roberts co

Environmental Management Plan

Children's Hospital at Westmead Stage 2 Development
Paediatric Services Building

Date: June 2023

Document Details

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Client	NSW Health Infrastructure
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Document Authorisation

James Stavropoulos	**Luke Tracey**	**Miles Mesic**
PROJECT MANAGER	**SITE MANAGER**	**PROJECT HSE MANAGER**
14.06.2023	14.06.2023	14.06.2023
Date	**Date**	**Date**

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1 DOCUMENT CONTROL

All changes made to the Project Environmental Management Plan are recorded in the amendment table below. The version number and date of revision for the current document revision are shown in the-footer of the document.

1.1 Revision History

Revision	Date	Description of changes	Prepared by	Approved by
01	15.07.2022	Initial version	Miles Mesic	James Stavropoulos
02	19.09.2022	Plan updated to new revision	Miles Mesic	James Stavropoulos
03	13.12.2022	Review Rev 03	Miles Mesic	James Stavropoulos
04	13.03.2023	Review Rev 04	Miles Mesic	James Stavropoulos
05	14.06.2023	Review Rev 05	Miles Mesic	James Stavropoulos

1.2 Management reviews

Review date	Details	Reviewed by
15.07.2022	Initial version	James Stavropoulos
19.09.2022	Plan updated to new revision	James Stavropoulos
13.12.2022	Review and update Environmental Control Plan	James Stavropoulos
13.03.2023	Review and update Environmental Control Plan	James Stavropoulos
14.06.2023	Review and update Appendix 1 – Environmental Policy	James Stavropoulos

1.3 Controlled copies

Name	Position	Date	Revision
James Stavropoulos	Project Director	15.07.2022	01
James Stavropoulos	Project Director	19.09.2022	02
James Stavropoulos	Project Director	13.12.2022	03
James Stavropoulos	Project Director	13.03.2023	04
James Stavropoulos	Project Director	14.06.2023	05

2 DEFINITIONS AND ABBREVIATIONS

Term/Abbreviation	Definition
AS/NZS	Australian Standard/New Zealand Standard
Client (Principal)	The party to whom Roberts Co is contracted for a Project
Client's Representative	The person appointed by the Client to perform the duties of the Client's Representative as defined in the contract
Consultant	The party engaged to perform the design, preparation of detailed 'For Construction' documentation and necessary certification to meet contractual requirements.
D&C	Design and Construct
ECP	Environmental Control Plan – defines management measures for a specific environmental aspect
EEO	Energy Efficiency Opportunities
HSE	Health, Safety and Environment
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
ESS	Environmental Effects Statement
EMP	Environmental Management Plan – this document
Environment	The Project's surroundings, including air, water, land, flora, fauna, humans and their interaction
Environmental Aspect	An element of the Project that has potential to cause environmental impacts
Environmental Impact	A change to the environment, positive or negative, caused by environmental aspects
EPBC Act	Environmental Protection and Biodiversity Conservation Act (Commonwealth) - legislation to protect and manage matters of national environmental significance
EPA	Environment Protection Authority
ESD	Ecologically Sustainable Development
H&S	Health and Safety
HSC	Health and Safety Committee
HSEQ	Health, Safety, Quality and Environment
IMS	Integrated Management System
ITP	Inspection and Test Plan – defines the steps to be taken to check and verify an activity or product
NGER	National Greenhouse and Energy Reporting
OEH	Office of Environment and Heritage
O&M	Operations and Maintenance
PAP	Principal's Authorised Person

Term/Abbreviation	Definition
PM	Project Manager
PMP	Project Management Plan
PP	Process Procedure – A work instruction, which details the technical/engineering/safety/quality/environmental methodology for a particular activity
RCo	Roberts Co
SEP	Site Environmental Plan – site level document providing a map or spatial representation of the site identifying the location of specific environmental controls and sensitive areas, and detailing practical environmental management methods to be implemented at specific work sites
SDS	Safety data sheet
SWMS	Safe Work Method Statement – a planning process to determine detailed methodology, identification of hazards, risks and control measures, used to break down and analyses individual PRA work elements. Specific risk assessment based on day-to-day tasks, facilitated by supervision and involving consultation with workforce before task is undertaken. Signed off by all people undertaking the task.
Subcontractor	Any company, body or person who is contracted to Roberts Co for the purpose of supplying plant and/or services
System Element	The administrative activities that need to be implemented and controlled to ensure that the product or service meets environmental requirements
The Project	CHW STAGE 2 – PAEDIATRIC SERVICES BUILDING
TMP	Traffic Management Plan
PRA	Project Risk Assessment – High level strategic risk assessment conducted on the workplace and broken down into work components for the purpose of identifying system, training and legislative controls requirements, and identifying the need for further detailed planning and risk assessment activities. The PRA also fulfils the function of an aspects and impacts register.

Table 01 – Terms of reference, definitions, and abbreviations.

3 PURPOSE AND APPLICATION

This Environmental Management Plan ("**EMP**") for the CHW STAGE 2 – PAEDIATRIC SERVICES BUILDING ("**The Project**") outlines the Roberts Co system for managing and minimising the environmental impacts of its activities, meeting its legislative and contractual obligations and providing a means of continually improving environmental performance.

This EMP provides a 'road map' for the implementation of the Project Environmental Management Systems, including plans, procedures and forms. It provides directions to the documents required to address Environmental Management for the Project. This EMP is for use by all Project personnel and subcontractors during the Project [include relevant phases]:

– Design
– Procurement
– Construction
– Commissioning

3.1 Environmental Management Plan

The EMP has been developed in accordance with the requirements of ISO 14001 and the Roberts Co Integrated Management System. It incorporates the requirements of the contract / project scope / tender documents including:

– Legislative and contractual requirements and other environmental obligations
– Approval conditions
– RCo Environmental Policy objectives
– Objectives and measurable targets associated with the potential environmental impacts of the Project
– Processes and procedures that Roberts Co will adopt to identify, manage and control the environmental aspects and impacts (using a risk management approach)
– Provision of adequate resources and allocation of responsibilities for ensuring the effective implementation of this EMP
– Methods for maintaining records and requirements for reporting
– Process for monitoring and reviewing the environmental management performance of the Project to drive continual improvement

This EMP has been revised to incorporate all relevant contractual information and obligations.

Project-based Roberts Co personnel are required to sign the EMP acknowledgment form in Appendix 02.

3.2 Supplementary Plans

Supplementary Plans may be required by the contract or deemed necessary by the Project Manager. Supplementary environmental plans that are required will be included as annexures to this plan.

Other environmental management plans may include, but not limited to the following [include relevant plans]:

– Noise and Vibration Management Plan
– Waste Management Plan
– Traffic Management Plan
– Heritage Management Plan
– Sustainability Management Plan
– Flora and Fauna Management Plan
– Acid Sulphate Soil Management Plan
– Community & Stakeholder Engagement Plan

3.3 Interfacing with Other Plans

This EMP should be read in conjunction with the other suite of Project specific management plans [include relevant plans]:

– Project Management Plan
– Construction Management Plan
– Design Management Plan
– Work Health and Safety Management Plan
– Quality Management Plan
– Workplace Relations Management Plan

3.4 Environmental Policy

The Project and its nominated contractors will operate in accordance with the RCo Environmental Policy as shown in Appendix 01. The policy is reviewed and endorsed on an annual basis by the Chief Executive Officer (CEO) to ensure its ongoing suitability and effectiveness.

The Project's commitment to the Environmental Policy will be demonstrated by:

– Communication of the policy intent to all personnel through inductions and notice board displays
– Provision of adequate resources and assigning responsibilities to implement and maintain the EMS
– Achievement of the Project Targets / Objectives and regular reviews to manage their suitability and effectiveness

3.5 Project Scope

The proposed Paediatric Services Building (PSB) will enable the expansion and replacement of existing paediatric services at Children's Hospital at Westmead, providing additional surgery and critical care services. The PSB will be an important addition to the Westmead Health Precinct, enhancing the provision and quality of paediatric health services to the growing Western Sydney population.

The PSB is a high-rise state-of-art paediatric hospital consisting of:

– Loading Dock, back of house and logistics services accessed via Redbank Road (Level 2)

– New front of house and retail facilities accessed via Hawkesbury Road (Level 2 and 3)

– A new Pharmacy and Surgical Short Stay Unit (Level 3)

– A new Perioperative service (Level 4)

– Shell floors for future Inpatient Units (Level 6 and 13).

– New PICU and NICU (Level 7 and 8)

– New Oncology Inpatient Units, and patient and family focused retreat areas and a Day Oncology Unit (Level 10 and 11)

– New Medical and Surgical Inpatient Units (Levels 9, 11, 12), inclusive of family accommodation.

– Short-stay parking.

– Integration to surrounding health and research buildings via pedestrian link bridges to the CASB and KR/CHW.

– Public domain and associated landscaping.

The project also includes a number of interfaces with other contracts and contractors on adjacent and related lots within the precinct, such as the refurbishment works to the existing Children's Hospital, and the Combined Civil works contract.

3.6 Receiving Environment

CHW is located within the Westmead Health Precinct which spans over 75 hectares, comprising over 400,000m2 of high-end health related developments, including four major hospitals, four medical research institutes and two university campuses. The Westmead Health Precinct stretches from Westmead Railway Station in the south to Toongabbie Creek and Parramatta River in the north and north-east.

The Westmead Health Precinct is located approximately 1.5km north-west of the Parramatta Central Business District (CBD), the primary metropolitan centre of Western Sydney, and approximately 26km west of the Sydney CBD. The surrounding areas include Northmead, North Parramatta, Wentworthville, and Constitution Hill.

Major health and education facilities, including CHW, Westmead Hospital and the Westmead Campus of Western Sydney University, are all accessible from Hawkesbury Road, which acts as the main public thoroughfare of the Precinct.

Figure 2 Local context of the site
The indicative location of the site is shown with a red dot.
Source: Metro Map with Architectus edits (2020)

3.7 Approach

RCo is committed to undertaking business in a manner that recognises the importance of environmental protection and sustainability through a risk and opportunity-based approach.

Our vision is to achieve environmental excellence through:

– Shared responsibility for self-regulation and continual improvement

– Understanding and accepting environmental accountability and responsibility

– Ensuring effective communication of information for improved performance

3.8 Environmental Risk and Opportunity

Prior to the commencement of works, the Project will identify environmental risks and opportunities, in order to limit, manage and improve the impact of works.

Overall risks to the project are managed through the Project Risk Assessment (PRA) (Refer to WHS Plan). Additional risks and opportunities may be identified during the Project and this EMP should be updated to reflect these changes. As defined in the **RCo-PROC-011_Risk Management**, a risk may have a positive or negative impact, however in order to differentiate controls required verses improvement potential, for the purpose of this EMP they have been classed as Risks (negative impact) and Opportunities (positive impact).

Environmental risks and opportunities of particular importance to this Project are defined in the Environmental Control Plans (ECP's) within this plan and the PRA.

4 LEGAL AND OTHER REQUIREMENTS

All personnel associated with the project will comply with all relevant requirements including:

– Laws – Acts, regulations, policies, etc;

– Environment Protection Licence (if applicable) and permits;

– Development consents, and;

– Relevant industry standards / codes.

An assessment of the relevant legislative instruments has been conducted and recorded in **Appendix 03**.

Compliance conditions shall be incorporated into this EMP. Specific details and controls are included in the associated sub-plans, project risk assessment and / or environmental risk action plans (ERAPs).

A copy of relevant Permits, Licences and any development approvals relevant to RCo activities will be kept on site.

4.1 Project Approval and Development Consent

The works are to be delivered in line with the following legislation:

NSW	Environmental Planning and Assessment Act 1979 No 203 Section 4.38

The approval process includes specific planning conditions and commitments that must be addressed in this EMP and delivered during the project.

A Conditions of Approval Compliance Tracking Matrix will be established upon commencement to ensure the approval conditions are captured, addressed and closed out. The Matrix includes all relevant conditions to Roberts Co's scope of work and will be updated as the works progress and reviewed on a quarterly basis to verify compliance with each condition.

Specific conditions of approval relevant to construction activities are included in the project's Operational Controls in the aspect specific Environmental Risk Action Plans (ERAPs).

Non-compliances with the conditions will be documented and addressed as per the Roberts Co Integrated Management System.

5 OBJECTIVES AND TARGETS

The project is committed to maintaining a high level of excellence in environmental compliance and diligence. Project objectives and targets have been developed to establish a baseline for the success of the project to be measured on. The objectives and targets are defined in Table 03 and 04, and in aspect-specific Environment Control Plans.

RCo has committed to the following Performance Targets:

Objectives	Target
Environmental Incident Frequency Rate (EIFR) = No. reportable/serious incidents x 1,000,000 divided by the man hours worked for the period	0.00
Breaches & Infringements	Nil
Certification Major Non-Conformances	Nil

Table 03 – RCo company-wide performance targets.

Objectives	Target
Conduct regular Environmental Inspections	Weekly– completion of environmental inspection checklist
Conduct regular Environmental Observations	Supervisors to complete regular task observations (target set by the project)
Prevent serious Environmental Incidents	Nil Class 1 or 2 incidents
Complete the project with no statutory environmental infringements, prosecutions or breach of conditions of approval	No infringements No prosecutions No breaches of conditions of approval
Conduct operations in accordance with Community and Regulatory expectations	No substantiated community complaints relating to works outside of approval No breaches of conditions of approval

Table 04 – Project specific objectives and targets.

6 RESPONSIBILITIES AND AUTHORITIES

Authorities and responsibilities for all positions are defined in this plan below and communicated in job descriptions and other project documentation. Key responsibilities are indicated in the project organisational chart. Key responsibilities and authorities include;

6.1 Construction Manager (Damian Vella – 0404 472 294)

- Ensure that independent audits of the system are conducted
- Review audit outcomes and take action as necessary
- Review regional environmental performance through the monthly reporting cycle
- Authorise resourcing on environmental issues
- Resolve major issues which cannot be resolved by the Project Manager
- Ensure that internal audits of the system are conducted
- Review audit corrective actions and take action as necessary to ensure timely close out of issues

6.2 HSEQ Manager (Sorcha Breenan 0451 082 230)

– Provide environmental support to the project team
– Consult project team on updates or changes to legislative requirements
– Facilitate internal and external audits
– Consult with environmental regulator on key environmental issues, incidents or breaches

6.3 Project Director (Jim Stavropoulos 0417 258 217)

– Ensure that project responsibilities and authorities are defined and communicated
– Provide adequate resources to meet environmental objectives
– Approve the EMP and various sub-plans and ensure effective implementation and maintained
– Allocate appropriate resources and provide support for the implementation of the EMP
– Report to senior management on the environmental performance, including assurance, incident and/or environmental breaches
– Take action to resolve environmental non-conformances and incidents
– Ensure suppliers and subcontractors comply with requirements;
– Report environmental incidents to the client / local authorities, as required.

6.4 Site Manager (Luke Tracey 0400 810 744)

– Supervise all site construction activities and personnel by ensuring that they meet environmental and other requirements
– Organise and manage site plant, labour and temporary materials
– Ensure that site environmental controls are properly maintained and provide support to the Project HSE Manager/Advisor
– Report all environmental incidents
– Take action to resolve non-conformances and incidents

6.5 Procurement

– Carefully select suppliers and subcontractors based upon their ability to meet stated requirements
– Ensure that purchase orders and agreements include environmental requirements as necessary
– Where practical, select materials which are “environmentally friendly”

6.6 Project HSE Manager (Miles Mesic 0401 756 192)

– Ensure that the EMP is effectively established, implemented and maintained on the project
– Ensure compliance with all relevant statutes, regulations, rules, procedures, standards and policies
– Liaise with the Principal’s Environmental Representative and/or Superintendent on environmental issues, including the written notification of non-conformances (incidents, emergencies or deviations from the EMP)

- Ensure that all personnel on site receive appropriate environmental induction and training and are aware of their environmental responsibilities under relevant legislation and the contract
- Report to the Project Manager on the performance of the system and improvement opportunities
- Provide support to the project team to enable them to meet their environmental commitments
- Ensure that environmental records and files are collected and maintained
- Regular compliance checking as required by this EMP
- Ensure that non-conformances and environmental incidents are recorded, and written reports provided to the Client's Representative and/or HSEQ Manager in accordance with ***RCo-PROC-012 Incident Management and Reporting***. Liaise with the required stakeholders to confirm the nature of the corrective action required and comply with the timeframe within which corrective actions must occur
- Ensure that environmental controls, materials and equipment are maintained

6.7 Contractors

- Comply with all legal and contractual requirements
- Comply with site environmental requirements
- Comply with management / supervisory directions
- Participate in induction and training as directed
- Report all incidents in a timely manner

6.8 All Personnel

- Comply with the relevant Acts, Regulations and Standards
- Comply with the Company's environmental policy and procedures
- Promptly report to management on any non-conformances, environmental incidents and/or breaches of the system
- Undergo induction and training in environmental awareness as directed by management
- Report all incidents
- Act in an environmentally responsible manner

7 OPERATIONAL CONTROL

7.1 Environmental Risk Assessment and Control

Project wide environmental obligations, aspects and impacts, and risks associated with the project shall be identified and assessed prior to the commencement of the project by the Project Manager in consultation with the project team and recorded in either or all of the following risk assessments or documents, as required:

– Project Risk Assessment (PRA) – (refer to WHS Plan-Appendix 04)

– Environmental Risk Action Plans (ERAPs) contained in **Appendix 04** of this plan

– Sub-plans contained in **Appendix 09** or standalone documents referenced below

– SWMS, Inspection and Test Plans / check sheets (as appropriate)

– Work instructions or procedures (e.g., refuelling and servicing)

Risks levels (i.e., Consequence and Likelihood) in relation to environmental Aspects and Impacts rated as 'High' or 'Medium' are considered 'Significant' as they have the potential to adversely impact on the environment, result in additional costs, potential fines and/or damage Roberts Co's reputation.

Significant environmental issues, with a risk ranking of High or Medium, will be controlled to a degree which is commensurate with the level of risk and the level of influence which the company has over these issues. The control measures to address these issues are documented in Environmental Risk Action Plans which are contained in **Appendix 04**.

Activities, aspect or impacts that represent a high risk after control measures have been applied must be reviewed / redesigned or have approval of the Construction Manager and HSEQ Manager.

