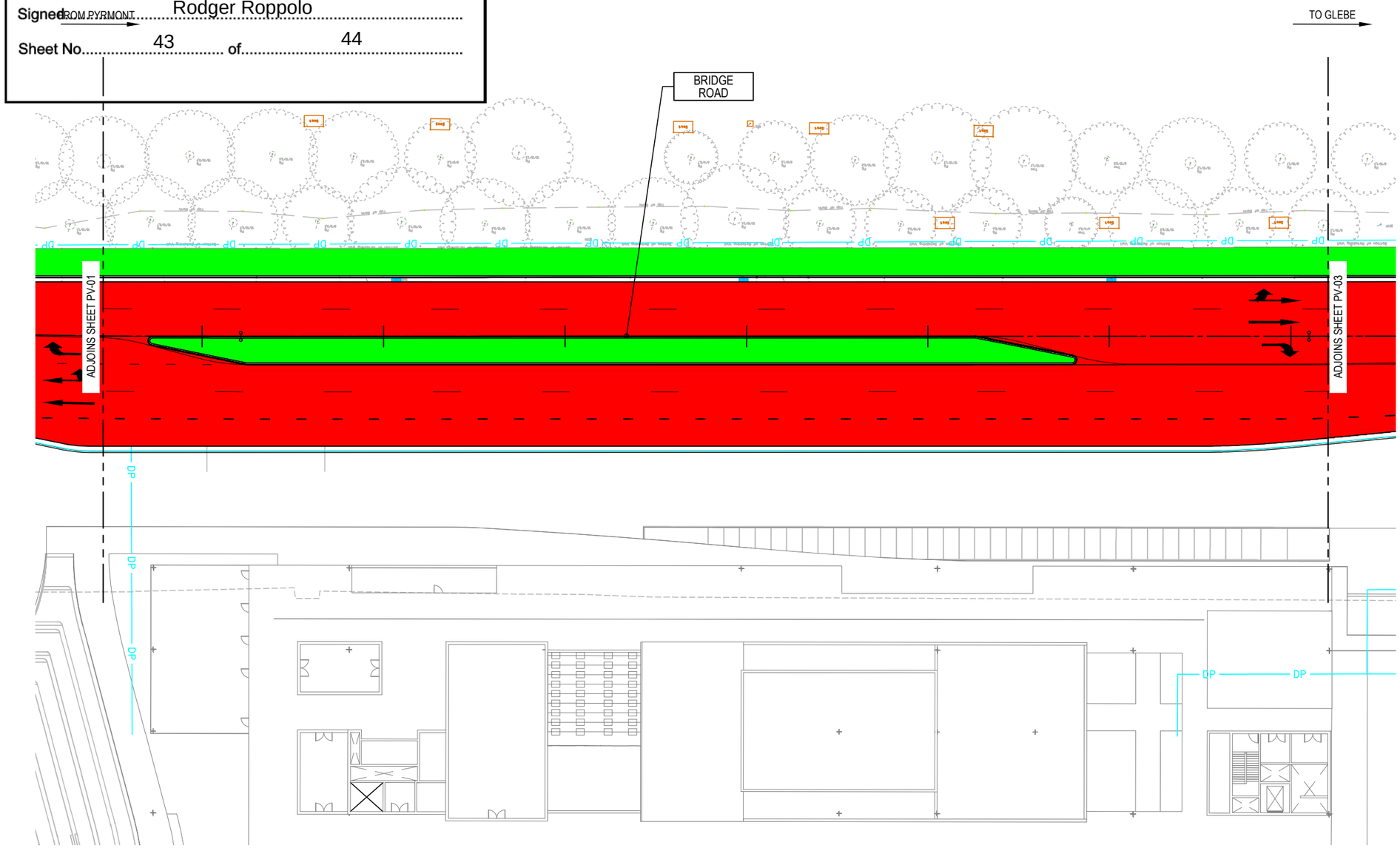

NOTES

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	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

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PAVEMENT PLAN — SHEET 2 OF 3

A3

RMS REGISTRATION No. DS2018/XXXXXX — PART 01

ISSUE STATUS	EDMS No.	SHEET No.	ISSUE
CONCEPT DESIGN		PV-0302	1

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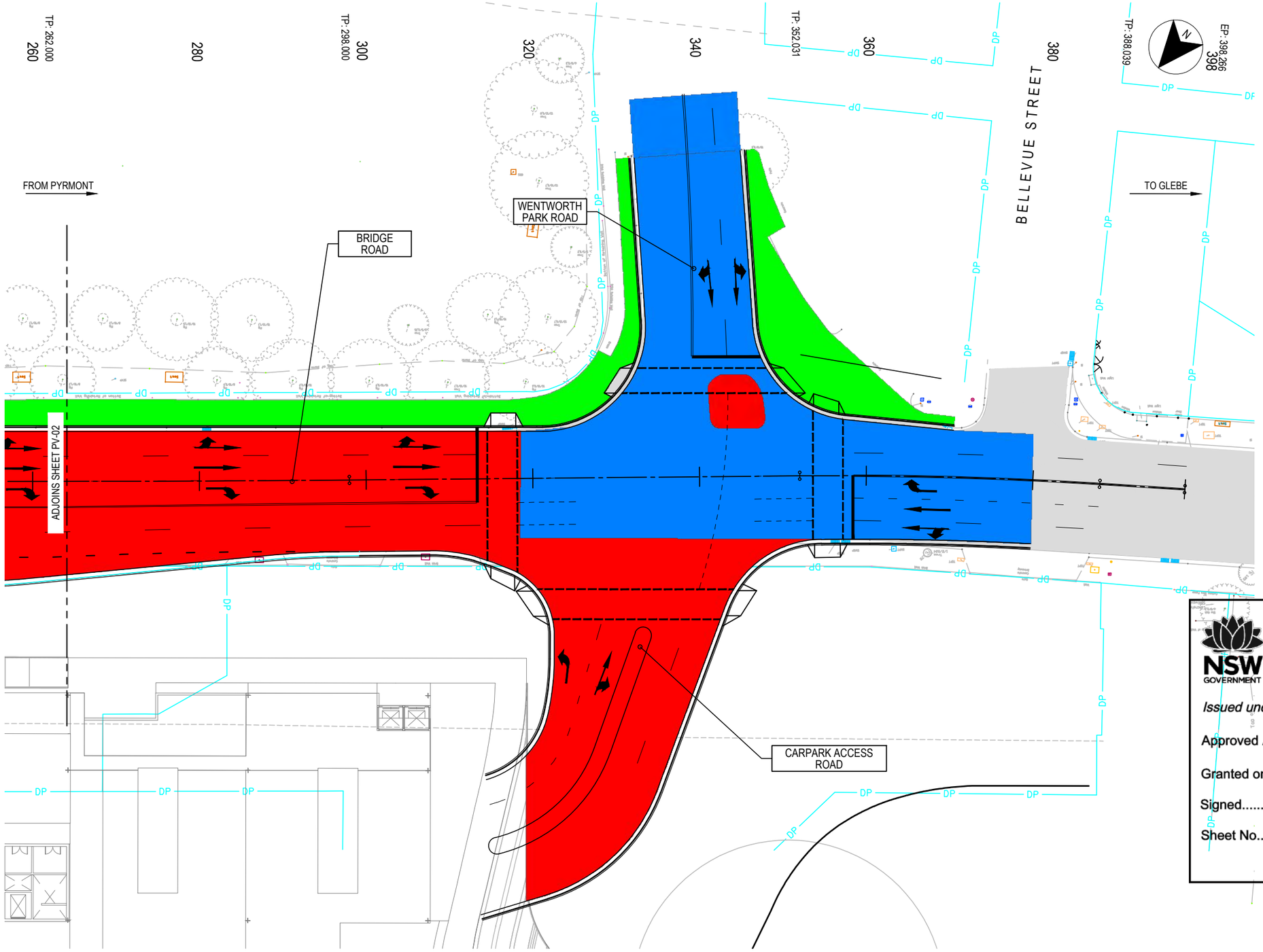

PAVEMENT LEGEND

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DESIGN LOT CODE:

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PLOT BY: PAC82679

CLIENT: UrbanGrowth NSW Development Corporation

ULTIMO - CITY OF SYDNEY
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FROM WATTLE STREET TO WENTWORTH PARK ROAD
PAVEMENT PLAN

A3

SHEET 3 OF 3

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	0	9.10.2018	ISSUED FOR CONCEPT DESIGN		B.SOO
	1	25.09.2019	RE-ISSUED FOR CONCEPT DESIGN		B.SOO

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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

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DRAWN	GA.PACIBEN	25.09.19
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3	Chris Bielby	Joanne Rosner	Joanne Rosner		04/04/2019
4	Chris Bielby	Joanne Rosner	Joanne Rosner		08/07/2020

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APPENDIX C
INTERIM AUDIT ADVICE

13 August 2020

Infrastructure NSW
Attn: Jennifer Chang
19 Martin Place
Sydney NSW 2000
Attention: Jennifer Chang

By email: jennifer.chang@infrastructure.nsw.gov.au

Dear Jennifer,

RE: INTERIM AUDIT ADVICE LETTER NO. 1 - DATA GAP ASSESSMENT AND HAZARDOUS MATERIALS MANAGEMENT PLAN, THE NEW SYDNEY FISH MARKET

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Ref 318000632

1. INTRODUCTION

1.1 Objective

As a NSW Environment Protection Authority (EPA) accredited Contaminated Sites Auditor, I am conducting an Audit in relation to the subject site. This initial review has been undertaken to provide an independent review of the suitability and appropriateness of a Data Gap Assessment (DGA) and Hazardous Materials Management Plan (HMMP).

The review was initially undertaken to address comments from the NSW EPA in letter '*The New Sydney Fish Market – Concept and Stage 1 (SSD 8924) and Stage 2 (SSD 8925) EPA comment on Response to Submissions'* (Document Reference: DOC20/229048), dated 20 March 2020. The NSW EPA reviewed the DGA and HMMP, as well as previously prepared documents, and provided the following comments that are addressed by this Interim Audit Advice (IAA) letter:

1. *"…the EPA recommends that an EPA-accredited site auditor be engaged to review the DGA and provide interim audit advice which comments on the appropriateness of the DGA report and the report's conclusions. If the site auditor finds any deficiencies in the report these must be addressed."*
2. *"The EPA recommends that an accredited site auditor is engaged to review the characterisation of fill materials in relation the presence of asbestos. The auditor must provide interim audit advice which comments on whether the characterisation is sufficient to ensure any asbestos containing materials in soils and at ground surface are managed appropriately. Any deficiencies in the characterisation of asbestos at the site that is identified by the site auditor must be addressed."*

3. *"The EPA recommends that an accredited site auditor is engaged to review the HMMP requirements for managing asbestos at ground surface and in soils. The auditor must provide interim audit advice which comments on whether the management requirements are appropriate. Any deficiencies in the asbestos management requirements by the site auditor must be addressed."*

Development Application SSD 8924 was subsequently approved by the Minister for Planning and Public Spaces on 12 June 2020. Condition B25 requires the Site Auditor to prepare an IAA letter commenting on the DGA (12 March 2019) and HMMP (8 April 2019) prepared by JBS&G Australia Pty Ltd (JBS&G) prior to the commencement of works. This IAA was prepared to satisfy this condition of the development consent.

1.2 Scope of Work

This IAA letter is based on a review of the documents listed below and observations made on a site visit on 5 March 2019, as well as discussions with Infrastructure NSW and JBS&G who undertook the investigation.

The reports reviewed were:

- 'Data Gap Assessment, The New Sydney Fish Market, 1A to 1C Bridge Rd, Glebe NSW', Report No. 54162/119400, 12 March 2019, JBS&G (*the DGA*).
- 'Hazardous Materials Management Plan, The New Sydney Fish Market, 1A to 1C Bridge Rd, Glebe and Part 56-60 Pyrmont Bridge Road, Pyrmont NSW', Report No. 54162/114239 (Rev 2), 8 April 2019, JBS&G (*the HMMP*).
- 'Hazardous Materials Removal Management Plan, New Sydney Fish Markets, 1A to 1C Bridge Road, Glebe and Part 56-60 Pyrmont Bridge Road, Pyrmont NSW', Report No. 54162/114239 (Rev 4), 12 August 2020, JBS&G (*the HMRMP*).

The HMRMP was prepared to address the findings of a draft version of this IAA and satisfy the requirements of Condition B28 of the development consent.