7.2 Hold Points

The activities outlined in the table below are not to proceed without objective review and approval by the nominated authority. Proceeding past a specified Hold Point without authorisation is deemed as a system non-conformance.

These activities below are considered hold points.

ITEM	PROCESS HELD	ACCEPTANCE CRITERIA	APPROVAL AUTHORITY
Environmental Management Plan	Site activities	Site specific Environmental Management Plan has been developed, reviewed and approved	Project Manager
Dewatering	Dewatering / pumping water off the site		Site Manager
Sediment and erosion control measures	Construction activities involving ground disturbance	Sediment and Erosion Control Plan has been developed, reviewed, approved and implemented	Project Manager
Site clearing / vegetation removal	Commencement of site clearing or vegetation removal	Clearing limits have been verified against the project approval environmental assessment, limits have been set-out and vegetation to be retained has been delineated and or protected	Project Manager

ITEM	PROCESS HELD	ACCEPTANCE CRITERIA	APPROVAL AUTHORITY
Construction Methodologies – direct delivery and subcontract works	Construction process representing potential medium or high impact to the environment	Construction methodology / SWMS / JSEA have been reviewed by the Site Environmental Management Representative and addresses the requirements of the EMP ERAPs	Responsible Engineer
Dangerous Goods	Transport of dangerous goods	Verification that transport vehicles meet the requirements	Site Manager
Dangerous Goods	Storage of dangerous goods	Verification that bunded storage is provided and that offset distances are maintained for the storage area	Site Manager
Controlled / Hazardous Waste	Transport of Controlled / Hazardous waste from the site	Verification that the waste has been classified in accordance with the guidelines, transport licensing in place and landfill can lawfully receive the waste	Project Manager
Spoil Transport	Removal of spoil from site	Verification that the spoil has been classified and the disposal location can lawfully receive the waste	Project Manager

Table 05 – Environment control hold points.

7.3 Environmental Control Plan

The project Environmental Control Plan(s) ("**ECP**") is prepared to assist in the planning and delivery of the project. It is specific to the site or work area and outlines the location of protection measures, monitoring requirements, conditions of approval and environmentally sensitive areas. It is the practical application of the proposed control measures.

A copy of the project ECP is provided in Appendix 05 of this EMP.

The ECP is to be used in project inductions, work site set-up, reviewing ongoing environmental performance, included as information in tender documents to subcontractors (where applicable) and in support of ancillary environmental approvals.

The project ECP shall include but not limited to:

– The worksite layout and boundary, including entry/exit points and internal roads and clearing limits
– Location of adjoining land-use and nearest noise sensitive receivers
– Location and type of sediment and erosion control measures, including size / capacity of detention basins and wheel wash facilities
– Location of site offices
– Location of spill containment and clean-up equipment
– Location of worksite waste management facilities
– Hours of work applicable to the worksite (including deliveries and any restrictions on high noise generating activities);
– Document control and approval details
– Location of environmentally sensitive areas (e.g., threatened species, critical habitat, contaminated areas, heritage zones, etc)

– Vegetation and trees to be protected
– Location of known heritage (indigenous and non-indigenous) items
– Location of stormwater drainage and watercourses leading to / from the worksite
– Specific environmental management requirements from licenses, approvals or permit conditions
– Key environmental risk issues and the specific mitigation measures

The plan is in addition to any erosion and sediment control plans or other documentation that specify the location of environmental controls on site.

7.4 Design

If the project is a design and construct contract in which RCo is responsible for the design functions. The following environmental issues should be considered during the design of the temporary works:

– How to minimise any adverse impacts on the environment including energy efficient operation, incorporation of sustainable or recycled materials
– How to improve design efficiency to conserve natural resources
– Address specific sustainability requirements
– How to meet environmental codes, regulations and other requirements

These issues should be considered, while taking into account the practicalities and economic realities of the project / workplace. The design process is controlled in accordance with the Project Design Management Plan.

7.5 Procurement

The supply of goods and / or services by suppliers and subcontractors will be controlled by the Project and Contracts Managers as follows:

– Environmental issues should be taken into account when selecting subcontractors and suppliers
– Suppliers of chemicals and hazardous substances will be required to submit safety data sheets with delivery or prior to chemicals arriving on site. Prior approval to bring hazardous substances to site may need to be obtained from the client / superintendent
– Subcontractors will be required to submit an environmental control plan covering work which is likely to have a significant impact on the environment. Alternatively, they will be required to work under this EMP

The environmental performance of subcontractors will be monitored during site inspections.

7.6 Handling, Storage, Packaging and Transport

The handling, storage, packaging and transport of goods will be controlled in accordance with the applicable regulations, codes and standards.

Dangerous Goods/Hazardous materials will be stored and handled in accordance with Safety Data Sheets and the requirements of the Australian Dangerous Goods Code.

The following legislative acts includes specific requirements in relation to the transport of dangerous goods. Where dangerous goods are to be transported as a result of the project, the requirements of the Act must be complied with by RCo and third parties:

NSW	Dangerous Goods (Road and Rail Transport) Act 2008 No 95

Regardless of the quantity, appropriate transport documentation must be included with each load unless a specific exemption exists.

Transport documentation must include the following:

– Project/workplace name, contact number

– Transporter name, contact number

– Transport date, origin and destination

– Product name, classification, container type, quantity

These materials will be stored in a safe area (e.g., bunded and/or store) which will prevent or contain accidental spillage and harm to the environment. Further details are provided in **Appendix 04** in the ERAP - Delivery and Storage of Chemicals, Fuels and Oils and including Dangerous Goods requirements.

Safety data sheets must be stored along with or at the point of storage and/or freely accessed using the Chemwatch application.

7.7 Plant and Equipment

Plant and equipment used onsite by RCo and contractors will be maintained in a safe and serviceable manner in accordance with both legislative requirements and RCo IMS procedures and standards.

In particular, the following requirements apply:

– Plant will be inspected (using the relevant Pre-Use Acceptance Checklist) prior to operation on site, particularly items with the potential to impact the environment are to be inspected. Items found to be worn, damaged or otherwise degraded are to be replaced prior to operation;

– Plant will be serviced, re-fuelled and washed-down only in approved areas where hydrocarbons can be captured and then properly disposed;

– Fuelling will be carried out in bunded areas when fuelling from bulk tanks (where applicable);

– Plant and equipment will be maintained to prevent / fix oil leaks;

– Plant will be driven and operated only in approved areas;

– Plant will have effective pollution control and sound attenuation devices fitted.

7.8 Emergency Preparedness and Response

The types of environmental emergencies which could occur on this site as outlined in **Appendix 06**. The client and relevant statutory and regulatory authorities (such as the EPA) will also be informed as necessary.

Environmental emergencies will be handled by:

– Immediately reporting all incidents to the Project Manager / Site Manager who will assess the situation and manage the following steps:

– Immediately take all reasonable steps to contain further damage or danger to personnel and the environment;

– Inform relevant authorities in accordance with the regulatory requirements;

- Contact emergency service personnel as necessary (e.g., local fire brigade, spill clean-up services, etc). Site emergency response team will also be contacted.
- Provide notification to the HSEQ Manager, Construction Manager, CEO and Roberts Co Legal counsel immediately via initial internal incident notification;
- Inform the Client's Representative as necessary and in accordance with contractual requirements;
- Complete a detailed report of the incident using HSE Incident report form and upload to Roberts Co's designated electronic database;
- Liaise with the Client's Representative regarding corrective and preventive actions required and the timeframes within which these actions must occur;
- The designated personnel will undertake an investigation to determine the corrective and preventive actions.

Information on the handling of hazardous materials is contained in the safety data sheet application, ChemWatch. Emergency Services contact numbers are to be displayed in the main site office.

8 MONITORING AND MEASUREMENT

Key characteristics of the project operations and activities which have a significant impact on the environment will be regularly monitored and measured.

Monitoring / Reporting Aspect	Details
Inspection and Monitoring	The Site Manager and/or HSE Manager environmental inspections and monitoring during the site establishment, construction and site demobilisation phases. Inspections and monitoring will be carried out in using **RCo-HSE-101-HSE Inspection** form. Project Procedures will be prepared as necessary to specify how monitoring is to be undertaken, including responsibility and frequency. Monitoring results and any corrective actions identified will be recorded in Roberts Co designated electronic database. National Greenhouse and Energy Reporting related information will be collected and uploaded into Roberts Co designated electronic database. Inspection checklists and any corrective actions identified will be recorded in Roberts Co designated electronic database.
Calibration of monitoring equipment	Monitoring equipment will be calibrated in accordance with equipment OEM manual. Monitoring equipment will be calibrated prior to use. Any equipment identified as having doubtful accuracy or precision will be removed from use and recalibrated. Where any monitoring equipment is found to be out of calibration, the validity of the previous monitoring results will be assessed and documented. Calibration of monitoring equipment will be recorded in the project document management system.
Reporting	The following information will be retained for inclusion in the Reports as follows: – HSE Inspections (Project) – HSE Incidents / complaints (Project) – Waste, water use data (NGERS – Annually) – Innovations and achievements. This information may also be included in the Client Monthly Report Reporting on environmental performance may be carried out in the forums as required.
Non-conformance and Incident Management	Non-conformance Reports will be raised, tracked and closed out in accordance with **RCo-PROC-010_Audits, Inspections and Corrective Action** Incident Reports will be raised, tracked and closed out in accordance with **RCo-PROC-012_Incident Management and Reporting Procedure**.

Table 06 – Environment control hold points.

The following environmental issues / non-conformances are to be included within **RCo-REG-009-Incident and Event Tracking Register** and/or **RCo-REG-003-Action** respectively, as corrective actions.

– Internal inspection outcomes that cannot be rectified immediately;
– Incidents and associated corrective actions;
– Internal audit observations/non-compliance;
– Client audits or other notice of non-compliance;
– Notices or action from regulatory authorities.

Where deemed necessary by the Project HSE Advisor / Manager and as a result of revisions to project scope or changes to project risks, additional Environmental Risk Action Plans to control potential impacts may need to be updated or developed.

8.1 Corrective Actions

Corrective actions are differentiated by risk ranking. The nominated timeframes to resolve items on the CAR Register are as follows:

1 = High	2 = Medium	3 = Low
Action: Imminent risk – issue must be rectified immediately	**Action:** Risk not imminent however issue is to be rectified immediately.	**Action:** Rectify within 24 hours or time frame specified.

Refer to **RCo-PROC-010_Audits, Inspections and Corrective Action** Procedure.

Further monitoring and reporting activities against operational objectives and targets are listed in Section 05 of this Plan.

8.2 Monthly Environmental Reporting

Each report to be included in the Monthly Project HSE Report and issued to the HSEQ Manager on a monthly basis. The report is to include specific details relating to risks, status of control measures, update to plans, ESCPs and the objective and target performance indicators nominated within the report.

On a monthly basis, monthly environmental indicators, energy use, water consumption and waste information shall be entered into RCo designated electronic database, including NGER information, such as:

– Waste consumption including volume purchased from water suppliers, volume of water extracted from surface water sources and volume of ground water sources
– Subcontractor energy and emissions

Monthly oversight of inspection outcomes, audit issues and corrective actions provided through the Actions created within Roberts Co's designated electronic database. Actions are to be addressed in accordance with the timeframes outlined in **RCo-PROC-010_Audits, Inspections and Corrective Action**.

9 INCIDENTS, COMPLAINTS, CORRECTIVE AND PREVENTATIVE ACTION

9.1 Incident Classifications

Environmental Incident is classified into three (3) classes:

Permanent / Long-Term Damage	Short to Medium Term Damage	Short Term / Nuisance Damage
Environmental Incidents that create permanent or long-term damage to the environment. This damage will result in the environment taking 12 months or more to return to pre-existing conditions. Major environmental. investigation and potential for large prosecution.	Environmental Incidents that create short to medium term damage to the environment. This damage will result in the environment taking up to 12 months to return to pre-existing conditions. Potential for prosecution or infringement notice.	Environmental Incidents that typically cause short term or nuisance damage. The damage is easily rectified usually within one day. These incidents do not cause medium or long-term damage.
Where permanent / long-term damage occurs the Chief Executive Officer, HSEQ Manager, Construction Manager and Roberts Co Legal counsel are to be informed immediately. These incidents shall be subject to an Incident Causal Analysis Method (ICAM) investigation.	Where actual or potential short to medium term damage has occurred, Roberts Co Senior Management is to be informed via the Project Manager.	Where an incident such as this has occurred, the Roberts Co Site Manager or immediate foreman/supervisor is to be informed. These types of incidents must be recorded on ***RCo-REG-009-Incident and Event Tracking Register.***
All environmental incidents will be reported to the relevant State & Federal Authorities as required under relevant Acts & Regulations.		

Table 07 – Environmental incident classification types and reporting requirements.

9.2 Incident and Complaint Reporting

All environmental incidents and complaints are to be reported, investigated and actions closed out in accordance with **RCo-PROC-012_Incident Management and Reporting.**

All incidents are to be recorded on **RCo-REG-009-Incident and Event Tracking Register** or in agreed electronic system.

RCo-FRM-018-Injury and Incident Investigation Report shall be completed and issued to the Project Manager for all Potential or Actual reportable and serious incidents.

Reporting of Actual and Potential reportable and serious Incidents and complaints shall occur within the timeframes outlined in the **RCo-PROC-012_Incident Management and Reporting procedure**.

Reportable incidents shall be reviewed by relevant personnel in the distribution list above prior to the issue of formal correspondence to external parties or regulatory authorities. Authorities are to be notified in accordance with the legislative time frames in the applicable state.

Complaints will be reported to external authorities in accordance with specific licence/permit or approval requirements. RCo will provide notification of the incident/complaint to the Client's Representative as required and in accordance with the contract.

Client Notification Type	Contract Requirement
Initial verbal notification	24 Hours
Environmental Incident report requirements	24 Hours

Table 08 – Client incident reporting requirements.

9.3 Investigations

Each incident shall be sufficiently investigated to allow specific and detailed corrective and preventative actions to be identified, actioned and closed out. Where an environmental non-conformance or incident is identified, Corrective and preventive actions shall be developed and may include:

– Review and improve existing environmental controls and job safety analyses/ work method statements
– Site rehabilitation
– Increased site inspections and monitoring
– Modify construction or installation methods
– Increase environmental awareness including re-training and tool-box meetings

The Project Manager will convene a briefing with relevant members of the Senior Management Team to provide an update on the incident investigation and to allow active involvement in the investigation process. The briefing will include discussion on the progress of the investigation and any specific initial findings. A status report on any rectification work or maintenance activities to the relevant environmental controls will also be provided.

The following information relating to the incident investigation shall be forwarded to the Construction Manager and Regional HSEQ Manager.

9.4 External Incident Notification

The EPA must be notified immediately of all pollution incidents that cause or threaten material harm to the environment. The HSEQ Manager (or their delegate) shall report the incident to the regulator, refer to **RCo-PROC-12- Incident Management and Reporting**.

Harm to the environment is "material" if the effect (or potential effect) from an incident on the health or safety of humans or ecosystems is not trivial and or results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000.

Incidents requiring notification to the EPA must also be immediately notified to the Regional HSEQ Manager.

If an incident presents an immediate threat to human health or property, 000 is to be called in accordance with the procedures outlined in the project Emergency Response Plan – Appendix 05 of the WHS Plan.

The EPA Environment Line is to be contacted on 13 15 55 (NSW) or 1300 372 842 (VIC).

The notification will need to include information on:

– The time, date, nature, duration and location of the incident
– The location of the place where pollution is occurring or is likely to occur

– The nature, the estimated quantity or volume and the concentration of any pollutants involved
– The circumstances in which the incident occurred (including the cause of the incident, if known)
– The action taken or proposed to be taken to deal with the incident and any resulting pollution or threatened pollution
– Other information prescribed by the regulations

In addition to notifying the EPA of pollution incidents, other authorities as outlined below must also be notified immediately:

– The Ministry of Health (via the local Public Health Unit - 02 9391 9000)
– The SafeWork NSW Authority (13 10 50)
– WorkSafe Victoria (13 23 60)
– Fire and Rescue 000
– The local council

Regardless of the actual or potential impact, these authorities must be notified under the amended legislation for all notifiable pollution incidents. Further information in relation to the incident must be provided immediately if it becomes available after the initial notification. Records of contact with and details of the information provided to external authorities must be maintained in the project records.

9.5 Commonwealth Matters

Environmental incidents relating to the Environmental Protection and Biodiversity Conservation Act 1999 must be notified to the Secretary of the Department within seven (7) days of the event.

These types of incidents include the death or injury to the following:

– Migratory bird species;
– Listed marine species;
– Threatened species or listed ecological community (includes taking).

9.6 Client Complaints

All communications from the Client (including CAR's and Audit reports) expressing concern or dissatisfaction with the implementation or operation of the EMP shall be documented in accordance with Section 9.2 of this plan.

Corrective and preventive actions may include:

– Site remediation and rehabilitation
– Increased site inspections and monitoring
– Increase environmental awareness (i.e., re-training, tool-box meetings)

Review and improve existing environmental controls and job safety analyses / work method statements

10 TRAINING AND AWARENESS

All employees will receive suitable environmental induction / training to ensure that they are aware of their responsibilities and are competent to carry out the work.

Environmental induction / training will be delivered to employees through the site induction, orientations and on-going training via pre-start and toolbox meetings, briefings, email notifications, etc.

All employees (including subcontractors) will receive induction / training in the following:

– Environmental Policy
– Site environmental objectives and targets
– Understanding individual authorities and responsibilities
– Environmental Risks and Controls
– Emergency procedure and response (e.g., Spill clean-up)
– Basic understanding of their legal obligations

Personnel performing tasks which can cause significant environmental impacts will be deemed competent on the basis of appropriate education, training and/or experience.

All Roberts Co operational staff on this project will be consulted on the requirements and implementation of this EMP. Initial training in the project EMP shall be undertaken within 1 month of the project commencement date. EMP training for new staff members shall be completed within 1 month of their commencement on the project.

Training in the operation and implementation of Roberts Co's Integrated Management System shall be provided for all operational staff during the company induction.

The Project HSE Manager will establish a schedule of environmental training in conjunction with the development of this EMP. Training in high-risk aspects shall be undertaken as the project progresses. An outline of the proposed training is provided below. The training shall be scheduled to reflect the requirements of the construction program.

ASPECT	TRAINING INCLUSION	PERSONNEL REQUIRED	METHOD / FREQUENCY
Emergency Spill Response	Use and location of spill kits, spill control Emergency response procedures, drills	Operational personnel	Project Induction Pre-start / tool meetings Internal Roberts Co course run as required for site personnel
Erosion and Sediment Control	Standard erosion and sediment controls from the Landcom 'Blue Book' Implementation of controls on site Erosion and sediment control plans	Operational personnel	Project Induction Pre-start / tool meetings
Heritage and Archaeological Awareness	Stop works and reporting protocols for discovery of previously unknown heritage and archaeological items Exclusion zones / no-go areas	Operational personnel	Project Induction Pre-start / tool meetings Protocol posted on message boards

ASPECT	TRAINING INCLUSION	PERSONNEL REQUIRED	METHOD / FREQUENCY
Contamination Awareness	Contamination status of site Stop works protocols for unidentified potential contamination (hydrocarbons, asbestos, etc)	Operational personnel	Project Induction Pre-start / tool meetings Process distributed to workers and posted on message boards
Environmental Legal Obligations	POEO Act and other project requirements Applicable fines and prosecutions	Operational personnel	Project Induction Pre-start / tool meetings
Energy and Resource Usage	Awareness training of energy and resource efficiency in the workplace including office/compound and site initiatives such as harvesting rainwater for dust suppression instead of potable mains water and use of bio-fuels	Operational personnel	Project Induction Pre-start / tool meetings
Community / Stakeholder Awareness	Adjacent community and Project involvement Relevant Project stakeholders Accepted behaviours Approved hours of work	Operational personnel	Project Induction Pre-start / tool meetings
Biodiversity	Wildlife status of project and surrounds Stop work and reporting protocols for injured wildlife Measures to stop feral animals coming to site	Operational personnel	Project Induction Pre-start / tool meetings

Table 09 – Environmental impacts and aspects training schedule.

11 AUDITING

11.1 Environmental Management System Audit

Auditing of the Project Environmental Management System will be carried out in accordance with Regional HSEQ Audit Schedule. The audit will evaluate compliance with this EMP and associated documentation including legal, contractual and other requirements.

The HSE Advisor / Manager, in consultation with the other managers, will decide on the frequency, scope and timing of project / workplace audits. It is expected that the project will be audited within three (3) months of commencing on site and thereafter as determined by the HSEQ Manager.

Where a client is undertaking an audit of the project which coincides with a planned internal audit by Roberts Co the client audit may, at the discretion of the HSE Advisor / Manager, negate the need for an internal audit.

An audit report will be issued to the Project Management Team for action. A follow up/close out audit will be coordinated within 1 month of the issue of the audit report. Audits shall be captured within the Roberts Co's designated electronic database. Actions associated with audits shall also be logged in the Roberts Co's designated electronic database.

11.2 Management Review

The Project Manager in consultation with the Project HSE Advisor / Manager will check the status and adequacy of the Project EMP to ensure that it meets current client and Company requirements as well as relevant environmental standards.

The Plan will be reviewed as and when required during the course of the contract when the following situations arise:

– Client recommendations for changes (particularly following initial review);
– Changes to the Company's Integrated Management System;
– Opportunities for improvement or deficiencies in the project system are identified;
– Following an audit of the system or the occurrence of significant incidents and non-conformances.

APPENDICES

Appendix 01 – Environmental Policy

roberts co

Policy and Procedure
Environmental Policy

Roberts Co is committed to reducing the impact of its operations on the environment. We acknowledge that as a service organisation we can minimise the negative impact on the environment in many small ways as well as role model responsible and sustainable environmental behaviour for our people, suppliers, and the community.

The key principles and actions underpinning our policy are:

- Take environmental issues seriously at an Executive and Senior Management Level.
- Develop and support small-scale environmental improvement plans at sites wherever possible.
- Consulting with employees and suppliers to ensure that environmental impacts on sites are understood and addressed effectively.

We maintain and continuously improve an Integrated Management System that complies with the requirements of ISO 14001:2015 and all environmental legislation and other requirements which are relevant to Roberts Co.

Our environmental objectives are to:

- Minimise environmental impact on land, water, air, flora, and fauna
- Prevention of pollution, protect the environment, preserve natural resources, and conserve all heritages.

To achieve these objectives, we shall act to:

- Ensure high levels of management and staff involvement in achieving stated objectives.
- Continuously engage all stakeholders in meaningful consultation and communication.
- Use suppliers, wherever possible, who have similar environmental objectives as ourselves and give preference to environmentally friendly products and equipment.
- Always weigh the environmental benefits of a product equally with its price and safety benefits.
- Measure our performance and use this information for the continual improvement of our services and the Integrated Management System.

Roberts Co's environmental policy applies to our managers, employees, and external providers. It expresses our ongoing commitment to understand, abide by and regularly review, consistent with the monitoring and audit schedule these key principles and actions.

Matt Bourne
Chief Executive Officer Date: 27/03/2023

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When printed this document is an uncontrolled version and should be checked against the electronic version for validity
REVISION NO: 05
ISSUE DATE: 27/03/2023

Appendix 02 – ENV Plan Sign Off

I have read and understand the requirements of the role, processes, responsibilities and accountabilities as outlined within this Project Environmental Management Plan.

NAME	POSITION	DATE REVIEWED	SIGNATURE

Appendix 03 – Legal and Other Requirements

The relevant legal and other requirements are outlined in the table below;

Legal and Other Requirements	Nat.	NSW	VIC	Summary of Obligations	Relevance to the Project / Notes and System
Environmental Planning Legislation					
Environmental Planning and Assessment Act 1979		X		This Act establishes a system of environmental planning and assessment of development proposals for the State.	**High** Relevance The DA conditions and obligations are incorporated into the specification documents and RCo's EMP.
Local Government Act 1993 Local Government (General) Regulation 2005		X		The Local Government Act and Local Government (General) Regulation provide a legal framework for an environmentally responsible system of Local Government including the responsibility to administer various regulatory systems (e.g., Environmental Planning, Development Consents and Conditions of Approval).	**High** Relevance The local Council (the Local Government body for this area) has number powers to control local issues including Development Applications (other than state significant development).
Roads Act 1993 Roads (General) Regulation 2000		X		This Act and Regulation primarily provide for such things as the opening and closing of public roads, identification of road boundaries and road widening, road levels, classification of public roads, road work, protection of public road and regulation of traffic, regulation of work, structures and activities.	**Medium** Relevance This Act is mostly an administrative Act for RMS and has minor relevance to carrying out the works.
Soil Conservation Act 1938		X		This Act makes provision for the conservation of soil resources, farm water resources and the mitigation of erosion. The Act is binding on the Crown, however the Crown is not liable for prosecution. The Act provides for notification in the government gazette catchments where erosion is liable to cause degradation of rivers, lakes etc (i.e., protected land).	**Medium** Relevance This Act is mostly an administrative Act for RMS and has minor relevance to carrying out the works.
Environment Protection and Biodiversity	X			The main purpose of this Act is to provide for the protection of the environment especially those aspects that are of national	No Relevance

Legal and Other Requirements	Nat.	NSW	VIC	Summary of Obligations	Relevance to the Project / Notes and System
Conservation Act 1999 (Cwth)				environmental importance and to promote ecological sustainable development. The Act binds the Crown. Do not take, use, keep or interfere with “nationally significant” cultural and natural resources, protected wildlife and protected plants without Approval.	This Act is of little relevance to the contractor on this project as it has been determined not to trigger the provisions of the act.
Native Vegetation Act 2003 Native Vegetation Regulation 2013		X		This Act and Regulation provide for the conservation and management of Native Vegetation by requiring Development Consent to be obtained for the clearing of Native vegetation. Section 12 of the Native Vegetation Act 2003 excludes the clearing of land carried out in accordance with consent under Division 3 of Part 9 of the Roads Act 1993. Clearing of native vegetation required for construction of the work under the contract would be covered by such consent. The Native Vegetation Regulation 2013 allows for the development of self-assessable codes for clearing of feral species, clearing of invasive species, environmental works, thinning native vegetation, clearing of paddock trees, and clearing of mulga.	**Low** Relevance Clearing of native vegetation is not required outside of the contract.
Land and Environment Court Act 1979		X		The Land and Environment Court is constituted under this Act. The jurisdiction of the Court is divided into numerous classes. The relevant classes for the project covers matter such as the prosecution for offences under various environmental legislation and to appeal against conditions of approvals, permits or orders.	**Low** Relevance The relevance of this Act would only apply to work under the contract if RCo were prosecuted for an Environmental Offence.
Greenhouse Gas (GHG) Emissions National Greenhouse and Energy Reporting Act 2007	X			Corporations emitting more than 50kT of carbon dioxide equivalent units are required to register and report their Scope 1 and Scope 2 emissions for all Facilities in which they have Operational Control. Facilities emitting more than 25kT of carbon dioxide equivalent units must register and report Scope 1 and Scope 2 emissions.	**High** Relevance RCo is a registered entity under this act. As such, where RCo has Operational Control, the Scope 1 and Scope 2 emissions associated with the project must be reported. This includes the collation and reporting of subcontractors site emissions.

Legal and Other Requirements	Nat.	NSW	VIC	Summary of Obligations	Relevance to the Project / Notes and System
					RCo does/does not have Operational Control of this facility.
Contaminated Land Legislation					
Contaminated Land Management Act 1997		X		This Act provides for a process to investigate and remediate land that has been contaminated and presents a significant risk of harm to human health. Section 60 of the Act is a "Duty to Report Contamination". This duty applies to owners of land and persons who become aware their activities have contaminated the land.	**Medium** Relevance The relevance of this Act to the contractor will be in the event suspected or potentially contaminated ground is found during construction activities.
Fire Control Legislation					
Rural Fires Act 1997		X		This Act is intended to prevent, mitigate and suppress bush and other fires. It places a duty on Roberts Co as the occupier of the site to extinguish fires during bush fire danger periods or if unable to do so notify appropriate firefighting authorities of the existence of the fire and its location.	**Low** Relevance This project site and surrounding areas are not prone to bush fires.
Hazardous Substances Legislation					
Environmentally Hazardous Chemicals Act 1985		X		This Act prohibits the manufacturing, processing, keeping, distributing, conveying, using, selling or disposing of an environmental hazardous chemical or waste (prescribed activity) except under the provisions of a chemical control or a licence. The EPA is required to prepare inventories of environmentally hazardous chemicals and declared chemical wastes.	**Low** Relevance It is not anticipated any environmentally hazardous chemicals or declared chemical waste will be used or stored on the site. The Act therefore has little relevance to the site other than being aware of the existence of registers of declared chemical wastes and environmentally hazardous chemicals.
Dangerous Goods (Road and Rail Transport) Act 2008		X		The purpose of this Act is to regulate the transport of Dangerous Goods by road and rail in order to promote public safety and protect property and the environment. The transport of Dangerous Goods is required to be appropriately licensed (both vehicle and driver).	**Medium** Relevance The relevance of the Act is in respect to the transport of dangerous good to & from the site. The project will require the use of a variety of

Legal and Other Requirements	Nat.	NSW	VIC	Summary of Obligations	Relevance to the Project / Notes and System
				Depending on the quantities being transported, the Act outlines specific requirements for including appropriate placards on the transport vehicle, emergency procedures, PPE, manifest documentation and fire extinguishers.	dangerous goods. RCo will need to review and ensure Dangerous Goods requirements are addressed where transported by its vehicles, plant and equipment.
Dangerous Goods Safety Management Regulation 2001		X			
Water Management Act 2000 Water Management (General) Regulation 2004		X		This Act repeals the Rivers and Foreshores Improvement Act, 1948 and the Water Act, 1912. The provisions of both the aforesaid Acts are progressively rescinded as Water Management Plans are prepared and gazetted for catchment areas within the state. This Act and Regulation provide for the protection, conservation and ecologically sustainable development of water sources of the State and in particular to protect, enhance and restore water sources and their associated ecosystems.	No Relevance This Act has no direct relevance at this time to the construction work under this contract. The project approval does not trigger the provisions of this Act.
Dams Safety Act 1978		X		This Act constitutes the Dams Safety Committee and confers and imposes on the Committee functions relating to the safety of certain prescribed dams.	**Low** Relevance It is unlikely any action in respect to this project will endanger the safety of any prescribed dam
Coastal Protection Act 1979		X		This Act requires public authorities to notify the Coastal Council of NSW of any information, proposed activity or work that in the opinion of the public authority is relevant to the exercise of the function of the Coastal Council. It further empowers the Minister for the Department of Commerce to require public authorities to obtain consent prior to carrying out development in the coastal zone or giving consent to a person to occupy or carry out development in the coastal zone.	No Relevance The project is not located in areas associated with this act.
National Parks and Wildlife Act 1974		X		The relevance of this Act is firstly in respect to the protection and preservation of aboriginal artefacts. Discovery of material on site suspected as being of aboriginal origin must be reported and	No Relevance No identified aboriginal artefacts have been identified within the construction area. The only

Legal and Other Requirements	Nat.	NSW	VIC	Summary of Obligations	Relevance to the Project / Notes and System
				protected pending assessment and direction by the Client's Representative. Secondly it is an offence under Part 8A of this Act to pick or harm threatened species. (Refer to the notes under the Threatened Species Conservation Act for more information)	relevance would be if new previous unknown artefacts were discovered during construction
Threatened Species Conservation Act 1995 Threatened Species Conservation Regulation 2002 Threatened Species Conservation (Savings and Transitional) Regulation 1996		X		This Act and Regulations provide for obtaining licenses to harm or pick threatened species populations or ecological communities whether plant or animal or to damage any critical habitat. The offence of picking or harming any threatened species is covered under the National Parks & Wildlife Act Part 8A. It is a defence under Part 8A of that Act if the offence was essential to carrying out development that is in accordance with a Development Consent within the meaning of the EP&A Act or an approval within the meaning of Part 5 of the EP&A Act.	No Relevance No threatened species of flora or fauna listed in the schedules of this Act have been identified within the area of the proposed work.
Fisheries Management Act 1994		X		This Act is applicable to all waters within the state including private and public waters and all permanent and intermittent waters. The Act is most relevant in respect to maintaining water quality and ensuring no polluted water from site works enters streams, creeks and waterways. In addition this Act also has relevance for the removal of marine vegetation.	**Low** Relevance Along with the POEO Act water discharging from the site must not pollute the adjacent streams or watercourses.
Marine Pollution Act 1987		X		This Act creates offences for discharges of oil, oily mixtures and noxious liquid substances from ships into State waters.	No Relevance The site is located adjacent to state waters and may involve the use of applicable vessels.
Noxious Weeds Act 1993		X		This Act provides for the classification and control of noxious weeds. Declared noxious weeds are classified as Class 1, State Prohibited Weeds; Class 2, Regionally prohibited Weeds, Class 3 Regionally Controlled Weeds, Locally Controlled Weeds and Class 5 Restricted Plants. The characteristics of each class is given in Section 8 (2) of	**Low** Relevance The Act applies to owners or occupiers of land including public authorities and thus does not apply to RCo.

Legal and Other Requirements	Nat.	NSW	VIC	Summary of Obligations	Relevance to the Project / Notes and System
				the Noxious Weeds Amendment Act 2005. Class 1, 2 & 5 weeds are referred to in the Act as “Notifiable Weeds”.	
Water Act 1912		X		This Act provides for licences to extract water for construction purposes either from surface or artesian sources. Should construction water be extracted from surface (other than sedimentation ponds) or artesian sources a licence will be required.	**Low** Relevance It is not proposed that construction water will be obtained from surface (e.g., creeks, lakes etc) or artesian sources.
Heritage Act 1977		X		This Act provides for the preservation and conservation of heritage items such as building, works, relic, places of historic interest, scientific, cultural, social, archaeological, architectural, natural or aesthetic significance. Under this Act a relic means any deposit, object or material evidence which is 50 or more years old and relates to the settlement of the area (not being an aboriginal settlement). It is an offence under this Act to wilfully and knowingly damage or destroy items of heritage value. Do not demolish damage, move or develop around any place, building, work, relic, moveable object, precinct, or land that is the subject of an interim heritage order or listing on the State Heritage Register or heritage listing in a Local Environmental Plan without an approval from the Heritage Council (NSW) or local council.	**Low** Relevance No heritage items have been identified.
Wilderness Act 1987		X		An Act to provide for the permanent protection of and proper management of Wilderness Areas and to promote the education of the public in the appreciation, protection and management of wilderness. The Act and associated Regulations provides a mechanism for the identification and declaration of Wilderness areas.	No Relevance This project is not within or immediately adjacent to a declared Wilderness area. This Act has little or no relevance to the project.
Plantations and Re-afforestation Act 1999		X		This Act is intended to facilitate the reforestation of land and development of timber plantations. It provides codified environmental standards together with a streamlined integrated scheme for the establishment and management and harvesting of timber and other forest plantation products.	No Relevance The location of work under this contract is not located within or adjacent to reforested or plantation forest land.