1.3 Background

I previously prepared 'Site Audit Report, The New Sydney Fish Market, 1A to 1C Bridge Road, Glebe and Part of 56-60 Pyrmont Bridge Road, Pyrmont, NSW' (the RAP SAR) and Section B Site Audit Statement (SAS) TO-054-A dated 25 September 2019 reviewing the suitability and appropriateness of a remedial action plan (RAP).

The RAP SAR reviewed the following reports:

- 'Environmental Site Investigation Blackwattle Bay Maritime Precinct, Blackwattle Bay Maritime Precinct, NSW', Report No. 2116954A PR_9459 Rev B, 9 March 2009, Parsons Brinkerhoff Australia Pty Ltd (PB)
- 'Preliminary Environmental Site Assessment for Proposed Redevelopment – Waterfront at Sydney Fish Markets, 56-60 Pyrmont Bridge Road, Pyrmont, NSW', Report No. E24125Krpt, August 2010, Environmental Investigation Services (EIS)
- 'Geotechnical Desktop Review', Report No. NB00046-300-ESG-RP-0001 / B, 6 August 2014, Jacobs Group (Australia) Pty Ltd (Jacobs)
- 'Environmental Site Assessment - The Bays Precinct Urban Transformation Area', Report No. 50460-101699 (Rev 1), 18 November 2015, JBS&G (JBS&G 2015(a))
- 'Site Wide Remedial Concept Plan – The Bays Precinct Urban Transformation Area', 4 December 2015, JBS&G (JBS&G 2015(b))

- 'Bays Market Precinct: Blackwattle Bay & Wentworth Park - History, Built Heritage, Archaeology & Landscape Study', Report No. H-16-237 (Rev 02), 17 July 2017, City Plan Heritage Pty Ltd (CPH)
- 'Contamination Investigation, The Bays Precinct – Separable Portion 1, Blackwattle Bay, Pyrmont, NSW', Report No. E29245KletRev1-SP1, 12 July 2017, Environmental Investigation Services (EIS)
- 'Revised Geotechnical Report to UrbanGrowth NSW on Geotechnical Investigation for Proposed Bays Market District at Blackwattle Bay & Wentworth Park, Pyrmont, NSW', Report No. 29245SrptRev2, 14 September 2017, JK Geotechnics
- 'Acid Sulfate Soil Management Plan, The New Sydney Fish Market, 1A to 1C Bridge Road, Glebe, NSW', Report No. 54162/113896 (Rev 2), 4 April 2019, JBS&G (the ASSMP)
- 'Hazardous Materials Management Plan, The New Sydney Fish Market, 1A to 1C Bridge Road, Glebe and Part 56-60 Pyrmont Bridge Road, Pyrmont, NSW', Report No. 54162/114239 (Rev 2), 8 April 2019, JBS&G (the HMMP)
- 'Environmental Site Assessment, The new Sydney Fish Market, 1A to 1C Bridge Road, Glebe and part 56-60 Pyrmont Bridge Road, Pyrmont, NSW', Report No. 54162 – 112239 (Rev 3), 4 April 2019, JBS&G (the ESA)
- 'Remedial Action Plan, The New Sydney Fish Market, 1A to 1C Bridge Road, Glebe and part 56-60 Pyrmont Bridge Road, Pyrmont, NSW', Report No. 54162/113808 (Rev 3), 4 April 2019, JBS&G (the RAP).

The various site investigations were completed prior to my engagement as Auditor, therefore discussions regarding the scope of work were not undertaken with the client or consultants. It is also noted that the PB (2009) Environmental Site Investigation referenced and reviewed six previous reports that were not provided for review.

The RAP SAR concluded that the site can be made suitable for the purposes of commercial/industrial land use (fish market) if remediated in accordance with the RAP, subject to compliance with the following conditions:

1. *"Assessment of data gaps prior to remediation commencing.*
2. *Preparation of a revised RAP or an addendum to the RAP should the data gap investigation identify contamination that was not anticipated in the RAP (if required).*
3. *Preparation of a Remediation Environmental Management Plan (REMP) prior to remediation commencing. The REMP is to be provided to the Auditor for review.*
4. *Preparation of a Construction Environmental Management Plan (CEMP). The CEMP is to be provided to the Auditor for review.*
5. *Preparation of a Site Audit Statement certifying suitability for the proposed use at the completion remediation and validation."*

The data gaps identified in the RAP SAR and the scope of the DGA are discussed in Section 6.

2. SITE DETAILS

2.1 Location

The site details are as follows:

Street address:	1A to 1C Bridge Road, Glebe, NSW 2037 and part 56-60 Pyrmont Bridge Road, Pyrmont, NSW 2009 (Attachment 1)
Identifier:	Lots 3-5 in DP 1064339, Part Lot 107 in DP 1076596, Part Lot 1 in DP 835794 (Attachment 2)
Local Government:	City of Sydney Council
Owner:	Roads and Maritime Services
Leaseholder:	Infrastructure NSW
Site Area:	Approximately 3.7 ha (approximately 0.76 ha land-based)
Zoning:	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.

The site boundaries are well defined by Bridge Road to the southeast and the existing fish market to the northeast. The site extends approximately 100 m into Blackwattle Bay and a further approximately 50 m at three areas comprising the footprint of wharf structures to be built as part of the proposed development (Attachment 2).

2.2 Adjacent Uses

The surrounding site uses include:

Northwest: Blackwattle Bay, part of Sydney Harbour

Northeast: the existing Sydney Fish Market

Southeast: Bridge Road, with Wentworth Park recreational area to the southeast

Southwest: Park area and Sydney Secondary College – Blackwattle Bay (Secondary School)

Blackwattle Bay represents a sensitive offsite receiving environment with estuarine waters of the bay connected to Rozelle Bay which flows into Darling Harbour and then into central Sydney Harbour.

2.3 Site Condition

A detailed description of the site condition is provided in the ESA and was summarised in the RAP SAR. The site is located within an area of commercial/industrial use and comprises four separate areas with different commercial/industrial uses.

The south-western portion of the site (Lot 5 DP 1064339) was occupied by a Hanson Cement concrete batching plant that was still operational at the time of the DGA assessment in March 2019 and at the time of the previous Audit (the RAP SAR) in September 2019. The central premises of the site (Lot 4 DP 1064339) comprised infrastructure associated with commercial hire boat operations and the remnants of the former Jones Brothers coal loader facilities (Lot 3 DP 1064339). The eastern most portion of the site comprised public open space areas of the current fish market (Lot 1 DP 835794) along the Blackwattle Bay foreshore area.

The ESA noted that the Hanson Cement concrete batching plant comprised several large bulk material silos, loading infrastructure, several washdown bays, and vehicle movement areas, vessel unloading facilities and a site office building. The northern portion of the premises was situated on a concrete deck

wharf structure overlying hardwood girders, whilst the southeast portion appeared to have been constructed on retained fill behind a sea wall. A number of conveyors connected the batch plant, four silos, and truck filling point infrastructure in addition to the adjoining weighbridge. Two designated bunded areas for chemical storage were located in the batch plant and central portion of the site. A two-storey site office building and Ausgrid substation (S1608) were situated in the east of the premises.

The commercial hire boat operations included facilities such as a wharf portion and associated finger jetty berths in the north, with vehicle parking areas, a demountable office building and shipping containers used for storage of supplies and audio-visual equipment. The wharf deck comprised a combination of concrete and asphalt pavement supported on timber beams and turpentine piles. The southern portion of the premises was established on fill material retained by a sea wall. Beyond the sea wall, services supporting the boats at dock were attached to the underside of the wharves (including sewer, water and power). A sewer pump-out facility was situated adjacent to the entry from Bridge Road, connected to the facilities beneath the wharves. One small building of unknown former use was located at the eastern most extent of the premises. Inspection of the site pavements during the ESA was limited by the presence of shipping containers, other equipment and vehicles. Areas able to be visually inspected did not identify indications of above ground storage tanks (AST) or underground storage tanks (UST).

The remnants of the former Jones Brothers coal loader facility included a rendered wall and timber framework adjacent to the street boundary and a paved yard area where structural steel infrastructure was stockpiled. The structure included an Ausgrid substation (S405) that was not inspected. Several temporary building structures were also located in this area. A sandstone block wall retained the land portion of the premises above the water line. Weed vegetation and several mid-sized trees were located in this portion of the site.

The area located directly west of the current fish markets building, which is part of the site, comprised public open space along the Blackwattle Bay foreshore area in the easternmost portion of the site. The area was primarily used as an outdoor dining area for patrons at the current fish markets. The eastern portion of the site was predominantly covered in hardstand, with the exception of a small grassed area in the southern portion of the property and rocks/boulders lining the foreshore area. The ESA noted that the hardstand ground surface of this portion of the site comprised a deck that overlies a mixture of soils (above the high-water level mark) and the surface waters of Blackwattle Bay.

The site is situated on predominantly flat terrain. The ESA noted that a review of topographic information available on the NearMap spatial information database indicated that the southern portion of the site had been subject to land reclamation and had an elevation of approximately 2 m Australian Height Datum (AHD). The northern portion of the site was situated on piers overlying the surface waters of Blackwattle Bay. Site surface water was anticipated to drain directly into Blackwattle Bay.

My observations during the site visit on 5 March 2019 generally confirmed the above consultant's observations, although the following additional observations were made:

- The premises in the central portion of the site were no longer operational, with the commercial hire boat operations having ceased. The premises were largely vacant, however the buildings remained and the sewer pump-out facility was reportedly still in use. No indications of ASTs or USTs were observed.
- Fill material was observed on the ground surface in the former coal loader facility and beneath the deck of the open space area adjacent to the current fish markets. A fragment of suspected asbestos containing material (ACM) was observed on the ground surface at the former coal loader facility.
- The concrete batching plant (Hanson Cement) was in operation at the time of the site visit and was therefore not inspected. The HMRMP reported that the plant was in the process of being demolished in April 2020.

2.4 Proposed Development

It is understood that the site is to be redeveloped by Infrastructure NSW as a new Fish Market. The most recent development plans for the proposed Fish Market are dated 18 September 2019 (those attached to the DGA were dated 31 August 2018). It is understood that statutory approval for the proposed development scheme was 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 was approved for:

- Building envelope for a 3-storey building
- use of the site for the fish market, including waterfront commercial and tourist facilities and ancillary uses
- waterfront structures, including wharves
- Public domain, including landscaping and foreshore promenade
- pedestrian, cycle, footpath and Bridge Road works
- demolition of existing wharves, structure, utilities and services.

The Main Works development application seeks approval for construction of a new fish market including land and water-based structures. The building will include three above ground levels and one basement level. The basement will comprise a car park, plant and storage, waste management facilities and bathrooms. The building will include wholesale services (storage, processing and sales), retail premises, waste management facilities, office space, amenities, plant and storage.

For the purposes of this audit, the 'commercial industrial' land use scenario will be assumed.

3. SITE HISTORY

The DGA provided a summary of the key aspects of the site history based on a review of previous investigations of the site, which was in line with the site history described in the ESA and RAP and as summarised in the RAP SAR. No additional site history information was reviewed in the DGA other than confirming that the central portion of the site was most recently used as a service/docking area for commercial hire vessels, but at the time of the DGA was vacant and that the northeast portion of the site, comprising the remains of the former coal loader, was also vacant.

The site history indicates that the site has been used, and continues to be used, for a range of commercial/industrial uses, including timber merchants, abattoirs and garbage collectors, coal depots, cement works and commercial boat hire.

3.1 Auditor's Opinion

The ESA reports the removal of five USTs from the site in 1995, with post-removal validation indicating residual contamination of soils with heavy metals:

> *"The site formerly had five underground storage tanks (USTs) which were removed from the site in 1995. The USTs had previously stored 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 total petroleum hydrocarbon (TPH) constituent impacts, however it was further reported […] that heavy metal impacts remained in-situ in fill material at the site. The metals impacts were reported to be relatively immobile (via TCLP testing) and not readily prone to leaching to groundwater/harbour waters."*

The RAP SAR identified that the location of the former USTs and potential residual contamination at these locations requires further assessment during the DGA. There was also uncertainty about the presence of additional USTs on the site due to the absence of a recent SafeWork NSW Dangerous Goods Records search, in particular in the current cement works operations in the south-western portion of the site.

The site history provided in the DGA, and as established in the RAP SAR, provides a general indication of past site uses. Details of activities and operations at the site were not available and the source of material used for reclamation of the bay is unknown, although may comprise potentially contaminated dredged material from deep-water berths formerly located in Blackwattle Bay. Sources of site history information, such as historical aerial photographs, NSW EPA records, SafeWork NSW dangerous goods records, Council records and Certificates of Title, were not previously reviewed in the reports provided or in the DGA.