Legal and Other Requirements	Nat.	NSW	VIC	Summary of Obligations	Relevance to the Project / Notes and System
Australian Heritage Council (Consequential & Transitional Provisions) Act 2003 Australian Heritage Council Act 2003 (Cwth)	X			The Australian Heritage Council (Consequential and Transitional Provisions) Act 2003 repealed the Australian Heritage Commission Act 1975. The Australian Heritage Council Act 2003 establishes the Australian Heritage Council. The Council is required to identify places to be included in the National Estate and to maintain a Register of the National Estate of places.	No Relevance The site is not on Register of the National Estate of places.
Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cwth)	X			This Act provides for the preservation and protection from injury or desecration to areas and objects of particular significance to Aboriginals. Areas and objects can be protected by Ministerial Declaration and it is then and offence to contravene such a declaration.	No Relevance No areas or objects within the works site have been identified as being subject to such a declaration and this Act is of little relevance to the project.
Ozone Protection Act 1989		X		This Act provides for a system of controls and to regulate and prohibit the manufacture, sale, distribution, use, emission, re-cycling & disposal of stratospheric ozone depleting substances and articles that contain these substances. The impact is that appropriately qualified people in accordance with this Act must undertake all servicing and maintenance of this type of equipment.	**Low** Relevance The relevance of this Act will relate to the use of refrigerators and air conditioning units in site buildings and vehicles which still contain CFCs. Such items are unlikely to be found on site.
Protection of the Environment Operations Act 1997		X		This Act is of most relevance to work being carried out under this contract. It integrates into one Act all the controls necessary to regulate pollution and reduce degradation of the environment, provides for licensing of scheduled development work, scheduled activities and for offences and prosecution under this Act.	**High** Relevance The Act provides for the issuing of environmental protection notices to control work and activities not covered by licences. Section 148 of the Act requires a pollution incident causing or threatening material harm to the environment to be notified to the EPA and other authorities immediately.
Sydney Water Act 1994		X		This Act establishes the Sydney Water Corporation as a statutory State owned corporation. The functions of the Sydney Water	**Low** Relevance

Legal and Other Requirements	Nat.	NSW	VIC	Summary of Obligations	Relevance to the Project / Notes and System
				Corporation is to supply and store water, provide sewerage services, provide stormwater drainage and dispose of waste water within it area of operations.	Coordination may be required with Sydney Water during the works
Sydney Water Catchment Management Act 1999		X		This Act establishes the Sydney Catchment Authority as a statutory corporation representing the Crown. The role of the Sydney Catchment Authority is to manage and protect the catchment areas and catchment infrastructure works, be a bulk water supplier and to regulate activities within or affecting the catchment areas	**Low** Relevance This project will not impact on areas regulated by the Sydney Catchment Authority.
Pesticides Act 1999 Pesticides Regulation 1995		X		This Act and Regulation establish a legislative framework to regulate the use of pesticides. They have the objective to promote the protection of human health, the environment, property and trade in relation to pesticides. It is an offence under this Act and Regulation to wilfully or negligently misuse pesticides.	**Low** Relevance It is not envisaged that pesticides will be used on the project by RCo.
Waste Avoidance and Resource Recovery Act 2001		X		This Act repeals the Waste Minimisation and Management Act, 1995.The purpose of the Act is to encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecological sustainable development. The Act provides for the making of policies and strategies to achieve these ends. It is an offence under the Protection of the Environment Operations Act to wilfully or negligently dispose of waste in a manner that harms or is likely to harm the environment.	**Medium** Relevance The relevance of the Act to this project is to implement the strategies by adopting the hierarchy of avoidance; avoidance of unnecessary resource consumption; resource recovery (including reuse, reprocessing, recycling and energy recovery), disposal (as a last resort).

Appendix 04 – Operational Control Procedures – Environmental Risk Action Plans

Environmental Risk Action Plans will be developed for each environmental issue which has a risk ranking of Medium or High.

Significant environmental issues will be managed according to the Environmental Risk Action Plans below.

Noise and Vibration	
Objective	– To comply with contractual requirements and ensure that noise and vibration from construction activities does not cause environmental nuisance
Targets	– No valid noise / vibration complaints resulting from construction works – No unreasonable noise or vibration – No noise and vibration impacts on external receptors
Legal, Contractual and Other Requirements	– Contract Specification Clause – Planning consent conditions – SSD-10349252 – Audible construction works unless otherwise approved by the Client shall be restricted to: 07.00am to 18.00pm Monday – Friday 08.00am to 13.00pm Saturdays Rock breaking, rock hammering, sheet piling, pile driving, and similar activities may only be carried out between the following hours: 09.00 – 12.00, Monday to Friday 14.00 – 17.00, Monday to Friday 09.00 – 12.00, Saturday – No work outside of these hours without approval – Construction activities that are inaudible external to the site may be undertaken outside of these hours where approved – Development Consent – AS2436 Guide to Noise Control on Construction, Maintenance and Demolition Sites

Noise and Vibration	
Site specific planning / approval conditions / licence conditions	– B17 - Construction Noise and Vibration Management Plan required.

Controls
(means and resources)
	– No work will be undertaken outside of the agreed hours without prior approval
	– Where work outside the hours nominated above hours is required, approval shall be gained prior to the commencement of works
	– Where construction vibration is found to be causing a disturbance to, the construction methods shall be reviewed to reduce the impact where possible
	– Site offices, compounds and sheds will be located so as to have no negative impact on the noise amenity of nearby sensitive receptors
	– Delivery operations or other noise generating activities at compound and storage areas will take place during the designated construction hours nominated above, unless specifically required by Police or RTA / VicRoads requirements
	– Where practical, substitution of excessively noise processes with alternative processes
	– Avoiding where practical the use of noisy plant simultaneously close together or adjacent to sensitive receptors
	– High efficiency mufflers must be fitted to all plant and equipment to minimise the generation of noise
	– All plant will be maintained in accordance with the manufacturer's requirements
	– Noise generating equipment to be orientated away from sensitive areas
	– Undertaking loading and unloading activities away from sensitive areas and during designated construction hours
	– Select the most appropriate plant and equipment to minimise noise generation and include where necessary screening and enclosures
	– On-site generators and auxiliary power sources used during construction should be positioned away from existing buildings to buffer noise/ vibration
	– Regular checks are to be undertaken to ensure all equipment and vehicles are in good working order and are operated correctly. Checking should include:
	  – engine covers
	  – defective silencing equipment

Noise and Vibration	
	– rattling components – leakages in compressed air lines – Awareness training and information will be provided to project personnel in relation to the vibration requirements on the project and the need to minimise vibration when in close proximity to operational areas – Plant, equipment and processes shall be selected so as to limit construction related vibration – Restrict or modify working hours to minimise impact if required. Include periods of respite where possible when vibration generating activities are being undertaken
Responsibilities	– The Site Manager will ensure construction activities comply with these requirements and implement the control measures – The Site Manager / Project Manager will obtain approval to work outside approved hours
Timeframe	– Duration of site works
Monitoring and Reporting	– Weekly inspections to be recorded on form HSE Inspection – Complaints to be recorded on form HSE Incident Notification Report – Daily inspection (pre-start) checks and regular servicing of equipment – Daily / weekly check sheets to be kept for engine-driven or other ‘noisy’ equipment

Tree Protection	
Objective	– To comply with contractual and Development Consent requirements and ensure that on-site trees are protected, where required from construction activities
Targets	– Compliance with Development Consent requirements in relation to protected trees from Local Council – No damage / death to trees marked as protected on the project – All RCo staff and subcontractors are informed of the requirements of protected trees on the project
Legal, Contractual and Other Requirements	– See Appendix 3 for list of applicable legislative requirements – Contract specification clause – Planning consent conditions – SSD 10349252

Tree Protection		
Site specific planning / approval conditions / licence conditions	–	C19 Tree Protection
Controls (means and resources)	–	Ensure approval is provided to remove trees
	–	Appropriately trained and qualified tree removal contractors to be used
	–	Awareness training in the need to preserve vegetation to be retained
	–	Provide barricading or other suitable protection measures for trees to be retained
Responsibilities	–	Site Manager, Project Manager and RCo Staff to ensure all targets are met
Timeframe	–	Duration of works by RCo
Monitoring and Reporting	–	HSE Inspection & Reporting

Dust and Air Quality		
Objective	–	To comply with contractual requirements and ensure that dust and other air emissions from construction activities do not cause impacts on sensitive receivers and equipment
Targets	–	No valid dust complaints from construction works
	–	No dust impacting on offsite activities or surrounding residences
	–	No release of contaminants, (odour, smoke etc) into the air
	–	Comply with construction contract conditions
Legal, Contractual and Other Requirements	–	See Appendix 3 for list of applicable legislative requirements
	–	Contract specification
	–	Planning consent conditions – SSD 10349252
Site specific planning / approval conditions / licence conditions	–	C20 and C21

Dust and Air Quality		
Controls (means and resources)	–	Spraying formations and exposed work areas to suppress dust using water carts, tankers and other suitable equipment
	–	Minimise traffic on exposed areas – create designated haul roads
	–	Cover haul vehicles loads & ensure tail gates are closed when operating on public roads
	–	Provide shaker grids or rumble strip at site egress points. Note where aggregate is used, minimum size is 150mm
	–	Remove mud from haul vehicles prior to entering public roads
	–	Remove spilt mud by construction equipment or vehicles on public roads
	–	Reprogram dust generating work during periods of high wind
	–	Provide awareness training in the need to minimise dust during site inductions and toolbox talks
	–	Regular visual monitoring of dust generation
	–	Maintenance of Plant & Equipment as per manufacturers requirements
Responsibilities	–	The Site Manager / Project Manager to implement the requirements of this plan
	–	Site Manager to inspect the works at regular intervals to identify areas of dust generation
Timeframe	–	Shaker grids to be installed prior to commencement of works (where applicable)
	–	Water tankers and other measures available at the commencement of earthworks
	–	Spilt mud and sediment to be removed from public roads prior to the end of each shift
	–	Duration of site works
Monitoring and Reporting	–	Weekly inspections to be recorded on Form HSE Inspection
	–	Complaints to be recorded on form HSE Incident Notification Report

Waste		
Objective	–	To comply with contractual and legislative requirements and ensure that waste from construction activities does not have the potential to escape from the site and cause an environmental nuisance / harm
Targets	–	No incidents where waste is stored in a position where it has the potential to move off-site
	–	All off site movements of waste will be tracked
	–	The principles of the waste management hierarchy will be adopted, where practicable

Waste	
	– Target to reuse or recycle <insert percentage target 60%> by weight of construction waste – Waste will be minimised wherever possible
Legal, Contractual and Other Requirements	– See Appendix 3 for list of applicable legislative requirements – Contract Specification Clause – Planning consent conditions – SSD 10349252
Site specific planning / approval conditions / licence conditions	– B29, C30, C31, C32, C33 and C34
Controls (means and resources)	– Licensed waste contractors will be utilised to remove waste – All waste is to be disposed of at a lawful facility **NOTE:** A lawful facility includes one that has the appropriate Development Consent, Environment Protection Licence or is complying with EPA approved conditions and requirements – Use a licensed contractor to remove waste from site – Waste must be classified prior to disposal – refer to either – NSW EPA Waste Classification Guidelines – VIC EPA Guide to Classifying Industrial Waste (1968) – All spoil material removed from the site will be classified as per the above-named guidelines. Only a suitable Licensed or approved facility or approved site may receive the waste – Records of the quantity and final location of the spoil material will be retained – Use skip bins and ensure there are an adequate number of bins on site to hold all waste generated – Provide bins to enable waste segregation – Provide recycling services. E.g., Paper, Concrete, Steel, Cardboard, Timber – Ensure housekeeping is maintained and waste is disposed of to the appropriate bin – Retain waste disposal permits and figures on the amount of waste that has been removed from site
Responsibilities	– Site Manager will ensure waste is correctly stored, classified, recorded, tracked and minimised at all times

Waste	
	– The Project Manager is accountable for ensuring lawful waste disposal – All personnel are responsible for ensuring waste is placed in the bins provided
Timeframe	– Duration of site works
Monitoring and Reporting	– Skips monitored visually by the Site Supervision on a daily basis – Form HSE Inspection to be used to verify site waste practices – Waste disposal records are provided by waste management provider monthly

Water Quality, Site Drainage and Erosion and Sediment Control	
Objective	– To comply with contractual and legislative requirements and ensure that water discharged off-site from construction and erosion and sediment control (ESC) activities does not cause environmental nuisance / harm
Targets	– No sediment impacts to the surrounding environment and waterways as a result of the works – Prevent water quality impacts off site as a result of erosion and sedimentation.
Legal, Contractual and Other Requirements	– See Appendix 3 for list of applicable legislative requirements
Site specific planning / approval conditions / licence conditions	– Planning consent conditions requirements – SSD 10349252 – B19
Controls (means and resources)	– Erosion and sediment control plans (ESCPs) will be developed and implemented prior to the commencement of topsoil stripping and earthworks – The development of ESCPs will be guided by the Blue Book and other guidelines where required – Particular attention will be paid to the design criteria for sediment fences, straw bales, catch drains, diversion drains, sandbags and similar controls – Permanent drainage to be installed as early in the program as possible – All water to be discharged in accordance with legislation and only after RCo approval – Discharge quality must comply with:

Water Quality, Site Drainage and Erosion and Sediment Control	
	– TSS: ≤ 50mg/lt (~Turbidy 30NTU). If this cannot be achieved though natural settling, then the trapped sediment laden water is to be flocculated with gypsum applied at a rate of approx. 40kg/100m3 – pH: Between 6.5 and 8.5 – Provide shaker grids or rumble strip at site egress points. Note where aggregate is used, minimum size is 150mm – Top-soil / mulch stockpiles to be not greater than 2.0m in height. All stockpiles will be located clear of watercourses and drainage works – Wastewater management facilities shall only be provided through connection to existing sewer or proprietary storage and pump out systems are permitted – Wastewater storage and pump out systems shall be procured, installed and operated, including the provision of automatic cut off valves for inflows and high level alarms – All disturbed surfaces will be revegetated within 1 month of final land forming and in compliance with the landscaping plans – ESC devices are to be maintained when their capacity has been reduced by 25% – Under no circumstances will temporary stockpiles be placed within 5m of the site boundary or in position where it could impact adjacent property – Toolbox talks will be conducted for employees and subcontractors on the requirements of the ESC Plan – The ESC Plan is to be maintained and up to date for the current site conditions – Use sandbag check dams to protect stormwater drains as required – All ESC works will be removed immediately prior to final completion and all surfaces will be returned to pre-existing condition
Responsibilities	– All staff to ensure adequate ESC devices are installed and maintained – The PER will undertake “at least weekly” inspections of on-site ESC devices, plus prior to expected rainfall and after rainfall – The Site Manager is responsible for the repair / management of any damage or additional ESC devices, as required
Timeframe	– Duration of site works
Monitoring and Reporting	– Visually monitored daily by site supervision – Weekly inspections to be documented on form HSE Inspection

Water Quality, Site Drainage and Erosion and Sediment Control	
	– Maintenance activities for ESCPs shall be documented – items that cannot be immediately repaired are to be documented on the project CAR Register – All water quality data including quantity, quality and dates of water release will be maintained the project records

Traffic Management	
Objective	– To comply with contractual requirements and ensure that noise and additional traffic from construction activities does not cause an environmental nuisance
Targets	– No valid complaints resulting from congestion from construction traffic outside the approved Traffic Management Plan (TMP) – Comply with traffic management standards – No visible cueing in streets surrounding the site
Legal, Contractual and Other Requirements	– See Appendix 3 for list of applicable legislative requirements – Planning consent conditions – SSD 10349252
Site specific planning / approval conditions / licence conditions	– B16, B22, B23 and C10
Controls (means and resources)	– A TMP shall be developed detailing the route to the site, times of activity, types of machinery, signage, traffic control measures, etc – An approved Traffic Control Plan is required for any activity on/or immediately adjacent to public roads – The TMP will detail the monitoring and inspection requirements – There will be no cueing of vehicles on any roads adjacent to or in the vicinity of the site – There will be no construction parking in non-approved zones or parking areas – Ensure pedestrian access ways are clearly defined and maintained – Regular checks are to be undertaken to ensure all equipment and vehicles are in good working order and are operated correctly. Checking should include: – defective silencing equipment

Traffic Management		
	–	rattling components
Responsibilities	–	The Site Manager is responsible for ensuring traffic management plans and TCPs are developed, approved and implemented
Timeframe	–	Duration of site works
Monitoring and Reporting	–	HSE Incident Notification Report to be used to document complaints
	–	Daily inspection, checks and regular maintenance to be completed for traffic control measures

Hazardous / Contaminated Material		
Objective	–	To comply with contractual and legislative requirements and ensure that hazardous / contaminated material from construction activities does not cause an environmental nuisance / harm and is disposed of in accordance with legislative requirements
Targets	–	No environmental incidences involving contaminated/ hazardous materials
	–	No pollution events of the surrounding environmental and water ways by contaminated material
	–	All off-site movement of any found contaminated material will be tracked
Legal, Contractual and Other Requirements	–	See Appendix 3 for list of applicable legislative requirements
	–	Contract specification clause
	–	AS/ NZS 1940: 2004 - The Storage and Handling of Flammable and Combustible Liquids
	–	Australian Dangerous Goods Code, 5th Edition
Site specific planning / approval conditions / licence conditions	–	B32
Controls (means and resources)	Suspected material may include that which is visibly different to surrounding material, fibrous in nature, exhibits hydrocarbon odours or other unexpected characteristics, unknown containers, piping, underground storage tanks, or similar structures are discovered:	
	–	Follow protocols in the contract, RAP or Client Environmental Management Plan

Hazardous / Contaminated Material	
	– Immediately cease work and contact the Site Manger / Foreman / Supervisor – Demarcate the 'unexpected find' to prevent access and install appropriate environmental and safety controls – Project Manager to contact the client representative – If substance is assessed as not presenting an unacceptable risk to human health. Site Manger / Foreman / Supervisor to remove controls and continue work In addition, the following controls will be incorporated: – Manage any contaminated material as per legislative / EPA requirements including the testing and assessment at the direction of the Client's representative – Protect the environment by implementing control measures to divert surface runoff away from the potentially contaminated ground – Capture and manage any surface runoff contaminated by exposure to contaminated ground – Environmental awareness training relating to the identification and management of acid sulphate soils to be provided to all site personnel involved in earthworks, excavation or drainage construction activities – The Client's Representative shall be notified upon discovery of suspected ASS or PASS – Implementation of a specific runoff control plan to prevent acid runoff from contaminating site areas and watercourses – Suspected ASS / PASS stockpiles to be covered with plastic overnight
Responsibilities	– Site Manger / Foreman / Supervisors, Project Manager and RCo Staff to ensure all targets are met
Timeframe	– Contaminated Material: Duration of any contaminated material removal – Hazardous Material: Duration of site works
Monitoring and Reporting	– Receipts for the disposal of any found hazardous material will be filed on site by the Project HSE Advisor / Manager – The finding of any contaminated material on site will be reported monthly by the Project HSE Advisor / Manager using the Monthly HSE Report form

Trade Waste	
Objective	– To comply with contractual and legislative requirements and ensure that trade waste from construction activities does not cause an environmental nuisance / harm