4. CONTAMINANTS OF CONCERN

The RAP SAR provided a list of the contaminants of potential concern (COPC) and potentially contaminating activities, based on the ESA. These have been tabulated in Table 4.1.

Table 4.1: Contaminants of Concern

Area	Activity	Potential Contaminants
Approximately 20 m wide area along Bridge Road and approximately 10 m along the eastern portion of the site adjacent to the existing fish markets (Attachment 2)	Reclaimed land with fill material	Heavy metals, total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), organochlorine pesticides (OCPs), herbicides, polychlorinated biphenyls (PCBs), asbestos, acid sulphate soils (ASS) and ground gases (methane, hydrogen sulfide, carbon dioxide, carbon monoxide and oxygen)
Former coal wharf	Not discussed in the ESA	Heavy metals, TPH/VOCs, PAHs, asbestos and tributyltin (TBT)
Current and former concrete batch plant	Not discussed in the ESA	Heavy metals, TPH/VOCs, PAHs, solvents, asbestos and TBT
Current and former industrial areas	Fuel storage and dispensing, building material	Heavy metals, TPH/VOCs, PAHs, VOCs, OCPs, herbicides, PCBs and asbestos
Marina areas	Maintenance and storage activities	Heavy metals, TPH/VOCs, PAHs, asbestos and TBT

4.1 Auditor's Opinion

The RAP SAR concluded that the COPC adequately reflect the site history and condition, however noted that the sampling density was low for some analytes.

Soil samples collected during the DGA were analysed for metals, TRH, BTEX, PAHs, TBT, asbestos, suspension peroxide oxidation combined acidity and sulfur (SPOCAS) and ASS potential, however were not analysed for OCPs, OPPs, PCBs, VOCs and herbicides. Groundwater samples collected during the DGA were analysed for metals, TRH, BTEX, and PAHs, however were not analysed for VOCs.

While VOCs were previously identified as a COPC, I note that the RAP states that previous soil and groundwater investigations undertaken on the site "*have not identified the occurrence of significant*

volatile compound impacts in soil and/or groundwater at the site". It is also noted that soil vapour sampling and analysis undertaken during the DGA and previous limited groundwater testing for VOCs did not identify concentrations of VOCs that would pose a concern, with all sub-slab vapour results below PQLs and therefore below the adopted site assessment criteria. The omission of VOCs from the analytical suite in soil and groundwater testing undertaken in the DGA is therefore considered acceptable.

Previous soil sampling and testing included analysis for OCPs at a low density (11 samples), however the results were below the laboratory PQL. Testing of sediment samples in the water-based portion of the site reported concentrations below the PQL. Pesticides (OCPs and OPPs) and herbicides are unlikely to have been used at the site and I am satisfied that they are unlikely to be COPC at the site.

Limited sampling for PCBs was previously undertaken (3 samples) and results were less than the PQL. However, PCBs are a contaminant of concern associated with the electrical substations located onsite. Assessment of the substation areas for PCBs following decommissioning would be required.

ASS are considered likely to be present across all areas of the site, including alluvial soil and fill material used in land reclamation. On this basis, the disturbance of materials during site redevelopment works will be required to be conducted in accordance with the ASSMP.

There has been no assessment by the consultants for the presence of per- and poly-fluoroalkyl substances but in my opinion there are no indications in the site history that they would be potential contaminants of concern.

5. STRATIGRAPHY AND HYDROGEOLOGY

5.1 Stratigraphy

JK Geotechnics (2017) 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 an approximate northwest to southeast alignment.

Boreholes in Blackwattle Bay identified a subsurface profile generally comprising natural clay and sandy clay soils 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 4.7 m depth was encountered. There generally appeared 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 within the site identified between 2.5 and 5.5 m of orange to yellow-brown gravelly sandy clay fill material, with inclusions of sandstone, wood/timber, ash, slag and brick. Boreholes in adjoining Wentworth Park identified fill comprising silty sand or sandy clay containing varying amounts of inclusions such as sandstone and igneous gravel, timber, tile, ceramic, glass, shell, concrete and brick fragments, slag and ash. Underlying natural material within land-based portions of the site comprised grey-brown silty marine sediments, containing abundant shell material.

Sandstone bedrock was encountered underlying natural soils at depths ranging from approximately 5.5 to 13.4 m below ground level (bgl), which is equivalent to -9.1 to -18.5 mAHD, although yellow-brown medium-grained sandstone bedrock was present at a depth of 3.20 mbgl in the central eastern portion of the site.

5.2 Potential for Acid Sulfate Soils

Review of the ASS Risk Map for Prospect/Parramatta (Acid Sulfate Soil Risk Map – Prospect/Parramatta, Edition 2, 1997, NSW Department of Land and Water Conservation) indicated that the site is located within an area of 'high probability' of ASS within bottom sediments.

PB (2009) noted potential indicators of ASS comprising odorous marine sediments with seashells 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 by JBS&G (2015) and EIS (2017), however no samples were analysed at a laboratory to confirm if the soils comprised actual ASS.

The DGA included assessment of fill material and natural marine sediments within the land-based portion of the site for ASS. Results are discussed in Section 9.3 of this IAA.

Management of the potential ASS (PASS) is proposed as discussed in the ASSMP.

5.3 Hydrogeology

The ESA stated that a review of the registered bore information maintained by the NSW Department of Primary Industries identified 14 registered bores within a 500 m radius of the site. The closest wells (approximately 250 m southwest of site) were constructed for monitoring purposes and were reported to contain a standing water level (SWL) of approximately 0.6 m within shallow fill materials.

During the DGA, boreholes undertaken in the land portion of the site identified saturated conditions at depths of between 1.8 and 3 mbgl.

Groundwater monitoring was undertaken by PB (2009) (one monitoring round at three monitoring wells - PBMW02, PBMW03 and PBMW04), JBS&G (2015) (one monitoring round at one monitoring well - MW1) and the DGA (one monitoring round at ten locations, including the four existing locations and six new locations – SBMW01 to SBMW06). The investigations identified the following:

- Site groundwater reported total dissolved solid (TDS) concentrations consistent with saline waters
- Groundwater had a relatively neutral pH and was low in oxygen
- Depth to groundwater was approximately 1.3-2.27 mbgl
- SWLs correspond with tidal surface water levels of Blackwattle Bay into which site groundwater is anticipated to discharge
- No odours or sheens were observed.

5.4 Auditor's Opinion

Potential ASS materials were identified within saturated marine sediments within the bay and land portions of the site. The lateral and vertical identification and assessment for ASS has not been undertaken in accordance with the guidance provided in ASSMAC (1998). Consequently, the acid generating potential of the PASS material as well as the extent/volumes of PASS material are currently unknown. It is noted that the ASSMP considers these uncertainties and assumes that sediment is PASS until confirmed otherwise. I consider this appropriate.

I consider that the site stratigraphy and hydrogeology are sufficiently well known for the purpose of remedial planning.

6. DATA GAP ASSESSMENT

6.1 Data Gaps Identified Following Previous Site Investigation

The RAP identified the following data gaps following previous investigation of the site:

1. The sampling density within the land-based portion of the site (eight locations in approximate 0.76 ha) was less than the minimum (19 locations) recommended by NSW EPA (1995) *Sampling Design Guidelines*.
2. Characterisation of fill materials for the presence of asbestos via quantification in accordance with NEPM (2013) and Western Australia Depart of Health (WA DOH, 2009) to determine asbestos management requirements (if any) during the site development works.
3. There was uncertainty as to the historical location of fuel infrastructure known to have previously been located at the site. Whilst there was indirect evidence that such facilities were removed, the original documentation associated with the remediation and validation works was not available. As such, there remains uncertainty as to the nature and extent of any residual impacts that may remain in the vicinity of these former features.
4. Characterisation of fill material and natural soils for ASS has not been completed to date and is required to verify the extent of material requiring management in future development works and assist with refinement of the ASSMP required to be implemented during development activities. Whilst all sediments are expected to be ASS, specific characterisation of the conditions has not been completed to date, which may assist with refining lime (or other material) addition requirements.
5. Additional leachate data will be required to confirm waste classifications for the potential off-site disposal of surplus materials as part of the development works.

The RAP proposed the following further assessments to address the data gaps:

- Soil vapour (20 locations)
- Groundwater (6 locations)
- Ground gas (6 locations)
- ASS (soil)
- TCLP leachates (waste soils)
- Soils (11 locations).

Additional data gaps identified in the RAP SAR included the following:

1. Sources of site history information, such as historical aerial photographs, NSW EPA records, SafeWork NSW dangerous goods records, Council records and Certificates of Title, were not previously reviewed in the reports provided.
2. There was uncertainty about the presence of additional USTs on the site due to the absence of a recent SafeWork NSW Dangerous Goods Records search, in particular in the current cement works operations in the south western portion of the site.
3. Previous assessment of sediments did not adequately address comparisons against ANZAST (2018) default guideline values (DGVs) for PCBs and OCPs (practical quantitation limits (PQLs) were too high) and normalisation with total organic carbon (TOC) (not analysed in EIS (2017)) on a sample-by-sample basis for all sediment samples obtained.

4. The density of sediment samples was not uniform across all areas of the site. Sediments in the western portion of the site were sampled at a lower density.

6.2 Scope of the DGA

The objective of the DGA was to *"address data gaps identified in JBS&G (2018a)* [the ESA] *to inform the final remedial/management requirements during the early works construction phase that when implemented, will ensure the site is suitable for the proposed development".*

Table 6.1 summarises the scope of the DGA field investigations.

Table 6.1: Summary of Field Investigations Undertaken during the DGA

Investigation	Field Investigations	Analytical Data Obtained
The DGA (JBS&G, 2019)	Soil (13 sample locations – SB01 to SB10 and SB05A to SB05C) Groundwater (six new wells SBMW01 to SBMW06, sampling of new and existing wells (total 10), including MW1, MW2A to MW4A). Ground Gas (10 borehole locations – MW 1, MW2A to MW4A, SBMW01 to SBMW06) Soil Vapour (20 sample locations – SS01 to SS20) Acid Sulphate Soils (10 sample locations - SB01 to SB10) TCLP leachability (1 borehole location – SB05)	Soils: Metals, TRH/BTEX, PAHs, Tributyltin (TBT), asbestos Groundwater: Metals, TRH/BTEX, PAHs Ground Gas: Methane (CH_4), Carbon Dioxide (CO_2), Oxygen (O_2), Hydrogen Sulfide (H_2S), Carbon Monoxide (CO) Soil Vapour: VOCs ASS: SPOCAS, ASS testing TCLP leachability: Metals, PAHs

6.3 Auditor's Opinion

The DGA included the testing of soils at 13 locations, which, along with the previous investigation locations, exceeds the minimum number of sampling locations required for site characterisation (19). The spatial distribution of the DGA sampling locations excluded the land-based area in the eastern portion of the site.

The number of groundwater, soil vapour, and ground gas sampling locations met or exceeded the data gap requirements identified in the RAP. Testing of soils for ASS (SPOCAS and acidity) and leachability testing (TCLP) was also undertaken during the DGA at a low density.

Data gaps identified in the RAP SAR were not addressed, including review of site history information, potential for additional USTs and sediment characterisation.

7. EVALUATION OF QUALITY ASSURANCE AND QUALITY CONTROL

I have assessed the overall quality of the data presented in the DGA. Assessment of data from previous investigations was undertaken in the RAP SAR and is not repeated here. My assessment follows in Tables 7.1 and 7.2.

Table 7.1: QA/QC – Sampling and Analysis Methodology Assessment

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Data Quality Objectives (DQO) The DGA defined specific DQOs in accordance with the seven-step process outlined in Schedule B2 of NEPM (2013).	These were considered appropriate for the investigation conducted.

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Sampling pattern and locations *Soil:* Thirteen boreholes (SB01 to SB10 and SB05A to SB05C) were undertaken. The sampling locations were located in the southern area of the land-based portion of the site to target specific areas of environmental concern including the area of potential hydrocarbon impacts around historical sample locations PBHA01 and PBHA02. *Groundwater:* Six boreholes were converted into groundwater monitoring wells (SBMW01 to SBMW06). Four existing groundwater monitoring wells (MW1 and PBMW02 to PBMW04) and the six new groundwater monitoring wells were subsequently sampled. The ten groundwater locations were situated along the southern land-based portion of the site. *Ground Gas:* Ground gas sampling was undertaken during the DGA at the ten groundwater monitoring well locations that are situated in the southern land-based portion of the site. *Soil Vapour*: A grid based sub-slab vapour assessment was completed at 20 locations within the proposed Sydney Fish Market building envelope within the southern land-based portion of the site at locations SS01 to SS20.	In my opinion, the DGA investigation of various environmental media within the site, including sampling and analysis of soils, groundwater, ground gas and soil vapour, provides adequate coverage within the southern land-based portion of the site. No further sampling and assessment of soils, groundwater, ground gases and soil vapour was undertaken within the eastern land-based portion of the site in the area along the existing Sydney Fish Market which is marked out to form part of the "Civic Plaza" which connects the new fish market to the wider precinct. The locations of former USTS was unknown and therefore investigation locations were not able to target these areas of the site. The investigation undertaken was considered sufficient to identify significant contamination associated with former USTs and unidentified additional USTs. No further assessment of sediment was undertaken during the DGA. Issues were noted in the RAP SAR with the existing dataset. Further characterisation activities are recommended to ensure sediment conditions are suitably understood from a contamination and ASS viewpoint. The RAP proposed further sampling following further design of the proposed development and evaluation of construction methods.
Sampling density *Soil:* The sampling density of 13 locations sampled during the DGA and eight locations sampled during previous investigations of the site over the land-based area of approximately 0.76 ha exceeds the minimum sampling frequency recommended by the NSW EPA (1995) *Sampling Design Guidelines* (19 locations). Between 1 and 4 samples were analysed from each borehole (total 25 samples). *Groundwater*: The 10 groundwater wells were sampled on one occasion during the DGA. *Ground gas:* The 10 groundwater wells were sampled for ground gas on one occasion. *Soil vapour:* The 20 grid locations were sampled on one occasion.	The soil sampling undertaken gives a reasonable indication of site conditions, in particular within the southern land-based portion of the site. The eastern land-based portion of the site adjacent to the existing fish market was not assessed during the DGA. ASS and PASS material in soils have been assessed in the DGA and the management of soils is addressed in the ASSMP. However, ASS and PASS have not been assessed in sediments, with the management of sediment dewatering activities requiring the development of a Dewatering Plan to demonstrate that dewatering of sediments will not result in the discharge of contaminants to the environment. The density and sampling frequency of groundwater wells, soil vapour sampling locations and ground gas sampling locations across the site following completion of the DGA is adequate. The RAP SAR noted that the density of sediment samples in the western portion of the site was low. The DGA did not include further assessment of sediments. Further assessment of sediment is proposed in the RAP.
Sample depths Soil samples were collected directly underneath the hardstand (concrete) then generally at 0.5-1.0 m intervals to a maximum depth of 7 m or at least 0.5 m into natural materials (or prior refusal), whichever was shallower. Soil locations terminated in fill material in 9 of 13 locations.	Characterisation of soils undertaken during the DGA is adequate, noting that the depth of fill is not critical for remediation planning purposes.

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Well construction *Groundwater:* Six new groundwater monitoring wells (SBMW01 to SBMW06) were installed during the DGA. The wells were constructed with 50 mm, class 18 unplasticised polyvinyl chloride (UPVC) screen (typically 3 m) and casing and were extended to at least 3 m into groundwater, or to a maximum depth of 6 mbgl. Monitoring wells were constructed using sand to pack the screen to a nominal depth of 0.5 m above the top of screen. Bentonite was then added to a nominal depth of 0.5 m above the sand level to seal the well. More soil cuttings were then added above the bentonite to the surface. The wells were finished with a lockable cap and flush-mounted gatic cover. *Ground gas:* Ground gas was sampled from the new and existing groundwater monitoring wells. No ground gas specific wells were installed. *Soil Vapour Pin:* A 16 mm diameter hole was drilled through the concrete slab at each location, with the slab thickness ranging between 0.1-0.25 m thickness. A VaporPin metallic probe was installed at each location, hammering the probe with a silicone sleeve into the drilled hole to a depth of the encountered slab thickness.	Well construction was generally acceptable. It is noted that groundwater typically intersected the screened interval of the wells, with the exception of SBMW02 and SBMW03. These wells may not be suitable for ground gas monitoring. Groundwater levels are likely to fluctuate with tides in the adjacent Blackwattle Bay, so standing water levels may periodically be above the screen interval.
Sample collection method *Soils:* The boreholes were drilled with solid flight auger, push tube and hand auger. Soil samples were collected by grab sample directly from the auger. *Groundwater*: Well development was undertaken using a decontaminated submersible pump or inertia pump to remove a volume of water until field-measured water quality parameters (EC, pH, DO, redox potential and temperature) had stabilised. Monitoring wells were sampled a minimum of 3 days after well development. The SWL was gauged and an assessment of the presence of light non-aqueous phase liquids/dense non-aqueous phase liquids (LNAPL/DNAPL) was made using an interface probe. Wells were purged and sampled using a low-flow methodology with peristaltic pump and dedicated tubing. *Ground Gas:* Subsurface gases were measured using a landfill gas meter to record levels of CH_4, CO_2, CO, H_2S and O_2, in accordance with Benchmark Technique 15 '*Subsurface Gas Monitoring Devices*' and Benchmark Technique 16 '*Subsurface Gas Monitoring Program*' provided in *Environmental Guidelines: Solid Waste Landfills, Environment Protection Authority* (NSW EPA, 2016). Each monitoring well was monitored for gas flow rates and concentrations and the following testing procedure was undertaken at each well: - Sampling ports on gas analyser (GFM435 or similar) were connected to well cap via gas sampling port using disposable tubing - Initial gas flow rates were reported and then flow rates were monitored for approximately 5 minutes with variation in flow rates documented - Analyser unit was disconnected from gas sampling port and meter connection changed to concentration sampling port prior to reconnection to gas well. Initial gas concentration readings were collected from	Soil sample collection from the auger flights is not ideal as it can result in loss of volatiles and sample cross contamination, although cross contamination was minimised by removing external material. Volatiles are not considered to be present at significant concentrations given that VOC concentrations in soil vapour and groundwater were typically less than the detection limit, therefore the sampling method is considered acceptable. Collection of soil samples using augers is not ideal for assessing the subsurface and quantifying asbestos in fill materials. Test pitting is the preferred methodology to obtain more reliable information on fill material composition. Sampling ground gas from groundwater monitoring wells is not ideal. Samples may represent off-gassing from groundwater within the well, rather than ground gas within soil. This is likely to be the case in SBMW02 and SBMW03 where the SWL was above the screen interval (however may be tide dependent). The data is likely to over-estimate potential ground gas concentrations at the site and is therefore considered conservative when adopted. The soil vapour sampling methodology was acceptable. Overall the sample collection methodologies for the sampling of soils, groundwater, ground gas and soil vapour were found to be acceptable.

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
monitoring wells after 10 second and then again once the gas concentrations had stabilised, noting that methane concentrations should be stable for longer than 10 seconds. *Soil Vapour:* Sampling of the sub-slab vapour probes involved the following: - GFM435 gas detector used to purge each probe for approximately 30 seconds. Gas readings were monitored until oxygen and photo-ionisation detector (PID) readings had stabilised - Leak detection evaluation via placement of isopropyl alcohol-soaked rag within an airtight box containing the sample train located on top of the probe. - Following confirmation of the absence of leaks, the sub-slab vapour samples were collected onto SKC-anasorb carbon tubes.	
Decontamination procedures *Soil:* The DGA states that decontamination of all non-disposable sampling equipment, including augers, was undertaken with a high-pressure water/detergent spray, rinsed with water and then air dried. The equipment was then inspected to ensure that no soil, oil, debris or other contaminants were apparent on the equipment prior to the commencement of works. Sampling equipment was subsequently decontaminated using the above process between each sample location. *Groundwater:* The DGA states that the pump used for well development was decontaminated.	Acceptable
Sample handling and containers *Soil:* Soil samples were transferred to laboratory supplied sample jars or 500 mL plastic bags for asbestos fines/fibrous asbestos (AF/FA) analysis. Samples were not mixed prior to placement into the jars to minimise the potential for loss of volatiles. The sample jars/bags were then transferred to a chilled ice box for sample preservation and transfer to the analytical laboratory under chain of custody protocols. Soil samples for field ASS and laboratory SPOCAS analysis were placed in small zip lock plastic bags and placed directly on ice during sampling activities. Field testing of samples were completed in the field following the collection of all samples in accordance with the field-testing procedure presented in ASSMAC (1998) with field pH_f and pH_{fox} tests recorded. *Groundwater:* Groundwater samples were immediately transferred to laboratory-supplied sample bottles, sampling the most-volatile contaminants first. Field filtering of groundwater samples was undertaken using 0.45 µm filters for samples designated for metals analysis. Sample containers were then transferred in an esky on ice to the analytical laboratory under chain-of-custody protocols. *Soil vapour:* A 6 L volume was collected through a carbon tube using a calibrated pump with a flow rate of 200 mL per minute and a 30 minute sampling period. Following sample collection, the carbon tubes were removed and capped and stored in a cool, dry, and dark container for delivery to the analytical laboratory under chain-of-custody protocols and prior to analysis.	Overall the handling of samples of soil, soil vapour and groundwater was acceptable. The DGA reported that field quantification for asbestos (10 L samples) was undertaken on samples representing 1 m increments collected by 150 mm diameter augers. Samples were sieved (7 mm) or inspected on a plastic sheet. Field records and results were not provided in the DGA.

Sampling and Analysis Plan and Sampling Methodology	Auditor's Opinion
Chain of Custody (COC) Completed COC documentation was provided for the DGA.	Acceptable.
Detailed description of field screening protocols *Soil:* Soil samples were screened using a PID to assess the presence of VOCs. Details of the methodology adopted were not provided. During advancement of the soil bore, PID screening of drill cuttings was undertaken at regular intervals, in particular at the base of fill and within different soil strata where there was potential for localised contamination. Representative soil samples were collected for field screening of potential ASS and laboratory SPOCAS analysis. *Groundwater:* Field parameters including pH, EC, redox potential and temperature were measured using a flow cell and samples were obtained after these parameters had stabilised (i.e. consecutive EC, Eh, DO, and pH readings within 3%, 10 mV, 10% and 0.5, respectively). *Ground Gas:* The following parameters were monitored using a landfill gas meter for CH_4, CO_2, O_2, H_2S, CO, atmospheric pressure, differential pressure and gas flow.	Acceptable.
Calibration of field equipment The DGA report indicates that calibration of the water quality meter was undertaken. No mention is made whether calibration of the PID field equipment had been undertaken prior to use and whether calibration checks were performed during use.	It is noted that calibration records for the water quality meter and the PID were not included in the DGA report. The PID results indicate generally low concentrations consistent with laboratory results, indicating that the field screening assessment was acceptable. The field records of the water quality meter indicate stable measurements with small fluctuations confirming the precision of these measurements, although the accuracy of these field measurements may be less reliable without the confirmed calibration records. However, the groundwater field parameters that were reported in the DGA are similar compared to data reported in previous investigations, confirming the overall reliability of these data.
Sampling logs Logs of soil boreholes and groundwater wells are provided in the DGA report. The borehole logs indicate sampling depth, sampling interval, lithology, observations and well construction details. Field logs of groundwater gauging data, sample observations (including colour, odour, presence of LNAPL, DNAPL, sheens) and sampling method details were recorded. Field sheets of ground gas sampling were provided in the DGA report for three wells sampled on 3 November (SB08, SB07 and MW1).	Acceptable.