Trade Waste	
Targets	– All trade waste to be discharged in accordance with legislation and approvals – Educate Roberts Co staff and subcontractors on the relevant legislation, the correct use of the washout system and the Roberts Co Trade Waste Permit where required – Reduced impacts to the surrounding environment and waterways
Legal, Contractual and Other Requirements	– See Appendix 3 for list of applicable legislative requirements – Health Administration Corporation Development Consent conditions, Consent No.: SSD - 10349252 – Contract specification clause
Site specific planning / approval conditions / licence conditions	– B29
Controls (means and resources)	– Provide a washout system on site which complies with all relevant legislation and contract conditions – Any paint washout required shall only be undertaken in the designated areas with appropriate bunding and control measures – Ensure the washout system is in a location which is away from stormwater drains and water courses – Trade waste or other prohibited substances will not be discharged into infrastructure (storm water drains or sewerage system) without approval – Toolbox talks will be conducted for RCo staff and subcontractors in the correct use of the washout system and legislation. – Ensure the washout system is monitored and cleaned on a regular basis **Note: Roberts Co staff and subcontractors may be prosecuted if they are found illegally dumping trade waste and could be responsible for paying sewerage system repair costs.**
Responsibilities	– The Project Manager will ensure a permit has been obtained prior to discharging trade waste – The Project HSE Advisor / Manager will ensure all relevant subcontractors undertake toolbox talks in relation to washout legislation and use
Timeframe	– At all times when there is site connection to sewage facilities

Trade Waste	
Monitoring and Reporting	– Visually monitored daily by the Project HSE Advisor / Manager – HSE Inspection report to detail any trade waste issues, follow up by Project HSE Advisor / Manager

Concrete Washout	<DELETE THIS SECTION IF NOT APPLICABLE>
Objective	– To comply with contractual and legislative requirements in relation to the washing out of concrete on the project
Targets	– Nil spills or uncontrolled release of concrete – No instances of uncontrolled concrete washout
Legal, Contractual and Other Requirements	– See Appendix 3 for list of applicable legislative requirements
Site specific planning / approval conditions / licence conditions	– B29
Controls (means and resources)	– Concrete washout to be constructed with geo-fabric lining and bunded – Location of washout to be at least 20m away from any drainage line or stormwater system – Washout to be constructed to the dimensions of 6m x 3m x .5m deep prior to commencement of concrete works – Washout to be barricaded off on all sides when not in use to prevent unauthorised entry – Washout area is to be inspected daily by the Site Manager to ensure residual water levels don't exceed 75% of capacity – Daily inspection of concrete washout to be undertaken, report and rectify issues using site diary or other means – Washout area to be cleaned when the capacity has been reduced below 50% – Cleaning of washout to involve, removal of spoiled geo-fabric material and disposed of in licensed landfill. Records to be retained – Where possible waste concrete shall be returned to the batch plant or concrete recycler – Concrete truck drivers are to be advised of the location of the washout area prior to arrival on site – The requirements relating to concrete washout on site are to be provided to the supplier prior to the works
Responsibilities	– The Site Manager will ensure that an approved and prepared area for concrete washout is available

Concrete Washout	<DELETE THIS SECTION IF NOT APPLICABLE>
	– All personnel are required to ensure that the requirements of this ERAP are implemented for their operations – Site Manager / Project Manager are required to advise Roberts Co of any concrete spills – The Site Manager is responsible for confirming these requirements with the concrete supplier prior to the works
Timeframe	– Duration of site works
Monitoring and Reporting	– Weekly inspections to be recorded on Form HSE Inspection – Incidents or spills of concrete to be recorded on form HSE Incident Notification

Delivery and Storage of Chemicals, Fuels & Oils and including Dangerous Goods requirements	
Objective	– To comply with contractual and legislative requirements in relations to the transport of dangerous goods – To comply with contractual and legislative requirements in relation to the storage of chemicals, fuels and oils on the site – To ensure contractual and legislative requirements in relation to hazardous substances and dangerous goods are adequately addressed for all operations – there are specific additional requirements relating to the storage and transport of dangerous goods
Targets	– Zero spills or uncontrolled release of fuel, oils or chemicals associated with Roberts Co's Operations, (inclusive of refuelling) – Compliance with relevant transport and storage requirements – All vehicles transporting dangerous goods have appropriate placards, licenses and emergency equipment and procedures
Legal, Contractual and Other Requirements	– See Appendix 3 for list of applicable legislative requirements – Contract specification – AS/NZS 1940: 2004 – The Storage and Handling of Flammable and Combustible Liquids
Site specific planning / approval conditions / licence conditions	– B19

Delivery and Storage of Chemicals, Fuels & Oils and including Dangerous Goods requirements	
Controls (means and resources)	The following are the minimum general control measures to be implemented on the project, however additional control measures may be required following the completion of the construction process procedure/work method statement for the proposed activity: – Minimise storage of fuel, oil, chemicals or other dangerous goods on site, though efficient and timely ordering – The SDS and material risk assessment and including any specific control measures are to be submitted where required to the Client's Representative for each and every substance to be brought on to site – A risk assessment relating to the use of these materials is to be completed in accordance with the Work Health and Safety Plan prior to the arrival of these goods to site – SDS and associated documentation for each material to be reviewed prior to the completion of the risk assessment for the relevant construction process. A copy to be included with the SWMS – Ensure SDSs are available on site for all fuels, oils, chemicals and dangerous goods. Suppliers are to provide SDS prior to dispatch of the material – Chemicals, fuels and oils to be stored in a securely bunded area with appropriate signage, at all times when not specifically in use – Chemicals fuels, oils and chemicals to be stored inside impervious bunds of sufficient capacity to contain 110% of the stored volume. Bunded areas must have sufficient cover to prevent ingress of rain – Materials removed from the bunded storage area for use are to be returned to the bund at the end of each shift – Storage sites are to be > 20m away from operational facilities, drainage lines, areas prone to flooding or on slopes > 1V:10H – Operator, driver or Supervisor to be in attendance at all times when unloading of fuel, oil or chemicals takes place on site – No water to be discharged from bunded areas into site drainage system. Contaminated water to be removed by appropriately licensed contractor & discharged to a suitably licensed waste facility – Delivery drivers are to be provided with specific drop off and storage instructions – Spill kits & absorbent material to be located adjacent to storage bunds – Training is to be provided to RCo personnel in the application of this ERAP and the use of spill kits – Absorbent material used to clean up spills to be disposed of in accordance with either: – NSW EPA Waste Classification Guidelines (2014)

Delivery and Storage of Chemicals, Fuels & Oils and including Dangerous Goods requirements

  - VIC EPA Guide to Classifying Industrial Waste (1968)
- A register of Chemicals, Fuels / Oils and Hazardous materials is to be kept onsite and maintained for the duration of the project
- Each construction method statement shall identify the use of chemicals, fuels & oils and hazardous materials
- SWMSs to address the specific requirements relevant to the work to be undertaken and document relevant site control measures
- Dangerous Goods
- Ensure transporters of these materials are appropriately licensed. This includes relevant licenses for vehicles and drivers
- Dangerous goods that are to be transported in receptacles greater than 500lt/kg may require specific licenses and shall not be transported by RCo without the Project Manager / Workplace Manager's approval
- Where dangerous goods are transported by RCo, a SWMS must be developed and include dangerous goods requirements
- Transport information / manifest is required to be included with any quantity of Dangerous Goods transported by RCo – Form 1232 Dangerous Goods Transport Note is to be used unless it can be demonstrated that the activity is exempt.
- The SWMS must address the requirement for Licensing, Placards or other specific regulatory requirements
- Transport activities in quantities that trigger the requirements of a "Placard Load" under the regulations require the following:
  - Transport vehicle to have appropriate Dangerous Goods Placard
  - Transport documents including manifests
  - Emergency procedures and information in an appropriate holder
  - 30B fire extinguisher
  - Double-sided reflectors
  - Driver safety equipment and PPE
  - Goods must be secured and where required segregated from incompatible goods.
  - Dangerous goods must be appropriately marked in accordance with the Australian Dangerous Goods Code

Delivery and Storage of Chemicals, Fuels & Oils and including Dangerous Goods requirements

Typical dangerous goods associated with operations include the following:

Type of Goods	DG Class
LPG Gas	2.1
Open Gear Lubricant	2.1
Marker Paint	2.1
Silicone Lubricant	2.1
Fuel Gas for welding/cutting	2.1
Fuel Gas for welding/cutting	2.2
Air Operated Tool Lubrication	3
Zinc Primer Paint	3
Air tool lubricant - workshop	3
Petrol-Unleaded	3
Sealant	3

Type of Goods	DG Class
Epoxy paint incl. hardener	8
Chemical Anchor-parts A&B	8
Chemical Anchor	8
Chemical Anchor	8
Adhesive Mortar	8
Acid	8
Degreaser (Pile Rigs)	9
Engine Coolant	9
Antifreeze	9
Grout	9
Form Oil	9

Type of Goods	DG Class
Plumbing adhesive	3
Diesel	3
Joint/gap sealant	3
Dry Film Lubricating Paint	3
Joint/gap sealant	5.2
Sealant	6.1
Flocculant	8
Rail Welding Consumables	1.4 S
Adhesive	3

Dangerous Goods Storage

- Dangerous goods storage on site must comply with the requirements of AS 1940:2004 including maintaining separation distances for incompatible materials
- The proposed materials need to be assessed for compatibility and required separation distances or control measures implemented
- Flammable materials storage is to be >15m from site facilities, officers, amenities or protected places

Delivery and Storage of Chemicals, Fuels & Oils and including Dangerous Goods requirements	
	– Quantities to be stored must be assessed to determine if they are considered manifest quantities - manifest quantities will require notification to relevant / applicable WorkCover authority – A storage location plan is required and needs to include internal layout, location of registers / manifests for the storage location – Bunding to be impervious and of sufficient capacity to contain 110% of the stored volume – Appropriate spill containment material and fire extinguishers are also required
Responsibilities	– Engineering personnel are responsible for identification of requirement to transport Dangerous Goods – Relevant Project Manager or Site Manager is responsible for ensuring all vehicles carry appropriate placards, licenses, emergency equipment and procedures – The Site Manager is required to ensure that sufficient bunds are available, and that material is stored appropriately – Engineering personnel are responsible for ensure SDS and other relevant documentation are obtained and where required submitted to the Client's Representative prior to the material arriving on site. Relevant documentation also includes appropriate risk assessment – The Project HSEQ Advisor / Manager is responsible for ensuring the Chemicals, Fuels / Oils & Hazardous Substances register is maintained
Timeframe	– Duration of operations – The requirements apply to goods transported by RCo and third parties
Monitoring and Reporting	– Plant / project risk assessments – Weekly inspections to be recorded on Form HSE Inspection – Register of Chemicals, Fuels / Oils and Hazardous Materials – Incidents or spills to be recorded on form HSE Incident Notification – Storage areas are to be inspected by the foreman / supervisory personnel on a weekly basis.

Flora and Fauna	
Objective	– To comply with contractual and legislative requirements and ensure that native fauna and flora are protected from construction activities.

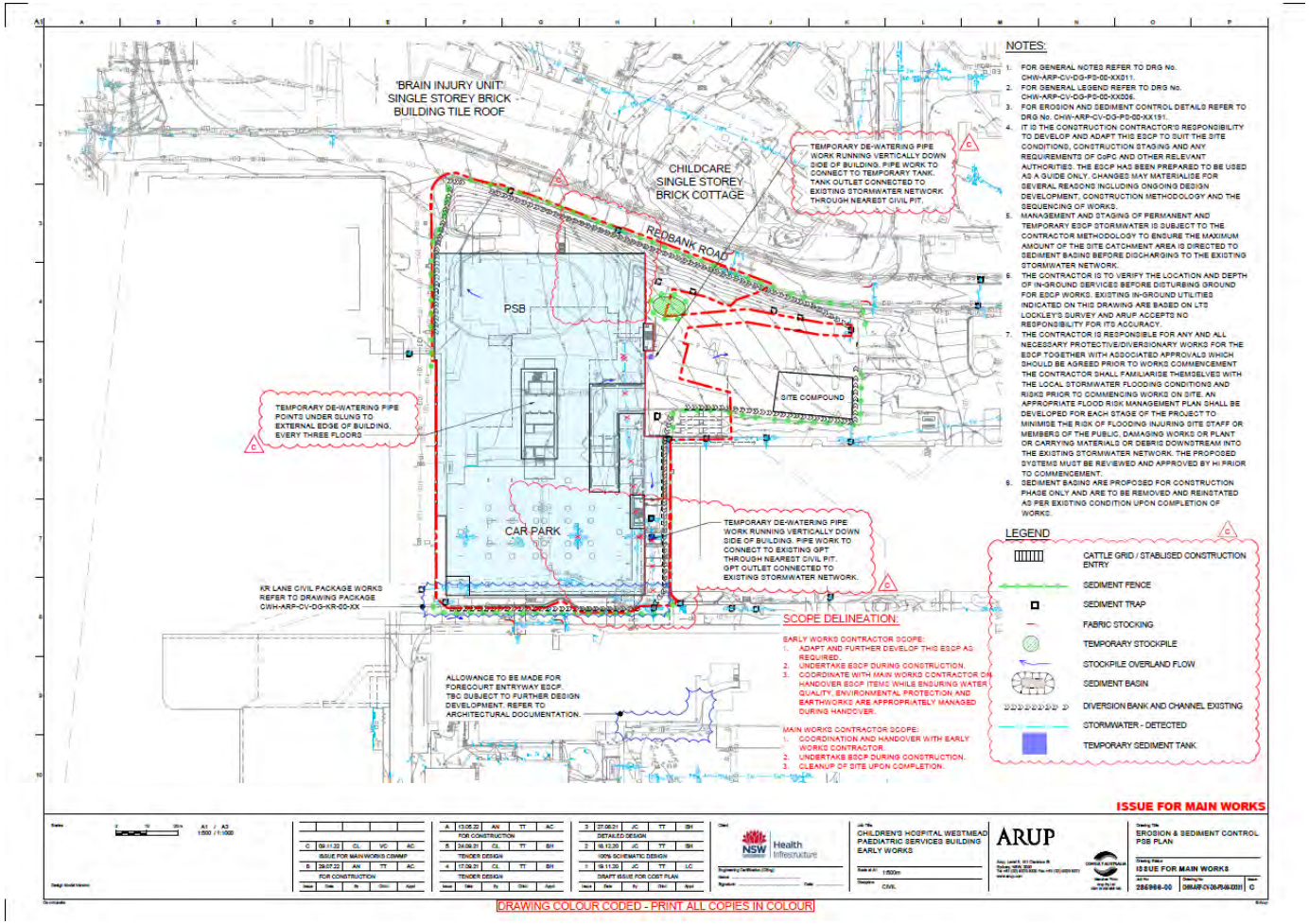
Flora and Fauna	
Targets	– No death or injury to fauna including the Green and Golden Bell Frog – No unapproved destruction of flora
Legal, Contractual and Other Requirements	– See Appendix 3 for list of applicable legislative requirements
Site specific planning / approval conditions / licence conditions	– B15
Controls (means and resources)	– If native fauna is identified within the disturbance footprint, the person taking the action must take all necessary steps to minimise harm and mortality to those animals – Open excavations and storage areas to be inspected regularly for the presence of fauna species – No clearing or vegetation removal to occur without the Client's approval – All vegetation to be retained shall be protected – Works will only be undertaken in designated areas – The clearing limits and protected vegetation, is to be clearly communicated to site personnel during site inductions and toolbox talks – Plant and equipment brought on to site must be cleaned and free of deleterious material, mud and other material that may harbour weed seeds – Identification of noxious weeds is to be notified to the Client's representative for action – Construction plant, equipment and materials are not to be stored within the dripline of any trees or vegetation to be retained – No personnel on site are permitted to hunt, fish, feed, capture, extract, or otherwise disturb aquatic, animal, or vegetative species while performing any tasks in performance of the work
Responsibilities	– All personnel are responsible for ensuring that the clearing limits, are addressed and native flora and fauna species are protected – All site personnel to undertake toolbox talks in relation to the reporting process for injury / death to fauna or clearing of flora occurring beyond the required limits for construction

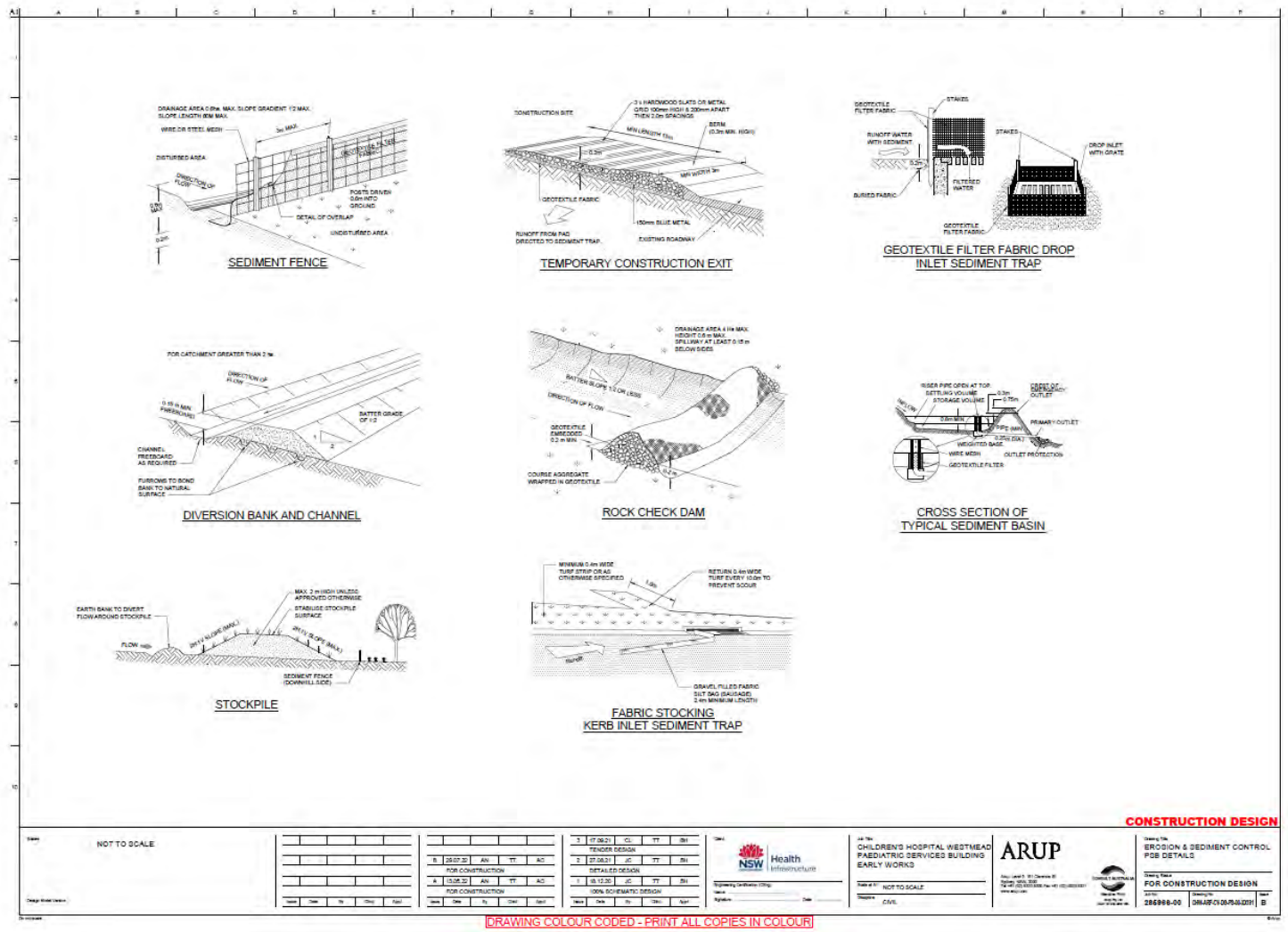
Flora and Fauna		
Timeframe	–	Duration of the works
Monitoring and Reporting	–	Visually monitored daily
	–	Weekly environmental inspection form HSE Inspection detailing any flora and fauna