Table 7.2: QA/QC – Field and Lab Quality Assurance and Quality Control

Field and Lab QA/QC	Auditor's Opinion
Field quality control samples *Soil:* Field QA samples were analysed as follows: • Intra-laboratory duplicate samples at a rate of 1 in 8 primary samples. Two duplicate samples and 16 primary samples were obtained for asbestos analysis. • Inter-laboratory duplicate samples at a rate of 1 in 8 primary samples. • Rinsate blanks (non-dedicated equipment only) with each sample batch. • Trip blanks (at a rate of one per sampling event). • Trip spike (BTEX only) was obtained with each sample batch. *Groundwater:* • Intra-laboratory duplicate samples at a rate of 1 in 10 primary samples. • Inter-laboratory duplicate samples at a rate of 1 in 10 primary samples. • Trip blanks (at a rate of one per sampling event). • Trip spike (BTEX only) was obtained with each sample batch. *Vapour:* • Intra-laboratory duplicate samples at a rate of 1 in 10 primary samples (comparison against analysis of tube front). • Inter-laboratory duplicate samples at a rate of 1 in 10 primary samples (comparison against analysis of tube front). • Field blank (carbon tubes).	The overall field QA/QC from the DGA investigation is acceptable.
Field quality control results Soil quality control results were generally reported to be within the acceptance limits. Copper, lead, TRH and PAH compounds were reported to have elevated RPDs, which was considered by JBS&G to be a result of the relatively low concentrations of these analytes in the samples and the difficulty in obtaining homogenous soil samples in undisturbed sample matrices. As a conservative measure, the highest reported concentration of each constituent at each location was considered in the interpretation of the results of the investigation. Groundwater quality control sample results were generally within acceptable limits. The RPDs for primary and duplicate pairs were within the RPD acceptance limits. JBS&G concluded that the elevated RPD for copper in the two duplicate samples was due to the concentration of the analyte being close to the PQL, and that this exceedance of the RPD DQI criterion is not considered to affect the reliability of the dataset. Blind and split duplicate vapour sample RPDs were within the acceptance limit.	Overall, in the context of the dataset reported, the reported elevated RPD results are not considered significant and the field quality control results are acceptable.
NATA registered laboratory and NATA endorsed methods Samples were analysed at the following laboratories: Eurofins MGT (primary laboratory) and Envirolab Services (secondary laboratory). Both laboratories are accredited by the National Association of Testing Authorities (NATA) for the laboratory analysis undertaken.	Acceptable.

Field and Lab QA/QC	Auditor's Opinion
Analytical methods Analytical methods were included in the laboratory test certificates provided in the DGA report.	Acceptable
Holding times The extraction and analysis of soil and sub-slab vapour samples were completed within the recommended holding times. Groundwater samples MW1, SBMW05 and SBMW06 were extracted and analysed for semi-volatile compounds outside of the recommended holding times.	Groundwater samples which exceeded analytical holding times prior to analysis were immediately placed on ice following sample collection and submitted to the laboratory, where these samples were kept refrigerated prior to sample extraction and analysis. The sample preservation was appropriate, as indicated by trip spike recoveries discussed above. Therefore, it is unlikely that the slight exceedance in extraction time for semi-volatile compounds significantly affects the reported concentrations. I consider that these minor exceedances do not significantly affect the outcomes of the assessment.
Practical Quantitation Limits (PQLs) PQLs were less than the threshold criteria for the contaminants of concern.	Overall the PQLs are acceptable.
Laboratory quality control samples and results Laboratory quality control samples including laboratory control samples, matrix spikes, surrogate spikes, blanks and duplicates were undertaken by the laboratory. Laboratory control samples were analysed for all media types (soil, soil vapour, groundwater) with all recoveries within the acceptance limit (70-130%). Matrix spike sample analyses exceeded the required frequency of 1 in 20 samples for both soil and groundwater analyses. The reported matrix spike recoveries were within the JBS&G DQI acceptance limit (70-130%) and JBS&G concluded that matrix interference in soil and groundwater samples is not considered to be significant with respect to the accuracy of the dataset. Matrix spike analyses were not undertaken for laboratory analyses of carbon tubes (vapour samples). Soil, groundwater and soil vapour surrogate spike analyses showed that generally recoveries for organic constituent analysis were within the DQI acceptance criterion (range: 70-130%). A small number of surrogate samples (in soil and water) showed ranges outside the JBS&G DQI acceptance criterion, however these were within the NATA accredited laboratory's acceptance limits (50-150% recovery). Laboratory blanks reported results less than PQLs for all analytes.	The laboratory quality control results are generally acceptable.
Data Quality Indicators (DQI) and Data Evaluation (completeness, comparability, representativeness, precision, accuracy) DQIs were identified by JBS&G in the DGA. JBS&G concluded that "*the field sampling and handling procedures produced QA/QC results which indicate that the soil, soil vapour and groundwater data are of an acceptable quality and suitable for use in site characterisation*. […] *On the basis of the results of the field and laboratory QA/QC program, the soil, groundwater and soil vapour data is of an acceptable quality in order to achieve the objectives of the assessment*."	An assessment of the data quality with respect to the five category areas has been undertaken by me and is summarised below.

7.1 Auditor's Opinion

I am of the opinion that the completeness, comparability, representativeness, precision and accuracy of the available data are acceptable for the purposes of assessing data gaps. Some data gaps remain, which are discussed in Section 13.

8. ASSESSMENT CRITERIA

Assessment criteria are the concentrations of a contaminant above which further appropriate investigation and evaluation will be required, and provide the basis of a Tier 1 risk assessment. As defined in National Environmental Protection Council (2013) *National Environmental Protection (Assessment of Site Contamination) Measure* (NEPM (2013)), a Tier 1 risk assessment is a risk-based analysis comparing site data against generic assessment criteria for various land uses to determine the need for further assessment or development of an appropriate management strategy. Assessment criteria are presented herein for the protection of human health and ecological receptors, for a range of media including soil, groundwater and ground gas. Soil vapour assessment criteria are not discussed as no VOC detections were made.

8.1 Site Land Use and Assessment Criteria

When choosing the most appropriate human health assessment criteria for the site, I have considered the form of the proposed development (Section 2.4). The human health assessment criteria adopted for this Audit are therefore considered to be protective of 'commercial/industrial' land use.

Although the protection of human health often drives the first stages of a site assessment, NEPM (2013) requires that all site assessments considers the protection of the environment (terrestrial and aquatic receptors). Ecological assessment criteria appropriate for 'commercial/industrial' land use were adopted.

The assessment criteria adopted for the protection of human health and ecological receptors are outlined below.

8.2 Soil Assessment Criteria

Human Health Assessment Criteria

I have adopted soil assessment criteria protective of human health from the following Australian sources:

- NEPM (2013) Health Investigation Levels (HILs) for non-volatile soil compounds for 'Commercial/Industrial' (HIL-D) land use.
- NEPM (2013) Health Screening Levels (HSLs) for TRH, BTEX and naphthalene compounds for 'Commercial/Industrial' (HSL-D) land use (0-1 m depth), for the vapour inhalation pathway. The HSLs assumed a sand soil type.
- NEPM (2013) Management Limits for Petroleum Hydrocarbons for Commercial/Industrial land use and assuming coarse soil texture. Criteria are relevant for operating sites where significant sub-surface leakage of petroleum hydrocarbons has occurred and when decommissioning industrial and commercial sites. These are therefore conservative when applied to the site.
- NEPM (2013) HSLs for Asbestos Contamination in Soil. Criteria applicable for 'Commercial/Industrial' (HSL-D) land use were adopted for AF/FA. ACM criteria were not applicable since 10 L samples were not field screened.
- Friebel & Nadebaum (2011) HSLs for direct contact for Commercial/Industrial (HSL-D), and vapour inhalation/direct contact pathways for intrusive maintenance workers.
- US EPA Region 9 screening levels (soil) for commercial/industrial land use for dibutyltin (DBT) and TBT (and oxide) have been used in the absence of established Australian soil criteria for organotin compounds.

Ecological Assessment Criteria

I have adopted ecological soil assessment criteria from the following sources:

- NEPM (2013) Ecological Screening Levels (ESLs) for 'Commercial/Industrial' land use, assuming coarse soil.
- NEPM (2013) Ecological Investigation Levels (EILs) for 'Commercial/Industrial' land use. In the absence of site-specific soil data on pH, clay content, cation exchange capacity and background concentrations, the lowest added contaminant limits have been applied as an initial screen.
- Canadian Council of Ministers of the Environment (CCME) (2010) *Canadian soil quality guidelines: carcinogenic and other polycyclic aromatic hydrocarbons (PAHs)* soil quality guideline (SQG) for benzo(a)pyrene for 'Commercial/Industrial' land use. The SQG has been adopted in place of the NEPM (2013) ESL as it is based on a larger and more up-to-date toxicity database than the low reliability NEPM (2013) ESL.

Soil Aesthetic Considerations

I have considered the need for soil remediation based on 'aesthetic' contamination as outlined in *Section 3.6 Aesthetic Considerations* of NEPM (2013) Schedule B1, which acknowledges that there are no chemical-specific numerical aesthetic guidelines. Instead, site assessment requires a balanced consideration of the quantity, type and distribution of foreign material or odours in relation to the specific land use and its sensitivity.

8.3 Groundwater Assessment Criteria

Human Health Assessment Criteria

I note that at this site there is no risk of human groundwater consumption due to its saline nature and the presence of a drinking water supply. There is also a low risk of the saline groundwater being extracted for beneficial use (e.g. watering, recreation). Assessment criteria protective of drinking water were therefore not adopted.

Criteria protective of recreational users were adopted from NHMRC (2011) *National Water Quality Management Strategy, Australian Drinking-Water Guidelines 6, Version 3.4 Updated October 2017*. The guidelines were derived assuming a human will ingest 2 L of water per day. Therefore, application of these drinking-water guidelines is overly conservative when exposure is assumed to occur incidentally during activities such as irrigation, swimming and/or maintenance of sumps/pipelines. A factor of 10 was therefore applied to the criteria to account for incidental ingestion in accordance with recommendations provided in Section 9.3.2 of the NHMRC (2008) *Guidelines for Managing Risks in Recreational Water*.

Ecological Assessment Criteria

I have adopted ecological groundwater assessment criteria from Australian and New Zealand Governments and Australian state and territory governments (ANZAST) (2018) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZG) (available at www.waterquality.gov.au/anz-guidelines).

Vapour Inhalation

When considering the vapour inhalation pathway for TRH, BTEX and naphthalene compounds in groundwater, I adopted the groundwater HSLs recommended by NEPM (2013) for 'Commercial/Industrial' land use (HSL-D) and assuming coarse soil texture and depth to groundwater of 2 to <4m. Groundwater was shallower than 2 mbgl in some locations and therefore the HSLs are not strictly applicable in those locations, however, were adopted as an initial screen.

8.4 Ground Gas Considerations

I have assessed the ground gas data provided by the consultant with reference to the NSW EPA (2019) *Assessment and Management of Hazardous Ground Gases, Contaminated Land Guidelines*.

8.5 Acid Sulfate Soil Criteria

The assessment of ASS conditions was undertaken by laboratory SPOCAS analysis, and the results were compared to the ASS action criteria in the *Acid Sulfate Soil Manual* (ASSMAC, 1998).

8.6 Consultant's Assessment Criteria

The human health and environmental quality criteria referenced by me are consistent with those adopted in the DGA.

I note that JBS&G did not consider the use of ecological criteria protective of ecological communities within soil to be relevant for the site because the site will be covered in hardstand under the proposed development, and as such, there will be only limited ecological receptors within the land-based portion of the site. I have assessed the analytical data against ecological criteria, as the proposed development plans included in the DGA were not final plans, with future plans potentially including small areas of landscaping within the land-based portion of the site for which ecological criteria may be applicable.

9. EVALUATION OF SOIL RESULTS

The DGA investigation included the collection of soil samples from 13 locations (Attachment 3).

9.1 Field Results

Fill material was encountered at all sampling locations, with the depth of fill confirmed as between 2.8 mbgl and 5.7 mbgl in four locations. Remaining locations were terminated in fill therefore the depth of fill was not confirmed. Fill material typically comprised gravelly sand and sandy clay with sandstone and varying levels of ash and slag. This was underlain by natural fine-grained silt and sandy clay material (marine sediments) to the maximum depth of the investigation (7 mbgl).

No visible fragments of ACM were identified during the soil sampling activities and no significant staining was observed within the soil/fill profile during the fieldwork.

Slight hydrocarbon odours were noted at soil sampling locations SB03, SB04 and SB05, however, PID field screening showed no evidence of hydrocarbon contamination at these locations, which were in proximity to previous sample locations PBHA01 and PBHA02, where localised hydrocarbon impacts were identified.

Field ASS screening was undertaken within boreholes and there were no visual or olfactory indications of potential ASS materials within shallow fill soils. Sulfidic odours and carbonaceous shells were observed within saturated silty sands and sandy clays (marine sediments), which is consistent with potential ASS conditions.

9.2 Analytical Results

Soil samples collected during the DGA were analysed for contaminants listed in Table 6.1. The results have been assessed against the assessment criteria (Section 8) and are summarised in Table 9.1.

Table 9.1: Evaluation of Soil Analytical Results – Summary Table (mg/kg)

Analyte	n	Detections	Maximum	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
ACM >7 mm (%) from 500 mL samples	18	0	<PQL	0 above HSL-D 0.05%	-
AF/FA (%)	18	1	0.0001%	0 above HSL 0.001%	-
Asbestos trace analysis	18	0	<PQL	-	-
Benzene	22	0	<0.1	0 above HSL-D 0-1 m, sand 3 mg/kg	0 above ESL (c/i) 75 mg/kg
Toluene	22	0	<0.1	0 above HSL-D 0-1 m, sand NL	0 above ESL (c/i) 135 mg/kg
Ethylbenzene	22	0	<0.1	0 above HSL-D 0-1 m, sand NL	0 above ESL (c/i) 165 mg/kg
Total Xylenes	22	0	<0.3	0 above HSL-D 0-1 m, sand NL	0 above ESL (c/i) 180 mg/kg
F1 (TRH C_6–C_{10} minus BTEX)	22	0	<20	0 above HSL-D 0-1 m, sand 260 mg/kg	0 above ESL (c/i) 215 mg/kg
F2 (TRH >C_{10}–C_{16} minus naphthalene)	22	1	480	0 above HSL-D 0-1 m, sand NL	-
TRH C_6–C_{10}	22	0	<20	0 above ML (commercial/industrial) 700 mg/kg	-
TRH >C_{10}–C_{16}	22	2	**480**	0 above ML (c/i) 1,000 mg/kg	**1 above ESL (c/i) 170 mg/kg**
TRH >C_{16}-C_{34}	22	6	1,500	0 above ML (c/i) 3,500 mg/kg	0 above ESL (c/i) 1,700 mg/kg
TRH >C_{34}-C_{40}	22	1	110	0 above ML (c/i) 10,000 mg/kg	0 above ESL (c/i) 3,300 mg/kg
Naphthalene	25	0	<0.5	0 above HSL-D 0-1 m, sand NL	0 above EIL (c/i) 370 mg/kg
Benzo(a)pyrene	25	10	24	-	0 above SQG (c/i) 72 mg/kg
Benzo(a)pyrene TEQ	25	10	37	0 above HIL-D 40 mg/kg	-
Total PAHs	25	12	254.6	0 above HIL-D 4,000 mg/kg	-
Arsenic	25	24	15	0 above HIL-D 3,000 mg/kg	0 above EIL (c/i) 160 mg/kg
Cadmium	25	0	<0.4	0 above HIL-D 900 mg/kg	-
Chromium	25	25	110	0 above HIL-D 3,600 mg/kg	0 above EIL (c/i) 310 mg/kg
Copper	25	23	**230**	0 above HIL-D 240,000 mg/kg	**4 above EIL (c/i) 85 mg/kg**

Analyte	n	Detections	Maximum	n > Human Health Screening Criteria	n > Terrestrial Ecological Screening Criteria
Lead	25	25	610	0 above HIL-D 1,500 mg/kg	0 above EIL (c/i) 1,800 mg/kg
Mercury (inorganic)	25	16	0.8	0 above HIL-D 730 mg/kg	-
Nickel	25	18	**120**	0 above HIL-D 6,000 mg/kg	**5 above EIL (c/i) 55 mg/kg**
Zinc	25	24	**680**	0 above HIL-D 400,000 mg/kg	**11 above EIL (c/i) 110 mg/kg**
Dibutyltin	8	5	0.018	0 above 250 mg/kg	-
Tributyltin	9	1	0.00062	0 above 250 mg/kg	-

n number of samples
- No criteria available/used
NL Non-limiting
<PQL Less than the practical quantitation limit
c/i commercial/industrial

In assessing the results, I make the following observations:

- Laboratory analytical results for soil samples from the DGA reported that concentrations of inorganic and organic contaminants of concern were below the adopted human health screening criteria.
- Exceedances of ecological screening criteria were reported for the following:
  - TRH (C_{10}-C_{16} fraction) at 1 location (SB03_2.9-3.0; 480 mg/kg), comprising saturated fill material with slight hydrocarbon odour and PID of 3.3-5.3 ppm.
  - copper at four locations (SB03_4.9-5.0; 120 mg/kg, SB05_0.5-0.6; 230 mg/kg, SB07_1.9-2.0; 190 mg/kg and SB10_2.9-3.0; 110 mg/kg)
  - nickel in five samples from three locations (SB07_0.4-0.5; 120 mg/kg, SB08_0.1-0.2; 110 mg/kg, SB09_0.2-0.3; 110 mg/kg and duplicate and triplicate samples of SB09_0.2-0.3; 80 mg/kg and 61 mg/kg, respectively)
  - zinc in eleven samples from locations SB03, SB04, SB05, SB07, SB08 and SB10 (up to 680 mg/kg).
- Fragments of ACM were not observed in sampled materials. Asbestos assessment was undertaken via the advancement of 150 mm solid flight auger boreholes, which is not the preferred method given the reduced volumes of drilling spoil inspected. The DGA reports that field quantification for ACM was undertaken, however results and field records were not provided. Trace chrysotile asbestos was detected as loose fibre bundles in sample SB06 0.2-1.0 at an estimated concentration of 0.00012% w/w, which was below the adopted site assessment criterion for AF/FA (0.001% w/w).
- TRH and BTEX concentrations were below the PQL or less than the human health assessment criteria.
- Total PAH and carcinogenic PAH concentrations were below the adopted site assessment criteria. Elevated concentrations of PAHs were reported in samples from SB03_4.9-5.0 (slight hydrocarbon odour noted) and SB05_0.5-0.6 (ash and slag noted).
- Concentrations of organotins were below the adopted criteria.

9.3 Acid Sulfate Soil Assessment

Seven soil samples were collected from shallow (<2.5 mbgl) gravelly sandy fill materials and assessed for the presence of ASS. Peroxide oxidisable sulfur (SPOCAS) ranged from <0.02% S to 0.04% S and the recorded acid trail was <2 mol H^+/t.

An additional five samples were collected from saturated silty clay and sandy clay materials within the lower portions of the boreholes in marine sediment materials. Samples SB05_4.9-5.0 and SB08_4.9-5.0 exhibited characteristics associated with potential ASS with peroxide oxidisable sulfur contents of 0.5% S and 0.74% S, respectively. The acid trail in these two samples was 220 and 310 mol H^+/t, respectively.

Based on the results and field observations, JBS&G considered that shallow gravelly sandy fill does not comprise ASS or PASS. However, underlying saturated silty-sand and sandy clay materials (sediments) comprise PASS and will require management during future construction activities where works disturb these materials.

9.4 Auditor's Opinion

In my opinion, the soil analytical results obtained during the DGA are consistent with the site history and field observations as well as with the results of previous site investigations assessed in the RAP SAR.

I note that contamination presenting a risk to human health was not identified. While asbestos has been found to be present at one sample location (SB06_0.2-1.0), the investigations undertaken to date have not identified the wide-spread occurrence of asbestos in fill materials. The site is largely sealed with hardstand and the sampling methodology adopted during the DGA limited the ability to visually inspect fill materials. There is therefore considered to remain a reasonable potential for asbestos to be present in fill material at concentrations of concern.

Concentrations of TRH (C_{10}-C_{16} fraction), copper, nickel and zinc exceeded generic ecological criteria in a limited number of samples. A number of the results were detected at a greater depth than EILs/ESLs apply (>2 mbgl), however it is noted that a shallower sample was often not analysed. Development of site specific EILs would likely result in many of the metals detections being less than criteria.

I note that soil sampling in the eastern land-based portion of the site was not undertaken in the DGA and previous investigations included limited locations in this area. The soil conditions in this area of the site are not considered adequately characterised.

Assessment of ASS was undertaken on a low density, however the results are consistent with expectations and field observations. Management will be required to minimise the potential adverse effects of ASS following disturbance and oxygenation of sedimentary material at depth within the land-based portion of the site or within the sediments in the water-based portion of the site in Blackwattle Bay. NSW EPA correspondence in '*The New Sydney Fish Market – Concept and Stage 1 (SSD 8924) and Stage 2 (SSD 8925) EPA comment on Response to Submissions'* (Document Reference: DOC20/229048), dated 20 March 2020 recommended that a Dewatering Plan be prepared for waterlogged materials comprising PASS and ASS.

10. EVALUATION OF GROUNDWATER RESULTS

10.1 Field Results

Groundwater sampling was undertaken on 25 and 26 October and 3 November 2018. Groundwater was clear to light brown with a low turbidity and no sheen. An estuarine swamp odour was observed in purged groundwater from locations PBMW2A and PBMW4A. Depths to groundwater were between 1.46 m (PWMW4A) and 2.50 m (PBMW2A) below top of casing (btoc), which corresponded closely to the

prevailing tide level. No NAPL was identified during the development or the gauging of the monitoring wells.

Physicochemical parameters measured in purged groundwater included pH of 6.6 to 7.73, electrical conductivity of 20,312 to 44,823 µS/cm, redox potential of -325 to 221 mV and dissolved oxygen of 0.08 to 4.32 mg/L. The results indicate that groundwater has a near neutral pH, is saline and slightly anoxic, which is consistent with the results reported in the ESA.

10.2 Analytical Results

In October and November 2018 groundwater samples were collected during one round of sampling from ten wells (MW1, PBMW2A to PBMW4A, and SBMW01 to SBMW06). Well locations are shown in Attachment 3.

The analytical results from the groundwater sampling investigation are summarised below in Table 10.1.

Table 10.1: Evaluation of Groundwater Analytical Results – Summary Table (µg/L)

Analyte	n	Detections	Maximum	Health Screening Levels (NEPM, 2013) n > HSL-D	Recreational Criteria (NHMRC, 2011) n > recreational criteria	Aquatic Ecosystem Criteria (ANZAST, 2018) n >95% species protection, Marine Waters
TRH/TPH	12	0	<PQL	0 above HSL	-	-
BTEX	12	0	<PQL	0 above HSL	0 above criteria	0 above criteria
Naphthalene	12	0	<PQL	NL	-	0 above 50 µg/L
Benzo(a)pyrene	12	0	<PQL	-	0 above 0.1 µg/L	0 above 0.1 µg/L
Anthracene	12	3	0.08	-	-	0 above 0.1 µg/L
Fluoranthene	12	5	0.38	-	-	0 above 1 µg/L
Phenanthrene	12	4	0.14	-	-	0 above 0.6 µg/L
Arsenic (As V)	12	7	4	-	0 above 100 µg/L	0 above 24 µg/L
Cadmium	12	0	<PQL	-	0 above 20 µg/L	0 above 0.7 µg/L
Chromium (Cr VI)	12	0	<PQL	-	0 above 500 µg/L	1 above 4.4 µg/L
Copper	12	9	**6**	-	0 above 20,000 µg/L	**9 above 1.3 µg/L**
Lead	12	3	**11**	-	0 above 100 µg/L	**1 above 4.4 µg/L**
Mercury	12	0	<PQL	-	0 above 10 µg/L	0 above 0.1 µg/L
Nickel	12	7	2	-	0 above 200 µg/L	0 above 7 µg/L
Zinc	12	9	**73**	-	-	**6 above 15 µg/L**

n number of samples
- No criteria available/used
<PQL Less than the practical quantitation limit
NL non limiting

In assessing the analytical results, I make the following observations:

- Concentrations of selected metals (copper, lead and zinc) exceeded ecological screening criteria. The results are consistent with the groundwater investigation results reviewed in the RAP SAR.
- PAH concentrations were recorded below the adopted ecological criteria, although detections of anthracene (up to 0.08 µg/L), phenanthrene (up to 0.14 µg/L) and fluoranthene (up to 0.38 µg/L) were reported in a number of samples. Samples were from wells located along the south-eastern area of the site.
- TRH and BTEX were not detected above the laboratory PQLs.

10.3 Auditor's Opinion

In my opinion, the groundwater monitoring undertaken in the DGA was sufficient to adequately characterise and identify widespread and significantly elevated contaminant concentrations.

Significant petroleum hydrocarbon impact associated with former USTs (as well as potential unidentified USTs) was not identified during groundwater sampling undertaken during the DGA or previously. Elevated PAH concentrations may be associated with USTs, however are more likely to be associated with ash and slag in fill material.

With respect to elevated metals concentrations (copper, lead and zinc), the DGA states that "*Given that there was no significant change of metal concentrations between up gradient and down gradient monitoring wells in addition to no high levels of metals reported in soils at the site, groundwater metal concentrations are likely to be representative of natural background conditions in the urban environment rather than point source impacts associated with site conditions*" and that "*it is considered unlikely that groundwater metal concentrations at the site are elevated because of previous or current activities at the site*".

I do not agree with some of the conclusions stated in the DGA. Fill material contained elevated metals concentrations (Section 9) and was located below the SWL. The elevated metals concentrations in groundwater may therefore be associated with fill material. It is noted however that fill material is more widespread than the immediate site, extending to the southeast into Wentworth Park. Further investigation or remediation of elevated metals concentrations in groundwater would therefore be of limited benefit if limited to the site.