Archaeology / Heritage		
Objective	–	To comply with contractual and legislative requirements and ensure that existing and undiscovered heritage and archaeological items are protected from construction activities.
Targets	–	Heritage Act 1977
	–	National Parks and Wildlife Act 1974
Legal, Contractual and Other Requirements	–	See Appendix 3 for list of applicable legislative requirements
	–	No disturbance or damage to existing known heritage sites or items.
	–	Unknown or undocumented heritage sites are not knowingly destroyed, defaced or damaged.
	–	Identify and protect any new artefacts or heritage sites before any harm can take place.
	–	Any relics found on site will be kept safe for consideration of incorporation into site fixtures
Site specific planning / approval conditions / licence conditions	–	C28 and C29
Controls (means and resources)	–	Awareness training on the need for the preservation of artefacts and items of heritage value to be provided during the site induction
	–	Location of currently identified archaeological and heritage items are to be nominated on the ECP
	–	Exclusion fencing will be provided around the perimeter of any identified heritage or archaeological items
	–	Awareness training on the need to stop work and to report on new sites, artefacts or items of heritage value
	–	Should any new items be discovered that are suspected of being of heritage significance, whether Indigenous or European, work in the specific area would cease and RCo is to be notified immediately

Archaeology / Heritage	
	– Should suspected heritage or archaeological items including human remains be found during the works, the following procedure will apply: – Work is to cease in the area immediately and RCo notified – The matter is to be referred to the client – The object is to be left in place – GPS coordinates of the item are to be noted – Photographic records of the item and its location are to be made
Responsibilities	– All personnel on site are to ensure that archaeological and heritage items are protected from damage or disturbance, unless – The Site Manager and/or HSE Manager will ensure all site personnel undertake toolbox talks in relation to protection of nominated items that were previously unknown.
Timeframe	– Throughout construction activities
Monitoring and Reporting	– Visual monitoring weekly of any existing items – Completion of weekly environmental inspection report HSE Inspection

Appendix 05 – Environmental Control Plan





Appendix 06 – Emergency Preparedness and Response

The types of environmental emergencies that could occur on this site are tabulated below.

Note: This plan is designed to supplement both the Roberts Co Project Emergency Response Plan and the Client's site emergency response plan/s, where available.

Emergency	Preparation	Response	Responsibility
Significant adverse dust event due to weather conditions: High winds	Monitor meteorological conditions for the area - develop contingency for wind speeds in excess of 16m/s (55km/hr). High wind 'stop works' protocols in place. Establish contingency strategy for additional dust control measures, additional water carts, dust suppressants, stockpile covers etc.	Dust generating activities will cease under direction of the Project HSE Manager or Foreman / Supervisor until adverse conditions subside. Deploy additional mitigation measures to exposed areas stockpiles and other dust generating items will be water sprayed or covered.	Project HSE Advisor / Manager Foreman / Supervisor
Discovery of friable asbestos	Review previous land uses, environmental reports for potential for friable asbestos. Include asbestos awareness in the site induction where the potential exists. Include contingency in relevant work procedures and SWMSs. Identify potential service providers for asbestos control and removal.	Quarantine suspected area. Cover or provide dust mitigation strategy. Engage licensed/approved removal and disposal organisation Complete post removal verification.	Project Manager Site Manger / Foreman / Supervisor Project HSE Advisor / Manager
Flooding	Monitor meteorological conditions – develop contingency strategy for rainfall > 100mm in 24hours or potential for > 1in 5 ARI All chemicals, fuels and other hazardous substances to be in secured containers and stored within a sealable shipping container	Recover materials washed from site including sediment and other waste. Check effectiveness of erosion and sedimentation devices and other flood controls, maintain where required and safe to do so.	Site Manger / Foreman / Supervisor Project HSE Advisor / Manager

Emergency	Preparation	Response	Responsibility
	Remove plant and equipment from low lying areas Secure plant that cannot be removed Review site drainage flow paths: Redirect site drainage to prevent flooding of residential/business premises. Ensure site drainage does not concentrate surface flow. Review and address the potential for excess water entering the site. Review and maintain erosion and sedimentation controls.		
Temporary erosion and sediment controls are damaged during rainfall.	Plan controls to be suitable for expected conditions. Ensure sufficient materials, labour and plant are available for additional controls.	A review of the site to be undertaken by HSEQ Advisor / Manager and Site Manger / Foreman / Supervisor. Controls to be repaired or replaced within 24 hours of detection, immediately if inclement weather current.	Project HSE Advisor / Manager Site Manger / Foreman / Supervisor
Damage to sediment basin	Check basins for suitability to project requirements; size, treatment type, etc. Basin outlet to be designed to remain functional in 1 in 20 ARI event. Ensure basin construction is in accordance with QA requirements including relevant ITPs.	Water in damaged basin to be pumped to another secure basin or discharged if it meets the site criteria. Damage to be repaired as soon as practical. Repairs to be monitored when basin brought back online.	Project HSE Advisor / Manager Site Manger / Foreman / Supervisor
Spill of hazardous or toxic substance. (< 20L)	Awareness training of appropriate response and procedures to be incorporated into Project Induction.	Report spills immediately to Site Manager and/or the Project HSEQ Advisor / Manager.	Site Manger / Foreman / Supervisor

Emergency	Preparation	Response	Responsibility
	SDS on site for all materials and kept up to date. Adequate supply of absorbent materials available in the site compound and on vehicles at work location.	Attempts to be made to limit or contain the spill using sandbags to construct a bund wall, use of absorbent material, temporary sealing of cracks or leaks in containers, use of geotextile or silt fencing to contain the spill. Site Manager and Supervisors to coordinate the response, clean up and disposal of the material. Material to be disposed of in accordance with the manufacturers' recommendations and applicable legislation.	Project HSE Advisor / Manager
Major spill of hazardous or toxic substance off site or to environmentally sensitive area. (> 20L)	Awareness training of appropriate response and procedures to be incorporated into Environmental and Safety Induction. SDS on site for all materials and kept up to date. Adequate supply of absorbent materials available in the site compound and on vehicles in work location. Emergency telephone numbers for Emergency Response organisations/fire brigade prominently displayed around office and issued to supervisors. Initial contact to be made with relevant organisations at project commencement.	Report spill immediately to Project Manager and/or Site Manager who will notify the client. Attempts to be made to limit or contain the spill using sandbags to construct a bund wall, use of absorbent material, temporary sealing of cracks or leaks in containers, use of geotextile or silt fencing to contain the spill, transferring remaining material. Implement procedures to notify the relevant authorities. Site Manager to coordinate the response, clean up. Fire brigade or emergency organisations should be called if spill cannot be controlled by site resources. Evacuation procedures are to be implemented to remove non-essential personnel from the affected area. On site client personnel are informed of the incident, internal reporting as per potential Class 1 matter. Access and egress to the area is established to ensure the appropriate vehicles have effective access and congestion is minimised.	Project Manager Site Manger / Foreman / Supervisor Project HSE Advisor / Manager

Emergency	Preparation	Response	Responsibility
		Senior Officer from fire brigade / emergency organisation assumes control of the operation with Roberts Co personnel assisting as required. Commence data gathering and investigation once emergency is contained.	
Vibration causing structural damage.	Choose correct plant when working near structures; minimise size and impact . Use safe working distances during planning phase. Implement vibration monitoring at commencement of vibration generating works to ensure compliance with standards.	Activities causing vibration would cease under direction of the Project HSEQ Advisor / Manager or Site Manger / Foreman / Supervisor. Any occupants of buildings may be evacuated with due consideration to safety, and the area secured to prevent unauthorised access. A structural assessment to be undertaken; and if any damage is associated with construction, rectification work would be agreed.	Project HSE Advisor / Manager Project Manager
Unapproved clearing / damage to protected vegetation – threatened / endangered species.	Clearly demarcate site boundaries. Clearly demarcate clearing areas and brief site personnel. Identify/mark vegetation to be retained or that is protected. Identify species that may be impacted, include material within the project induction. Included requirements within construction planning documentation.	Immediately cease activities. Engage consultant to assess damage to vegetation and presence of any endangered or threatened communities.	Site Manger / Foreman / Supervisor Project HSE Advisor / Manager
Injury/death to protected / endangered / threatened fauna.	Identify potentially impacted species prior to commencement on site. Identify species that may be impacted, include material within the project induction.	Immediately cease activities upon discovery of injured fauna. Implement procedure for short-term stabilisation and transport to Vet or WIRES.	Site Manger / Foreman / Supervisor Project

Emergency	Preparation	Response	Responsibility
	Review/inspect vegetation to be cleared prior to clearing – utilise ecologist/spotter where there is the potential for endangered/threatened species Engage with local vet/WIRES representative on the appropriate contact/procedure. Site procedure for the short-term management of injured fauna.	Undertake additional vegetation inspection to identify any remaining fauna prior to recommencement.	HSE Advisor / Manager
Damage / destruction of indigenous heritage item.	Ensure site investigations detail any heritage items on or in proximity to the site. Include awareness material within the project induction. Develop a 'stop works' protocol for any heritage find on site.	Cease works and stabilise the area, under the direction of the Environmental Manager or Site Manger / Foreman / Supervisor. The Environmental Manager is to report the remnants to the client and regulatory authority. Request an archaeologist to assess the significance and archaeological potential of the uncovered feature.	Project HSE Advisor / Manager
Damage / destruction of European heritage.	Ensure site investigations detail any heritage items on or in proximity to the site. Develop a 'stop works' protocol for any heritage find on site.	Cease works and stabilise the area, under the direction of the Environmental Manager or Site Manger / Foreman / Supervisor. Contact an archaeologist to assess the significance and archaeological potential of the uncovered feature.	Project HSE Advisor / Manager

Unexpected Aboriginal & Non-Aboriginal Heritage Find

An 'unexpected heritage find' can be defined as any unanticipated archaeological discovery that has not been identified during any previous assessments or is not covered by an existing permit under relevant legislation such as the NPW Act or Heritage Act.

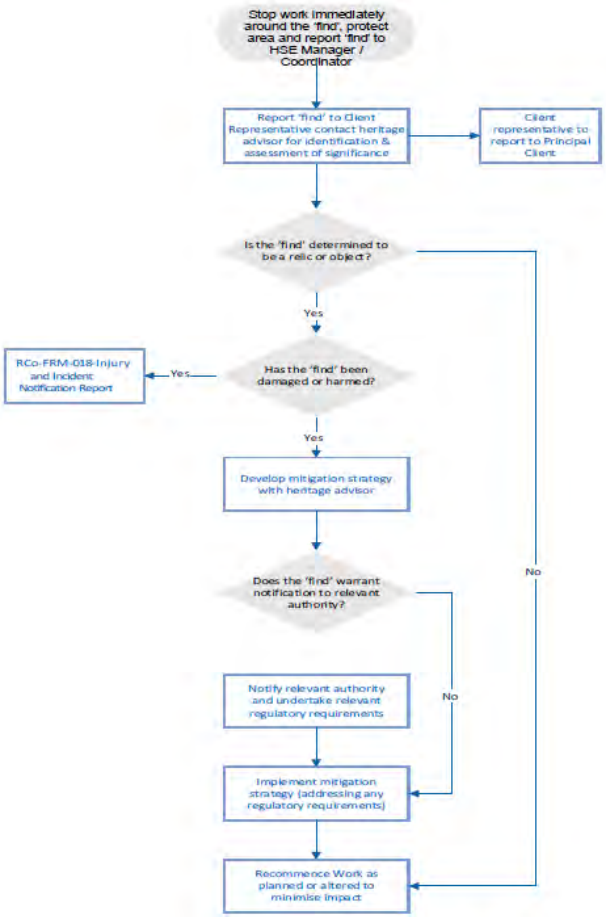
The find may have potential cultural heritage value, which may require some type of statutory cultural heritage permit or notification if any interference of the heritage item is proposed or anticipated.

The range of potential archaeological discoveries can include but are not limited to:

- Aboriginal stone artefacts, shell middens, burial sites, engraved rock art, scarred trees;
- remains of rail infrastructure including buildings, footings, stations, signal boxes, rail lines, bridges and culverts;
- remains of other infrastructure including sandstone or brick buildings, wells, cisterns, drainage services, conduits, old kerbing and pavement, former road surfaces, timber and stone culverts, bridge footings and retaining walls, and;

artefact scatters including clustering of broken and complete bottles, glass, ceramics, animal bones and clay pipes • archaeological human skeletal remains.

Unexpected Heritage Finds – Flowchart



Unexpected find Asbestos Containing Material (ACM)

An 'unexpected ACM find' can be defined as any unanticipated discovery that has not been identified during any previous assessments or is not covered by an existing asbestos removal permit under relevant legislation and/or as issued by SafeWork NSW.

Procedure for managing unexpected finds or incidents is as follows;

1. **Stop Work Immediately**
    - **a.** Leave the area and alert nearby workers;
    - **b.** Report the incident to your supervisor or RCo EHS Manager / Coordinator;
    - **c.** Workers or the person controlling the workplace who believe a worker or workers have or may have been exposed to asbestos or ACM must be decontaminated as soon as possible;
    - **d.** Clothing must be treated as asbestos waste and disposed of in the asbestos waste bags with any disposable PPE and the wet wipes used for decontamination. Any item that can't be decontaminated such as socks must also be disposed of as asbestos waste; and
    - **e.** Workers suspected of being exposed to asbestos or ACM should undertake a baseline medical examination as soon as practical after the exposure.

2. **Inform workers and isolate area**
    - a. Inform workers to clear the workplace until the hazard has been contained;
    - b. Establish a suitable exclusion zone (minimum of 10 metres) using barricades and warning signs to restrict access. The size of the zone should be based on the nature of the disturbance and advice from hygienist. Anything less than 10 metres will require asbestos air monitoring to be conducted at the exclusion zone boundary;
    - c. Consult a licensed asbestos assessor, occupational hygienist or competent person for advice should access within the exclusion zone be unavoidable (for example for essential maintenance), prior to entering the exclusion zone;
    - d. Minimise disturbance of the material; and
    - e. Workers must wear minimum PPE of P2 respirator (P3 preferred), disposable coveralls and boot covers should emergency access to the exclusion zone be required.

3. **Install warning signage**
    - a. Asbestos warning signs must be positioned at all points of entry to the contaminated area;IF NO warning signs are onsite, use danger flags or normal warning signs as a temporary measure; and

b. IF NO warning signs are onsite, use danger flags or normal warning signs as a temporary measure; and

c. If asbestos is assumed or confirmed, warning signs should be obtained for use when asbestos or ACM is being removed or used in the case of an unexpected find.

4. Reports to Regulator (SafeWork NSW)

a. Evaluation of the incident by the RCo EHS Manager / Coordinator will determine if SafeWork NSW should be notified such as in incidences of uncontrolled escape, spillage or leakage of asbestos; and;
b. Notify the regulator immediately or within a maximum of 24 hours after becoming aware of the incident if the RCo EHS Manager / Coordinator determines it is required.

5. Assessment, removal and decontamination

a. Engage a licensed asbestos assessor, occupational hygienist or competent person who will inspect, test and assess the area and the material and provide advice for remediation/decontamination; and
b. Engage a licensed asbestos removalist to safely remove the asbestos and decontaminate the area in accordance with the WHS regulations.