11. EVALUATION OF GROUND GAS RESULTS

During the DGA, hazardous ground gas was sampled at the ten groundwater sampling locations, with sampling undertaken on 2 November and 4 December 2018. The results of the hazardous gas monitoring are summarised below. It is noted that the discussion of results in the DGA (Section 10.2) presented different data than that in Table D of the DGA report. This IAA has reviewed the data presented in the Table D rather than relying on the information presented in Section 10.2 of the DGA.

Stabilised gas flow rate measurements during the monitoring event varied from less than 0.1 L/hr to a maximum flow rate of 2.5 L/hr at SBMW05. JBS&G state that the highest flow rates were potentially associated with elevated atmospheric wind conditions.

Recorded gas concentrations at each well location include the following:

- CH_4 concentrations were generally below the limit of reporting, with one detection at PBMW4A (1.3%). A gas screening value (GSV) of 0.005 was calculated for CH_4 (1.3% x flow rate of 0.4 L/hr).
- CO_2 gas concentrations varied from below the limit of reporting to a maximum concentration of 11.5% at PBMW4A. A GSV of 0.046 was calculated for CO_2 (11.5% x flow rate of 0.4 L/hr).
- H_2S and CO gas concentrations were below the limit of reporting at all locations.

- O_2 concentrations varied between 17.7% to 21.7%.

The results are consistent with previous monitoring reviewed in the RAP SAR.

The calculated GSVs for CH_4 and CO_2 classify the site as very low risk (characteristic situation 1). No gas protection is required based on the results presented in Table D of the DGA.

11.1 Auditor's Opinion

Ground gas monitoring was undertaken from an adequate number of sampling locations and provides an adequately representative (conservative) assessment of the ground gas conditions. Further assessment of ground gas conditions is not considered to be warranted.

12. EVALUATION OF SOIL VAPOUR RESULTS

Soil vapour probes were installed at 20 sample locations during the DGA (SS01 to SS20) (Attachment 3).

No significant odours or indicators of contamination were observed during the placement of the vapour probes. Stabilised O_2 (range: 1.3% to 20.8%), PID (range: 0.1 to 8.3 ppm), CH_4 (0% at all locations), CO_2 (range: 0.0% to 6.6%) and H_2S (0% in all samples) readings were obtained at each sample location prior to collection of the vapour sample.

VOC analyses of the 21 sub-slab vapour samples, including one duplicate sample, reported concentrations below the PQL.

12.1 Auditor's Opinion

Soil vapour monitoring was undertaken from an adequate number of sampling locations and provides a representative assessment of soil vapour conditions. VOC contamination was not identified, which is consistent with field observations and the site history. Further assessment of soil vapour conditions is not considered to be warranted.

13. EVALUATION OF CONCEPTUAL SITE MODEL

A conceptual site model (CSM) is a representation of the contaminant source, pathway and receptor linkages at a site. The ESA and RAP previously presented a CSM based on the results of previous investigations. The CSM was used in the ESA to identify data gaps and inform decisions around further investigation and management requirements. The DGA provided a refined CSM based on the results of the additional investigations of soil, groundwater, soil vapour and hazardous ground gas.

Table 13.1 provides my review of the CSM presented in the DGA.

Table 13.1: Review of the Conceptual Site Model

Element of CSM	Consultant	Auditor Opinion
Contaminant source and mechanism	The previous site investigations identified areas of potential environmental concern (APEC) and corresponding COPCs, including: • Fill used during land reclamation activities (COPCs: heavy metals, TPHs, VOCs, PAHs, OCPs, herbicides, PCBs, asbestos, ASS, ground gases) • Former coal wharf (COPCs: heavy metals, TPH, VOCs, PAHs, asbestos, TBT) • Current and former concrete batch plants (COPCs: heavy metals, TPH, VOCs, PAHs, solvents, asbestos, TBT, OPPs)	The revised CSM in the DGA does not discussion the contaminant sources. The previous site investigations identified and adequately described the known and potential sources of contamination and contaminants of concern including the mechanism(s) of contamination.

Element of CSM	Consultant	Auditor Opinion
	• Current and former industrial areas, including USTs and associated infrastructure, chemical use and building materials (COPCs: heavy metals, TPH, VOCs, PAHs, OCPs, OPPs, herbicides, PCBs, asbestos) • Marina areas where maintenance/storage activities using TBT, creosote and heavy metal containing products/materials have been applied and/or removed, infrastructure, and the wharves themselves as part of site activities (COPCs: heavy metals, TPH, VOCs, PAHs, asbestos, OPPs, TBT, solvents)	
Affected media	Each of the APECs and corresponding COPCs previously identified in the ESA have the potential to impact soils, groundwater, surface water and vapours (indoor and ambient air). The DGA identified the following affected media and corresponding COPCs: • Fill used during land reclamation activities: *"no identified impacts to site soils that require management or remediation…"*. • Natural soils: ASS • Groundwater: copper, lead and zinc exceeding ecological criteria, however these were considered to be natural background conditions of an urban environment • Ground gas was considered very low risk • VOC concentrations in soil vapour were less than the detection limit and was therefore not considered to be affected.	I agree with the affected media identified, with the exception of the characterisation of fill and sediment, as follows. Elevated concentrations of metals and TPHs were identified in fill material exceeding ecological criteria. Elevated concentrations of PAHs were also identified in fill material associated with ash and slag. The site is largely sealed with hardstand, the sampling methodology adopted during the DGA limited the ability to visually inspect fill materials, and quantification of ACM was not undertaken. There is therefore considered to remain a reasonable potential for asbestos to be present in fill material at concentrations of concern. Impact to sediments is not included in the DGA CSM. Previous investigations included only a limited scope for the assessment of sediment, which was to be addressed in future data gap assessments. Previous investigations identified TRHs, PAHs, metals, TBT and PCB as COPCs in sediment. The RAP reported that contaminant concentrations in sediment were generally consistent with sediments across the broader Blackwattle Bay area.
Receptor identification	The DGA summarised potential human receptors and associated exposure pathways for the site based on exposure scenarios that may occur under the proposed redevelopment of the site. The potential primary human receptors are as follows: • Patron (adult or child) and commercial worker (adult). Location: commercial building and land area of the site. • Construction worker or intrusive maintenance worker (short duration). Location: excavations. • The site will be sealed as a result of building and/or accessway construction. Ecological receptors are limited to off-site receptors which have the potential to be	The potential human and ecological receptors have been adequately identified. It is however noted that disturbance of in situ sediment during development or site use may impact ecological receptors. Should the development plans be revised, there may be a requirement to revise the receptors. In particular, if landscaping with site soils is proposed.

Element of CSM	Consultant	Auditor Opinion
	impacted as a result of groundwater or surface water (if present) migrating from the site to the surface waters of Blackwattle Bay.	
Exposure pathways	No current ecological or human health risks have been identified within soils or groundwater under the proposed development. The primary pathway of concern for the site is gas/vapour intrusion. Gases from the subsurface can potentially migrate into buildings and gases can potentially accumulate in buildings due to reduced ventilation. However, concentrations of VOCs in sub-slab vapour were shown to be below laboratory detection limits, indicating an incomplete pathway for these contaminants. Review of the existing ground gas data indicated that the maximum GSV for the site falls within 'characteristic gas situation 1' comprising very low risk conditions. Available soil and sediment data were previously compared to direct contact criteria (where available), and results were below the adopted criteria under a recreational land use scenario.	Direct contact pathways (oral and dermal) will be limited for most site users. The majority of the site will be sealed, and as such direct contact to contaminated soils, groundwater or sediment would be limited for site users. Constructions workers may be exposed to impacted materials during development works. Inhalation of soil vapour or ground gases is an exposure pathway, however is not considered to present a risk based on the results of the DGA. With regard to potentially completed ecological exposure pathways on-site, the majority of the site will be sealed as a result of building and/or accessway construction. Limited vegetation will be present in raised planter beds or similar, rather than within site soils. As such there are no direct exposure pathways for ecological receptors to soil. The proposed development may result in changes in sediment bed levels and in the movement of vessels within the Bay. This may lead to changes in hydrodynamic flow conditions, such that surficial sediments may at times be disturbed/re-suspended in different areas of the Bay, resulting in localised changes in sediment/water chemistry and ecosystem conditions. Further consideration as to the potential environmental impacts of such changes were beyond the scope of the previous assessments and will require further consideration during the broader design of the development.
Presence of preferential pathways for contaminant movement	The DGA did not discuss preferential pathways.	Preferential pathways are typically associated with soil vapour and ground gas. Impact was not identified during the DGA therefore further consideration of preferential pathways is not considered necessary.
Potentially complete source-pathway-receptor (SPR) linkages requiring remediation or management	The DGA concluded that *"No current ecological or human health risks have been identified within site soils or groundwater under the proposed development scheme"*. The SPR linkage for gas/vapour intrusion was considered to be incomplete based on the contaminant concentrations identified during the DGA.	The available investigation data has not identified complete SPR linkages, however there is the potential for some to be present based on the identified data gaps (discussed in Section 13.1 below).
Evaluation of data gaps	The DGA noted that waste classification of material requiring offsite disposal was a data gap, in particular leachability analysis. The DGA noted that this was to be assessed when service plans were available.	The DGA addressed a number of data gaps outlined in the RAP, however some remain. These are listed in Section 13.1 below.

Element of CSM	Consultant	Auditor Opinion
	The RAP notes that additional surface water quality data should be collected to provide a baseline dataset prior to development activities commencing. The dataset can be used to monitor the success of management measures to be implemented during construction activities.	

13.1 Auditor's Opinion

The CSM presented in the DGA is considered an adequate basis for assessing remedial requirements and to inform management requirements during the proposed development works. Additional data gaps considered to remain following the DGA include the following:

- Soil in the eastern land-based portion of the site was not assessed at an adequate density. Further assessment would be required to inform suitability of the material to remain onsite or for waste classification for offsite disposal.
- The footprint of the electrical substations require assessment for PCBs and PAHs following demolition.
- Characterisation of fill materials for the presence of asbestos was limited by the methodology adopted during the DGA. There is considered a reasonable potential for asbestos to be present within fill material. The absence of asbestos in material disposed offsite and any fill material retained onsite should be confirmed by further assessment during redevelopment, ideally following removal of buildings and hardstand.
- The location of historical fuel infrastructure is unknown. Whilst there is indirect evidence that it was removed, the original documentation associated with the remediation and validation works has not been provided. Investigations to date have not identified significant petroleum hydrocarbon contamination in soil, groundwater or soil vapour, therefore this data gap is not considered significant. Further assessment or management may be required if localised impact is identified during excavation of the site, however this could be adequately managed under the UFP.
- There is the potential for additional USTs to be present as records of dangerous goods storage have not been reviewed. Bulk excavation of the site is proposed which would likely identify any unidentified USTs. The RAP includes a general procedure for removal of USTs within the contingency plan. Review of SafeWork NSW dangerous goods records and other sources of historical information (i.e. historical aerial photographs, NSW EPA records, Council records, Certificates of Title) is recommended to identify additional potential sources of contamination.
- Previous assessment of sediments did not adequately address comparisons against relevant ANZAST (2018) DGVs for PCBs and OCPs (PQLs were too high) and normalisation with TOC (not analysed in EIS, 2017) on a sample-by-sample basis. Further sediment assessment was not undertaken in the DGA. The RAP did not indicate specifics of further sediment sampling to be undertaken. It is noted, however, that the RAP states that *"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 will be undertaken. The scope and nature of the assessment will be sufficient to enable a suitable data set to guide management of potential contaminant and acid release during the construction works"*. This should be addressed when the final development plans are available.
- The RAP SAR noted that the density of sediment samples is not uniform across all areas of the site. In particular, sediments in the western portion of the site have previously been sampled at a lower density. The existing data set is considered sufficient to broadly characterise sediment quality,

although further characterisation of sediments is required to inform management during excavation and construction. Management of sediment dewatering activities requires the development of a Dewatering Plan to demonstrate that dewatering of sediments will not result in the discharge of contaminants to the Blackwattle Bay receiving environment.

The remaining data gaps can be addressed during demolition of existing structures, excavation of the basement area and construction of the Fish Market building. Processes and procedures defined in the RAP were updated in a revised RAP (8 July 2020) to address the remaining data gaps. The revised RAP is to be reviewed by me in a Section B SAS and SAR. The proposed construction environmental management plan (CEMP), REMP and Dewatering Plan will provide further confidence that data gaps can be adequately addressed.

14. HAZARDOUS MATERIALS REMOVAL MANAGEMENT PLAN

JBS&G prepared a HMMP (8 April 2020) which provided details and management procedures for the proposed decommissioning and demolition of the existing structures at the site, including the Hanson concrete batching plant infrastructure, wharf structures, a finger jetty, a concrete jetty, piles supporting the existing wharves and jetty structures, the Jones Brothers Coal Loader remnants and all other associated land and water based infrastructure in addition to works to make good the existing seawall infrastructure.

The HMMP was replaced by the HMRMP (12 August 2020) in response to the findings of a draft version of this IAA and to satisfy the requirements of Condition B28 of SSD 8924. Condition B28 requires the HMRMP to include the following:

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 code 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 material 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 procedures for validation and inspection following the completion of asbestos removal works and issuing of asbestos clearance certificates.

The objective of the HMRMP is to provide *"…procedures and standards to be followed in order to remove hazardous materials associated with current infrastructure at the site, whilst ensuring the protection of human health and the surrounding environment"* under appropriate regulatory and legislative guidance.

Hazardous building materials that may be identified in historical buildings include ACM, lead-based paint, PCBs, synthetic mineral fibres (SMFs) and ozone depleting substances (ODS), in addition to asbestos and lead containing dusts from degraded materials. These materials require careful

management during demolition activities undertaken at a site in order to protect sensitive receptors. The HMRMP summarises the findings of a survey of buildings and other structures on Lots 3 to 5 undertaken on 30 April 2020. The survey identified asbestos, lead paint and dust and SMF. Inspection of light fittings could not be undertaken, and it was assumed that PCB containing capacitors were present.

The survey did not access the electrical substations on Lots 3 and 5 and the HMRMP recommended that hazardous material identification and removal be undertaken under separate management/removal plans.

The survey also did not access the portions of Lot 107 and Lot 1 within the site and the HMRMP recommended that a pre-demolition hazardous building materials survey be undertaken to confirm the presence, extent and conditions of materials.

Removal works management procedures and relevant responsible persons are identified in the HMRMP, in addition to asbestos removal contractor licence requirements and site management activities (Hazardous Material Removal Control Plans, site safety inductions, training and certification, site access controls, personal protective equipment (PPE) and decontamination requirements). The removal protocols for asbestos, lead paint and dust, SMF and PCBs are detailed in the HMRMP. ODS were not identified during the survey and therefore removal protocols were not included in the HMRMP.

14.1 Auditor's Opinion

The HMRMP addresses the proposed decommissioning and demolition of the existing structures at the site (excluding the electrical substations). The requirements of Condition B28 are largely met, with the exception that an Asbestos Management Plan (item e) was not included in the HMRMP. JBS&G considered that the requirements of an asbestos management plan were provided in the HMRMP. I note that the contents of an asbestos management plan are defined by the *Work Health and Safety Regulation 2017*, which I have not reviewed as it is not a requirement of the *Contaminated Land Management Act 1997*.

The HMRMP notes that asbestos may be present within fill material, however does not provide procedures for handling asbestos in soil. Asbestos has not been observed during site investigations and laboratory assessment of fill material identified AF/FA in one sample below the criteria. Limitations were identified with the sampling density and methodology, therefore characterisation of fill material for asbestos has been identified as a data gap (Section 13.1) requiring further assessment following removal of buildings and hardstand. There is a reasonable potential for fill material to contain asbestos given the presence of other anthropogenic materials (timber, tile, ceramic, glass, concrete, brick, slag and ash). The HMRMP noted that appropriate asbestos management controls were provided in the revised RAP and could be included in the CEMP. This is considered appropriate.

The HMMP would require revision to include specific procedures for ODS should these be identified on the site.

15. CONCLUSIONS AND RECOMMENDATIONS

JBS&G concluded in the DGA that:

> "*Based on the results and findings of this data gaps assessment, it is considered that the remedial framework outlined in the RAP… is valid, and when implemented will ensure the site is suitable for the proposed development. Notwithstanding, it is recommended that the RAP, ASSMP and HMMP… be revised to include the additional results and findings of this data gap assessment such that the final remedial scope/management requirements can be defined.*"

As noted in Section 13.1 of this IAA, there are residual data gaps that were not addressed in the DGA. The data gaps are unlikely to preclude remediation works outlined in the RAP from being undertaken, however I agree that update of the RAP and HMMP was required to incorporate the results of the DGA

and plans for addressing remaining data gaps, as well as the requirements of the development consent. The HMRMP was prepared to address the findings of a draft version of this IAA and satisfy the requirements of Condition B28 of the development consent. A revised RAP (8 July 2020) has also been prepared and is to be reviewed by me in a Section B SAS and SAR.

In response to the NSW EPA comments provided in Section 1.1, I provide the following conclusions:

1. *"…the appropriateness of the DGA report and the report's conclusions…":* The scope of the DGA addressed many of the data gaps identified in the RAP and the RAP SAR, however some are noted to remain (Section 13.1 of the IAA). I agree with the DGA conclusion that the remedial framework in the RAP was valid, however update of the RAP was required to include the results of the DGA, as well as processes and procedures to address the remaining data gaps and the findings of this IAA. The revised RAP is to be reviewed in a Section B SAS and SAR.
2. *"…whether the characterisation is sufficient to ensure any asbestos containing materials in soils and at ground surface are managed appropriately…":* Characterisation of asbestos was identified as a data gap following the DGA. Areas of the site were not assessed, the density of field quantification was low and the methodology adopted did not adequately characterise fill materials for asbestos. There is considered a reasonable potential for asbestos to be present within fill material. Further assessment of fill material for asbestos should be undertaken following building demolition and removal of hardstand. The revised RAP summarised the remaining data gaps and included procedures for addressing them.
3. *"…whether the management requirements [of the HMMP] are appropriate…":* The HMMP reviewed by the NSW EPA was revised in the HMRMP. The HMRMP identifies hazardous building materials and includes procedures for their removal. It does not discuss removal of asbestos from the surface or within soil, however the revised RAP provides appropriate procedures for this purpose. It is therefore concluded that the HMRMP and revised RAP provide appropriate processes and procedures for the management of asbestos within structures, on the ground surface and within soil.

* * *

Consistent with the NSW EPA requirement for staged 'signoff' of sites that are the subject of progressive assessment, remediation and validation, I advise that:

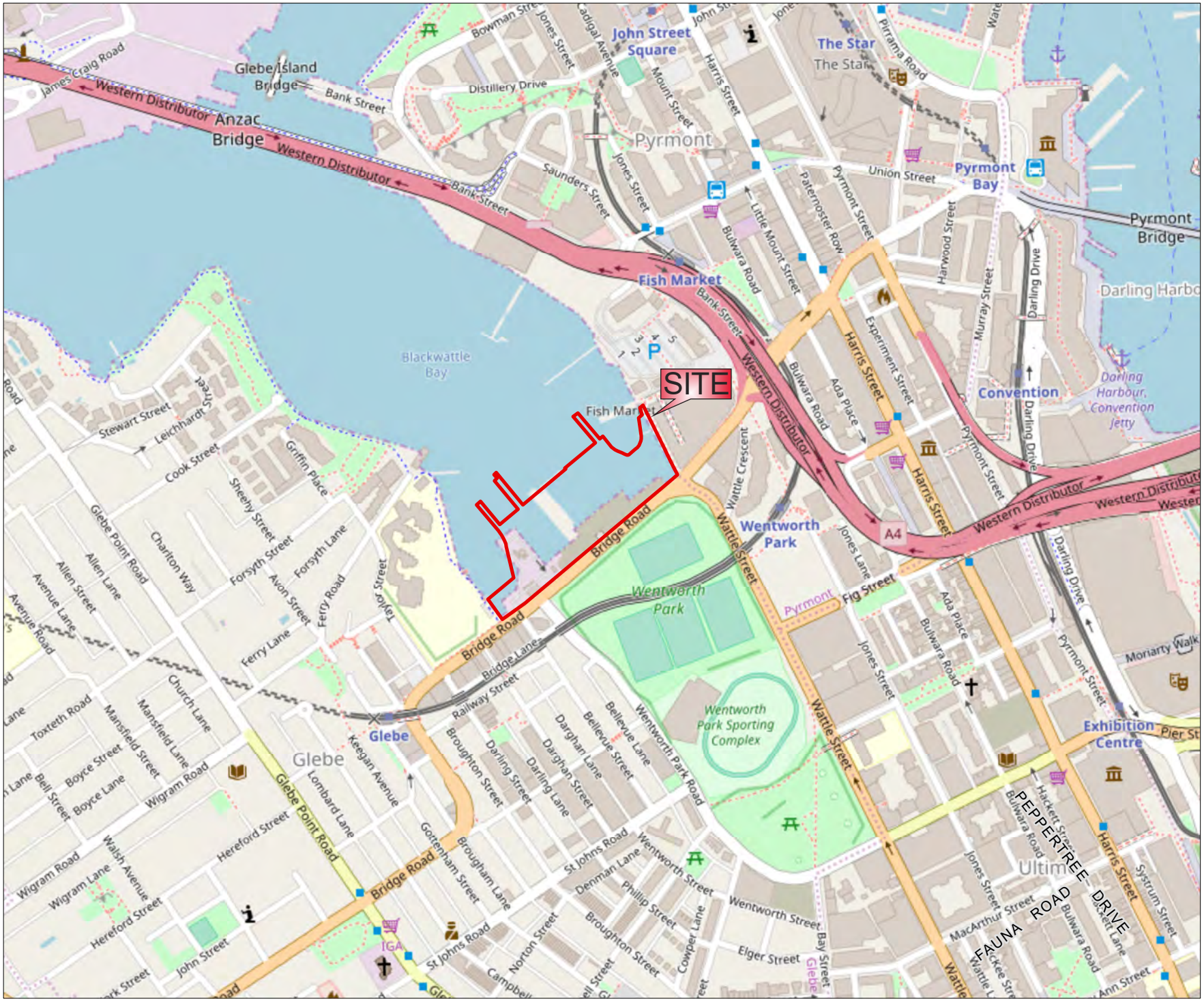
- This advice letter does not constitute a Site Audit Report or Site Audit Statement.
- At the completion of the remediation and validation I will provide a Site Audit Statement and supporting documentation.
- This interim advice will be documented in the Site Audit Report.

Yours faithfully
Ramboll Australia Pty Ltd

Tom Onus
EPA Accredited Site Auditor 1505

Attachments:
1. Site Location
2. Site Layout
3. DGA Sample Locations

Attachment 1: Site Location



Legend:

Approximate new Sydney Fish Market development boundary

JBS&G

Job No: 54578	
Client: UrbanGrowth NSW	
Version: R05 Rev A	Date: 04-Feb-2019
Drawn By: RF	Checked By: CB

Scale 1:8,000

0 100 200
metres

Coor. Sys. GDA 1994 MGA Zone 56

1A-C Bridge Road
Pyrmont, NSW

SITE LOCATION

FIGURE 1

File Name: 54578_01
Service Layer Credits: © OpenStreetMap (and) contributors, CC-BY-SA

Legend:

- Approximate new Sydney Fish Market development boundary
- Cadastral Boundary
- Approximate Land Area
- ACM Fragments Observed on Ground Surface

Proposed Landuse

- Fishmarkets Building Envelope
- Public Domain
- Working Wharfs

Attachment 2: Site Layout

JBS&G

Job No: 54578

Client: UrbanGrowth NSW

Version: R05 Rev A	Date: 01-Mar-2019
Drawn By: CA	Checked By: CB

Scale 1:2,000

0 25 50
metres

Coor. Sys. GDA 1994 MGA Zone 56

1A-C Bridge Road
Pyrmont, NSW

SITE LAYOUT

FIGURE 2

File Name: 54578_02
Reference: Near Map - http://www.nearmap.com.au/. Imagery - 18-01-2018.

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

JBS&G

Job No: 54578	
Client: UrbanGrowth NSW	
Version: R05 Rev A	Date: 01-Mar-2019
Drawn By: CA	Checked By: CB

Scale 1:1,200

0 20 40
metres

Coord. Sys. GDA 1994 MGA Zone 56

1A-C Bridge Road
Pyrmont, NSW

SAMPLE LOCATIONS
FOR DATA GAP ASSESSMENT

FIGURE 4

Document Path: \\JBSG-NSW-FS01\Company Data\Projects\UrbanGrowth NSW\54578 Fishmarkets BMD DA RAP ASSMP CEMP\GIS\Maps\R05 Rev A\54578_04.mxd
Reference: www.nearmap.com - Imagery 20180415

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