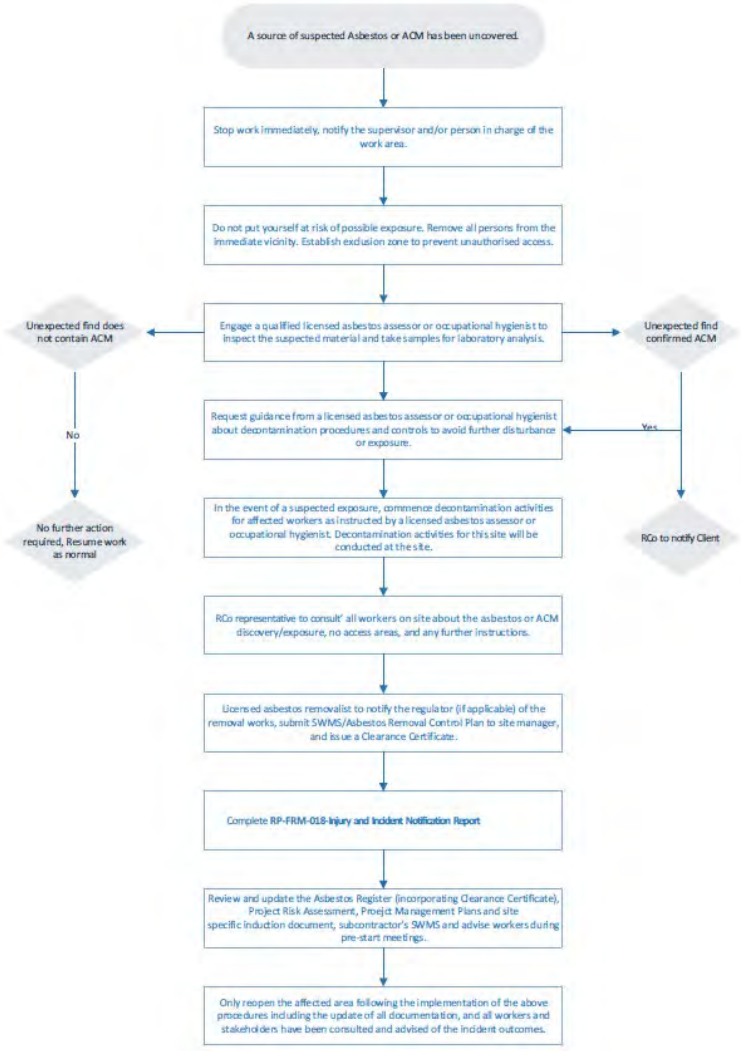
6. Air Monitoring

a. Air monitoring should be conducted by a licensed asbestos assessor, occupational hygienist or competent person with the analysis conducted by a NATA accredited testing facility.

7. Clearance and Reoccupation

a. No unprotection persons are permitted into the affected area (except asbestos removalists) prior to a Clearance Certificate being issued, and
b. After decontamination and air monitoring has been completed a licensed asbestos assessor, occupational hygienist or competent person can conduct a clearance inspection and issue a Clearance Certificate prior to reoccupation.

Unexpected ACM Finds – Flowchart



Appendix 07 – Conditions of Approval Compliance Tracking Matrix

Refer to the Project Drive for the Conditions of Approval Compliance tracking Matrix – coordinated by the Design Manager

Appendix 08 – Environmental Impact Statement

Recommendations and Mitigation Measures

The collective measures required to mitigate the impacts associated with the proposed development are detailed in **Table 16** below.
These measures have been derived from the previous assessment in **Section 6** and those detailed in appended consultant's reports.

Table 16 Mitigation Measures

Item	Mitigation Measures
Heritage	It is recommended that, as soon as practicable, suitable trees be planted along the western boundary of Wisteria Gardens in order to mitigate the visual impact of the PSB. The type of trees planted should be in keeping with the existing significant plantings of the Wisteria Gardens and in keeping with the latest version of the CMP for the Cumberland District Hospital Group.
Aboriginal Heritage	An "Unexpected Finds Protocol" will be put in place prior to the commencement of work for the instance that any archaeological remains are found. If human remains, or suspected human remains, are found during excavation, all work in the vicinity should cease immediately. The site should be secured and the NSW Police and the DPIE notified.
Historical Archaeology	Although considered unlikely, should archaeological material be identified during construction/excavation for the PSB, all works in the area should stop, the area cordoned off and a qualified archaeologist be contacted to assess the significance of the archaeological material. Works should not recommence in that area until a management plan for the deposits is completed.
Operational traffic	Operational traffic impacts and requirements have been assessed and documented in the Traffic Assessment and Preliminary Green Travel Plan prepared by WSP. A precinct-wide operational traffic and access management plan would be developed to encompass the post redevelopment operations across the precinct, adopting precinct-wide transport management measures to ensure safe operation of the precinct. A Detailed Travel demand measures will be implemented in a Detailed Green Travel Plan required to be prepared and implemented as a condition of consent.
Construction Traffic	Construction traffic measures traffic impacts and requirements have been assessed and documented in the Traffic Assessment prepared by WSP. A Detailed Construction Traffic and Pedestrian Management Plan will be required to be prepared as a condition of consent.
Geotechnical	The proposed development is in accordance with the recommendations outlined in the Geotechnical Investigation Report prepared by JK Geotechnics at **Appendix P**.

Contamination	The proposed development will be delivered in accordance with the Detailed Site Investigations at **Appendix Q** and **R,** and the Remedial Action Plan at **Appendix S**. −A Construction Environmental Management Plan (CEMP) should be prepared prior to redevelopment works, which documents the environmental monitoring and management measures required to be implemented during construction related activities associated with the construction of the site. −The existing CHW Asbestos Register and AMP should be updated to reflect the results of this assessment. −The WSLHD AMP should be updated to reflect the results of this assessment. WSLHD should continue to implement the WSLHDAMP until such a time that the redevelopment commences, and the management of the site is passed to the Principal Contractors engaged by Health Infrastructure NSW. −Further, a redevelopment specific AMP and Asbestos Register will be required to be prepared and implemented during future redevelopment works. − A Work Health and Safety Management Plan (WHSP) to document the procedures to be followed to manage the risks posed to the health of the remediation workforce.
Arboricultural	The proposed upgrade works will be delivered in accordance with the recommendations described in Section 6.2 of the Arboricultural Impact Assessment Report attached at Appendix AG, prior to the commencement of any works.
Ecologically Sustainable Development	The proposed upgrade works will be delivered in accordance with the Ecologically Sustainable Development Report prepared by Steensen Varming at Appendix AB. A climate adaptation study will be undertaken to identify the climate risks in response to CSIRO projected impacts.
Waste	Waste generated during construction and operation of the PSB is to be managed in accordance with the industry standards and guidelines identified in the Waste Management Plan prepared by JBS&G at Appendix Y.
Noise and Vibration	− A Construction Noise and Vibration Management Plan (CNVMP) will be acquired when construction management is finalized to mitigate noise emissions to the surrounding context and included in the CEMP. − The Proposal will align with noise and vibration mitigation measures outlined in the Noise and Vibration Assessment report, prepared by Stantec. − Short-term and long-term monitoring are to be undertaken by an experienced noise and vibration monitoring professional or an acoustic consultant. The results of any noise or vibration monitoring are to be provided to the relevant party or person in a timely manner allowing the builder to address the issue and respond to the complaints. − The noise and vibration monitoring program for the project, outlined in the Acoustic Report, is implemented.
Construction management	− Construction will be managed in accordance with the measures identified in the Preliminary Construction Management Plan prepared by PwC. − A Detailed Construction Environmental Management Plan (CEMP) is to be prepared prior to construction commencing on site.

Flood	− Consultation with SCHN on developing a flood emergency management plan and coordination with the wider Westmead Health Precinct management plan. − Since the lowest habitable floor level is above the riverine flood levels and overland flooding is expected to be short duration/high hazard events, a shelter-in-place approach in the event of a flood would be feasible for users in the building and around the site. − Further design development of the PSB in consultation with the Architect as the design progresses. This includes assessment of the CHW forecourt area and PSB entryway to mitigate flood risk into the building. − Updated flood modelling to demonstrate flood risk and impact of PSB and CHW forecourt as the development design progresses.
External lighting	The following approaches will be incorporated into the external lighting design to minimise obtrusive lighting: − Luminaire mounting heights selected to minimise spillage and cater for better lighting control. − Where possible, light fittings adequately setback from the property boundary to reduce light spill. − Light fittings with narrow beam or sharp cut of angles. − Light fittings with low vertical aiming angles.

ARUP

Roberts Co

Paediatric Services Building (Stage 2 Children's Hospital Redevelopment at Westmead Hospital)

Construction Traffic and Pedestrian Management Sub-Plan

Reference:

v6 | 25 January 2023

Job number 271985

Arup Australia Pty Ltd | ABN 76 625 912 665

Arup Australia Pty Ltd
Level 5
151 Clarence Street
Sydney
NSW 2000
Australia
arup.com

ARUP

Document Verification

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		Name	Ryan Tay	James Edwards	James Edwards
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		Description	Revision following comments from TfNSW		
			Prepared by	**Checked by**	**Approved by**
		Name	Joyce Wong	Eoin Cunningham	James Edwards
		Signature	*Joyce Wong*		
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		Description	Inclusion of Oversize/Overmass comments		

	Prepared by	Checked by	Approved by
Name	Joyce Wong	Eoin Cunningham	Eoin Cunningham
Signature			

Issue Document Verification with Document ✓

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1. Introduction

1.1 Overview

The Children's Hospital at Westmead (CHW) Stage 2 Redevelopment will be part of the Westmead Health Precinct, adjacent to Westmead Hospital.

The proposed PSB will enable the expansion and replacement of existing paediatric services at CHW, providing additional surgery and critical care services. The PSB will be an important addition to the Westmead Health Precinct, enhancing the provision and quality of paediatric health services to the growing Western Sydney population.

The Project includes the construction of a new Paediatric Services Building (PSB) located adjacent to the CASB, and on the site of the former P17 car park. The PSB will address the following principles:

- Achieving SCHN's strategic vision, clinical priorities and project objectives.
- Maximising the fit-out of clinical space and extent of acute services within the PSB and CASB, enabling the priority services identified in the Clinical Services Plan to be brought on-line with minimal further investment (if any) in line with forecast demand.
- Addressing key adjacencies and clinical links between the CASB and the existing CHW.
- Providing optimised clinical and back of house adjacencies.
- Enabling the most efficient future location of Inpatient Units (IPUs) and realisation of the "acute services zone" developed via the CASB and PSB as per the CHW Master Plan, through the provision of two shell floors to accommodate future IPUs and provide decant capacity for Lot 3 services impacted by the Parramatta North Program.

This Construction Traffic and Pedestrian Management Sub-Plan (CTPMSP) has been prepared to address the requirements for SSD 10349252 Condition B16, specifically the Stage 2 Crown Certificate (for construction), works entail the building's superstructure.

1.2 Proposed development

The proposed PSB site lies between the recently constructed Westmead Hospital Central Acute Services Building (CASB) to the southwest and the existing Westmead Children's Hospital Block 6 to the northeast of the site. The site has frontage to the southern side of Redbank Road.

Figure 1: Building aerial showing the PSB development site including site compound

PSB Main Works (Stage 3) work will follow the approved completion of the Early Works Package (Stage 1) for the building's substructure, aligning with the SSD Staging Report.

1.3 Construction Traffic Management Principles

As a general principle, construction of the proposed works will be staged to minimise impacts to traffic and other modes of transport. The overall principles for traffic management during construction of the proposed works will include:

- Maintaining access to and from properties and hospital facilities located in the vicinity of the site at all times
- Manage and control construction traffic movements on the adjacent road networks and vehicles movements to and from the construction site
- Limit the interaction of construction traffic with hospital traffic, especially heavy vehicle and light vehicle conflicts
- Trucks to enter and exit the site in a forward direction
- Maintain traffic capacity at intersections and mid-block in the vicinity of the site
- Restrict construction vehicle activity to designated truck routes in the area
- Construction access driveways and on-street work zones to be managed and controlled by site personnel
- Provide an appropriate environment for pedestrians at all times

- Maintain convenient access and circulation for public transport
- Pedestrian movements adjacent to construction activity, across construction access driveways and to/from public transport facilities, will be managed and controlled by an authorised and qualified traffic controller
- Pedestrian warning signs and construction safety signs/devices to be utilised in the vicinity of the site and to be provided in accordance with SafeWork and any applicable legislative requirements
- Construction activity is to be carried out in accordance with approved hours of work.

Traffic management and control will be established at all site entrances across the project. Traffic control will ensure that materials and deliveries will not block off roadways and will streamline the truck movements in and out of the project site.

1.4 Conditions of Consent

This CTPMSP responds to the items set out in Condition B16 for SSDA 10349252. Table 1 outlines the relevant sections within the report where these items have been addressed.

Table 1: Conditions of consent responses

Item	Description	Report Section
B15.	**Construction Environmental Management Plan** Prior to the commencement of construction, the Applicant must submit a Construction Environmental Management Plan (CEMP) to the Certifier and provide a copy to the Planning Secretary for information. The CEMP must include, but not be limited to, the following:	
(d)	Construction Traffic and Pedestrian Management Sub-Plan (see condition B16);	This document
B16.	The Construction Traffic and Pedestrian Management Sub-Plan (CTPMSP) must be prepared to achieve the objective of ensuring safety and efficiency of the road network and address, but not be limited to, the following:	This document
B22.	**Construction Parking** Prior to the commencement of construction, the Applicant must provide sufficient parking facilities on-site or within any approved works zones for construction vehicles and machinery, including for heavy vehicles, to ensure that construction traffic associated with the development does not utilise public and residential streets or public parking facilities.	Site layout plans, staging area
(a)	be prepared by a suitably qualified and experienced person(s);	Arup personnel are suitably qualified Traffic Engineers and Transport Planners with experience in preparing Traffic Management Plans for similar projects
(b)	be prepared to the satisfaction of Council's Traffic and Transport Manager and TfNSW;	This plan has been prepared for the approval of Council and TfNSW
(c) (i)	detail: measures to ensure road safety and network efficiency during construction in consideration of potential impacts on general traffic, cyclists and pedestrians and bus services;	Sections 3.7-3.9
(ii)	measures to ensure the safety of vehicles and pedestrians accessing adjoining properties where shared vehicle and pedestrian access occurs;	Section 3.9

Item	Description	Report Section
(iii)	detail the measures that are to be implemented to minimise the impact of activities associated with the construction of the development the subject of this consent on the Parramatta Light Rail (PLR) Project, in liaison with PLR's Construction Contractor and/or Operator;	Section 3.8
(iv)	construction and heavy vehicle routes, access and parking arrangements;	Section 3-3.6
(v)	the swept path of the longest construction vehicle entering and exiting the site in association with the new work, as well as manoeuvrability through the site, in accordance with the latest version of AS 2890.2;	Appendix A, Section 3.2-3.3
(vi)	arrangements to ensure that construction vehicles enter and leave the site in a forward direction unless in specific exceptional circumstances under the supervision of accredited traffic controller(s);	Section 3.2
(vii)	details of crane arrangements including location of any crane(s) and crane movement plan; and	Section 3.6
(viii)	detail measures to minimise cumulative construction impacts on surrounding road networks, identifying the duration of impacts.	Section 2.1, 2.2, 3.1, 3.5
C10.	**Construction Traffic** All construction vehicles are to be contained wholly within the site, except if located in an approved on-street work zone (Hawkesbury Road is not suitable), and vehicles must enter the site or an approved on-street work zone before stopping unless directed by traffic control.	Section 3.1

2. Proposed works

This section outlines the staging of the planned construction works and associated vehicle movements.

2.1 Construction programme

Construction of the PSB Main Works (Stage 3) is estimated to begin once the Early Works package (Stage 1) construction is complete, in early 2023 as shown in the SSD Staging Report. Figure 2 provides a high-level overview of the approximate construction programme. Main construction activities are scheduled between January 2023 and January 2025, while commissioning and completion works are due to finish by March 2025.

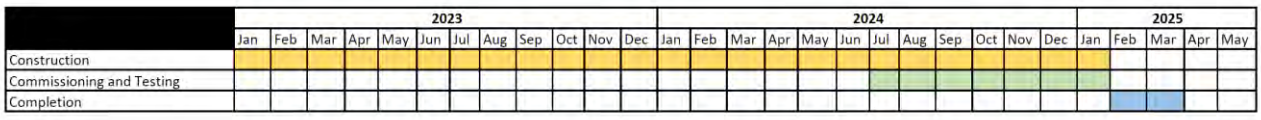

Figure 2: PSB construction stage 2 approximate duration

2.2 Peak construction movement

Peak construction vehicle movements would likely occur during the concreting stages of the project where there will be continual concrete truck deliveries to the site.

Based on an estimated maximum of 400m^3 of concrete being poured on site in a day, 50 concrete truck deliveries would be needed transport this quantity to site over the course of the day (assuming each truck holds 8m^3). Assuming concrete pouring can begin by 8am and conclude at 6pm, this

equates an average of 6.3 trucks per hour or, one truck every ten minutes. Site traffic control will be required to manage truck arrivals and departures from the site during the afternoon shift changeover which dictates the local traffic peak.

The anticipated peak construction vehicle volumes are therefore unlikely to impact the surrounding campus transport network. Particularly given activity for construction of PSB Main Works (Stage 3) would replace current activity that has been occurring for construction stage 1 (substructure) of the CHW.

Given that construction workers are expected be on site by 7am, peak private vehicle arrivals are expected to before the surrounding AM peak, minimising impact on the surrounding road network.

2.3 Work hours

Construction work will be undertaken in accordance with the conditions of approval for the Environmental Impact Statement and will generally be undertaken on a five-day work week. At some stages, weekend and night works may be required. Permissions for works outside the standard Monday to Friday hours, including notifications to stakeholders, will be managed through the established Disruption Notice process for the Westmead Redevelopment projects on the campus.

SSDA approved work hours are presented in Table 2 below.

Table 2: SSDA approved work hours for construction sites

Days	Start time	End time
Monday to Friday	7:00am	6:00pm
Saturday	8:00am	5:00pm
Sundays & public holidays	No work permitted	

The contractor would be responsible for informing and ensuring all sub-contractors adhere to the set hours of work. Any disruptions to daily traffic and disturbances to hospital staff and patients as well as surrounding land owners will be managed through the established Disruption Notice process for the Westmead Redevelopment projects on the campus.

2.4 Vehicle types expected

Construction vehicles likely to be generated by the proposed construction activities would generally include rigid vehicles (6.4m-12.5m), 18m truck-and-dog vehicles and/or 19m semi-trailers and vans and utes, depending on the construction activities.

The largest construction vehicle which will need to access site is the 19m semi-trailer which will also be used to transport mobile cranes onsite. Swept paths for this vehicle entering and existing the site has been attached in Appendix A.

The health campus roads have been designed to accommodate vehicles up to a 19m semi-trailer[2]. Therefore, the envisaged construction vehicle types can be accommodated on the internal road network and along the proposed construction vehicle access routes.

It is anticipated that limited oversized or overmass vehicles would be required for the works. However, if an oversize or overmass vehicle is needed, this would be subject to consultation and approval from the appropriate roads authority and a separate approval from the National Heavy Vehicle Regulator. It is expected that oversize or overmass vehicles would travel on the road

[2] WSP, *The Children's Hospital at Westmead Redevelopment stage 2, Paediatric services building transport assessment*, (2021)

network in low activity times such as night-time. This would be stipulated as part of the specific approvals.

3. Project conditions and access

Redbank Road is a key throughfare within the hospital campus, providing access to many buildings and staff parking areas and provides access the ambulance bay of the CASB, adjacent to the PSB site. Observations on site indicate this is primarily egress from the Ambulance Bay, with primary entry from Hawkesbury Road on the southeast side of the building, however all efforts should be made to minimise impacts to emergency vehicle access at this location and across the hospital site.

3.1 Heavy Vehicle routes to site

Construction vehicles will have origins and destinations from a wide variety of locations throughout Sydney. However, all will be expected to use the arterial road network where possible and will be instructed to access the site from Darcy Road to Mons Road. Recommended heavy vehicle routes are detailed below and shown graphically in

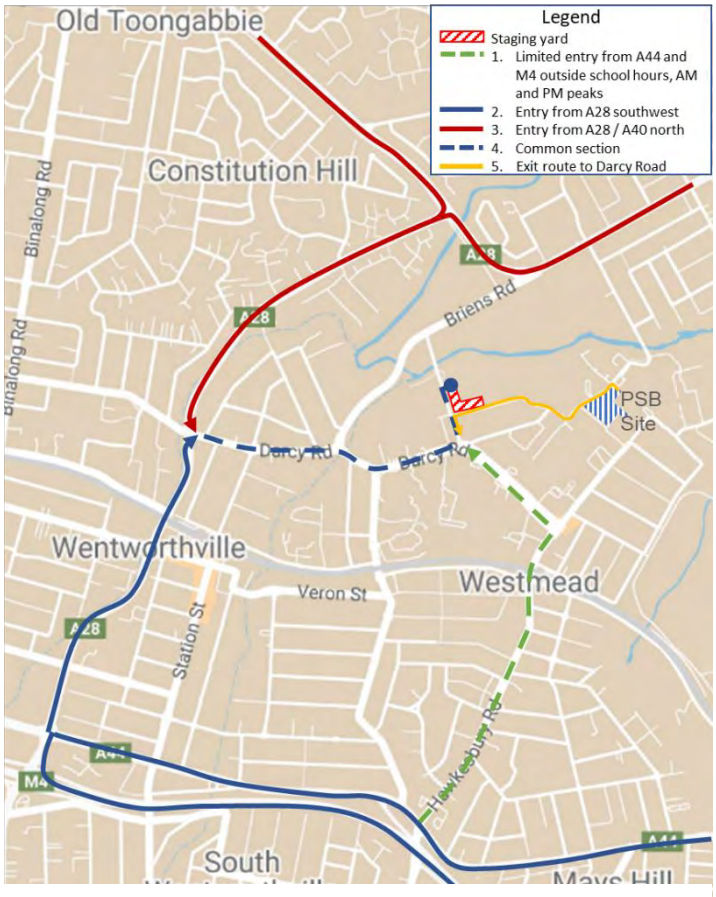

Figure 3: Heavy Vehicle Approach Routes

1. Vehicles approaching from the Great Western Highway (A44) or the M4 south of the site will be instructed not to travel on Hawkesbury Road during AM and PM peaks, or during School Zone hours. Vehicles will be directed to Emert Street (A28), then to turn right to Darcy Road and then to turn left into Mons Road.
2. Vehicles approaching from the Cumberland Highway (A28) or Old Windsor Road (A40) from north of the site will arrive via Hart Drive (A28), turn left into Darcy Road and then turn left into Mons Road.
3. When exiting the site, vehicles must turn left to Redbank Road due to a low load limit (3t) applying to Redbank Road from the Toongabbie Creek crossing, east of the site. Drivers will retrace the route via Redbank Road and Dragonfly Drive, turning left on Mons Road toward Darcy Road.

In order to avoid potential queuing of construction vehicles at the entrance to the site compound on Redbank Road, construction vehicles will be directed to the staging yard located on Mons Road, as shown in Figure 3 and Figure 4. Vehicles will wait inside the staging yard until loading space within the PSB construction site becomes available. When access to the construction site is available, traffic control will radio to the staging yard for the next vehicle to depart and make its way to site. Swept path access assessment of the staging yard is included in Appendix A.

As part of the construction process, it is expected that there will be a requirement for infrequent attendance at site by an oversize or overmass vehicle, such as a mobile crane. Oversize or overmass vehicles are required to obtain approvals from the National Heavy Vehicle Regulator (NHVR) prior to travelling and adhere to requirements of the NHVR approval.

3.2 Vehicle access – primary site area

The primary site compound is located on the former Children's Hospital Staff Car park site, accessed from Redbank Road as shown in Figure 4.

Construction vehicles will travel from the staging area on Mons Road, via Dragonfly Road to Redbank Road and perform a right turn into the site as shown in Figure 4. Vehicles will unload, turn around within the site and exit in the forward direction. Vehicles turn left onto Redbank Road as shown in Figure 4

Figure 4: Heavy vehicle route between the staging area and the main PSB site and continue west on Redbank Road, exiting to Mons Road. Swept path assessments for the Staging yard access and egress and PSB Site access and egress, including internal turning, are included in Appendix A.

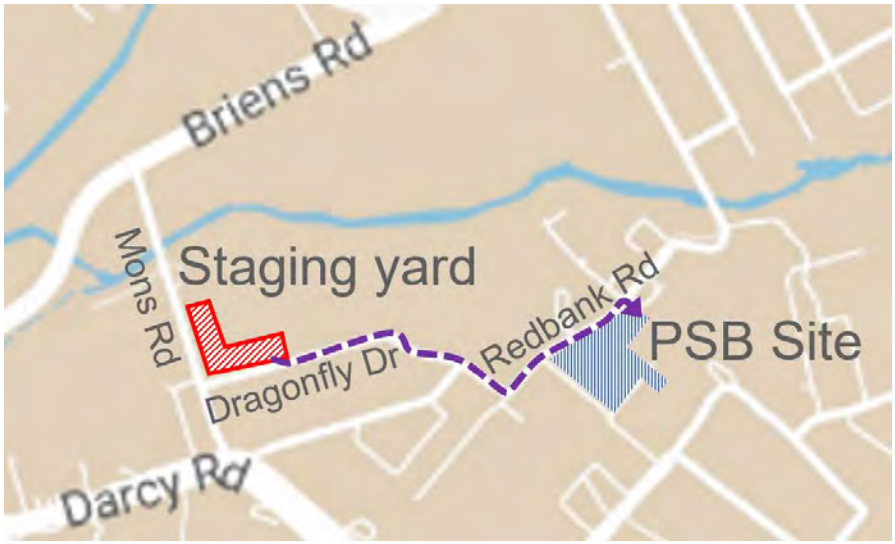

Figure 4: Heavy vehicle route between the staging area and the main PSB site

Large vehicles entering and exiting the site area will need traffic control assistance to safely manage Redbank Road traffic and ensure safe construction vehicle movements. Vehicles exiting the site will need the full width of Redbank Road so while vehicles exiting should wait for a break in traffic, oncoming vehicles may need to be temporarily stopped at a safe distance to allow the exit turning movement. Swept path analysis showing access to the PSB site is shown in Figure 5 and in full in Appendix A. Site Managers should be aware of the daily peak traffic periods around the site and should avoid scheduling truck arrivals at these times to minimise conflict between construction vehicles, pedestrians and private vehicles on site.

As shown in the swept paths in Appendix A, the 19m semi-trailer movement requires full clear width of the whole the driveway when entering and exiting. To manage conflict, traffic controllers will give vehicles entering the site priority over vehicles exiting the site to minimise delays on Redbank Road.

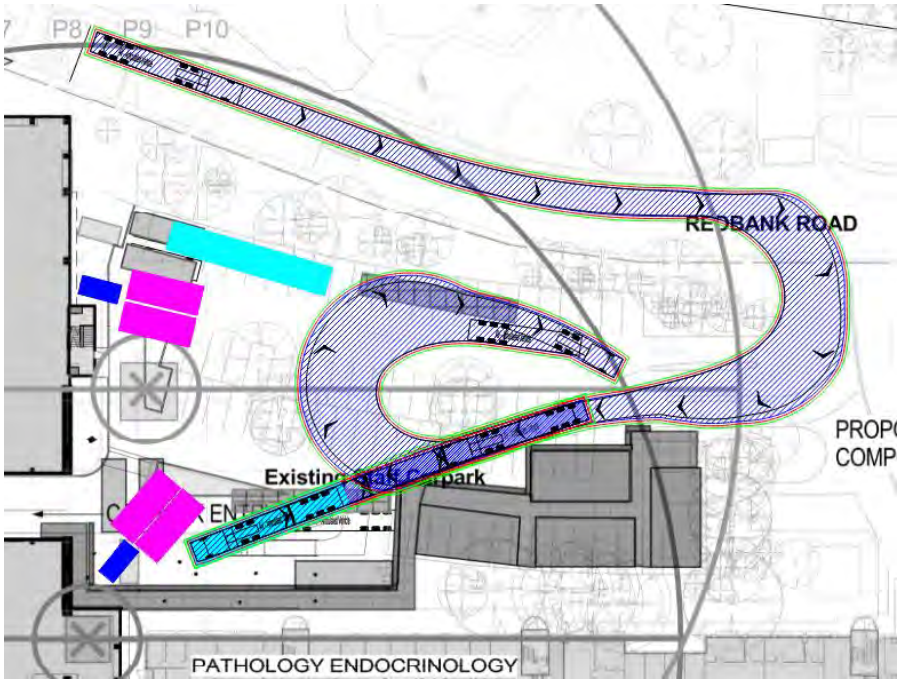

Figure 5: 19m Articulated vehicle PSB site access and turnaroud swept paths

3.3 Vehicle access - secondary loading area

A secondary loading area is proposed on the southern side of Redbank Road, in the form of a roadside hardstand between the Emergency Vehicle access and the primary site entrance. Access to this loading area will be in a forward direction from the eastern approach. In this instance, a vehicle will leave the staging area, enter the PSB site as described in Section 3.2, then turn around within the site, exit left onto Redbank Road and drive into the hardstand loading area on the left-hand side of the road as shown in Figure 6. After unloading, the vehicle can then exit in the forward direction to Redbank Road and continue to Dragonfly Drive, turning left at Mons Road to exit the Hospital campus.

Vehicles accessing the Redbank Road loading area will be subject to the same controlled access conditions outlined above, entering the staging area from Mons Road where they will be held until turning space in the primary site and the hardstand loading area are available.

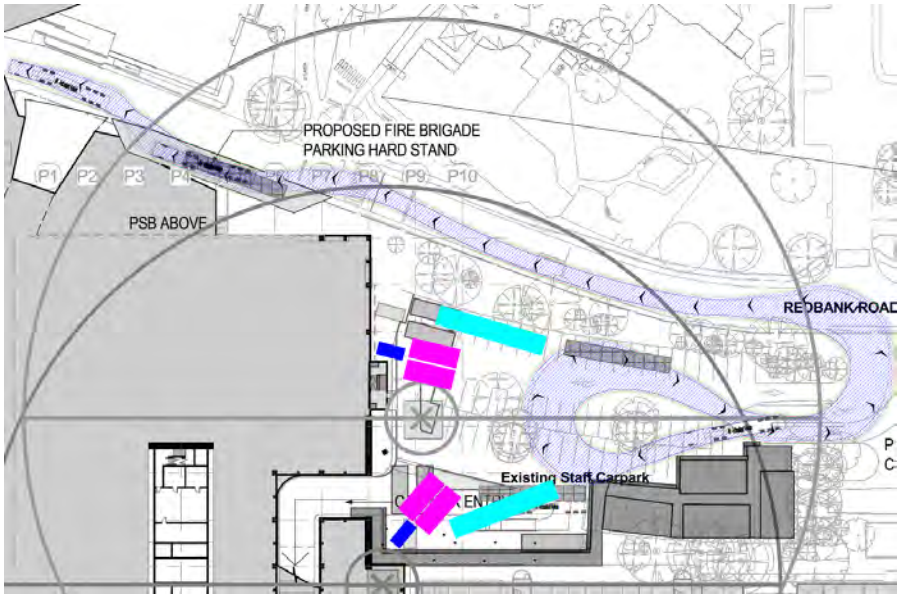

Figure 6 Redbank Road hardstand access and egress

3.4 Off-site staging areas

In the instance where vehicles have travelled to site from regional and interstate areas, timing arrival to site can be more difficult, and allowances must be made for the potential for arrivals prior to site access being possible. These provisions are being made in part to address concerns raised by local residents during recent site works on other hospital projects. Figure 7 shows the three identified locations marked with yellow stars and the PSB staging site with a red star, with approximate 2.5km and 5km rings for context.

Figure 7 context map of off-site staging locations and PSB site

Off-site locations for heavy vehicles to temporarily layover have been identified along major transport routes. Areas identified are located within industrial areas where heavy vehicle traffic will not disturb residents in the early morning while waiting for the on-site staging area to open. The three suggested off-site staging areas below are on public roads with on-street parking provisions. No permits or permissions should be necessary for standard NHVR approved vehicles to access these locations.

3.4.1 Western approach (M4 and A44)

If approaching from the M4, use Reservoir Road exit to Great Western Highway A44. Staging area identified is the northern kerbside of Amax Avenue, Toongabbie, accessed from Great Western Highway A44 via Toongabbie Road. Extensive, unrestricted kerbside parking available. Return to Great Western Highway A44 via Girraween Road.

Figure 8 Amax Avenue staging area with access from the Great Western Highway A4. The satellite image of Amax Avenue shows heavy vehicles parked on street (Source: satellites.pro)

3.4.2 Northwestern approach (A40)

Staging area identified on the northern kerbside of Artisan Road, accessed via right turn to Powers Road and left to Artisan Road. Extensive, unrestricted kerbside parking available. Return to Old Windsor Road A40 via Powers Road.

Figure 9 Artisan Road staging area showing access from Old Windsor Road A40. Satellite image of Artisan Road shows extensive kerbside parking availability (Source: satellites.pro)

3.4.3 Northern approach (A28/A40)

Staging area identified on the northern kerbside of Boundary Road, accessed from James Ruse Drive A28/A40 via Kleins Road. Extensive, unrestricted kerbside parking available. Return to A28 via Windsor Road. Access to site via Briens Road to Darcy Road and Mons Road.

Figure 10 Boundary Road staging area showing access from James Ruse Drive A28. The north side of Boundary Road has few driveway crossovers, providing space for long vehicles (Source: satellites.pro)

3.5 Cumulative impact of surrounding infrastructure works

It is recognised that Parramatta Light Rail and Sydney Metro West works are located near the proposed PSB site. In order to assess the cumulative impacts from the surrounding infrastructure works, heavy vehicle movements mentioned in the Constriction Traffic and Transport Impact Assessment Report (CTTIAR) for Parramatta Light Rail prepared by GTA Consultant in August 2017 and Construction Traffic Management Plan (CTMP) for Sydney Mero West – Western Tunnelling Package Westmead Site Establishment prepared by GAMUDA in August 2022 have been considered and shown in Table 3.

Table 3 Heavy vehicle movement from Parramatta Light Rail and Sydney Metro West works

Project	Precinct	Peak Hour Heavy Vehicle Movement (inbound and outbound)
Parramatta Light Rail	Westmead	12
	Parramatta North	24
	Parramatta CBD	7
	Rosehill and Camellia	21
	Carlinford	12
	Stabling and Maintenance Facility	9
Sydney Metro West	Westmead	10

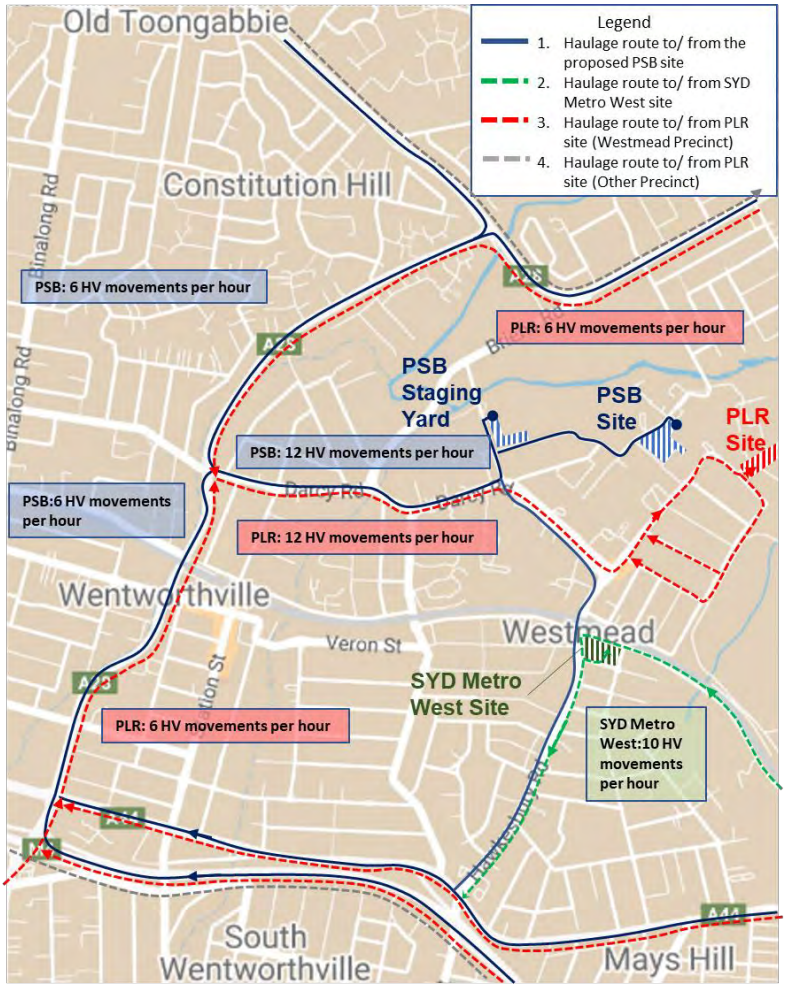

Figure 11 shows the haulage routes and number of heavy vehicle movement from all works in the precinct to identify the cumulative impacts.

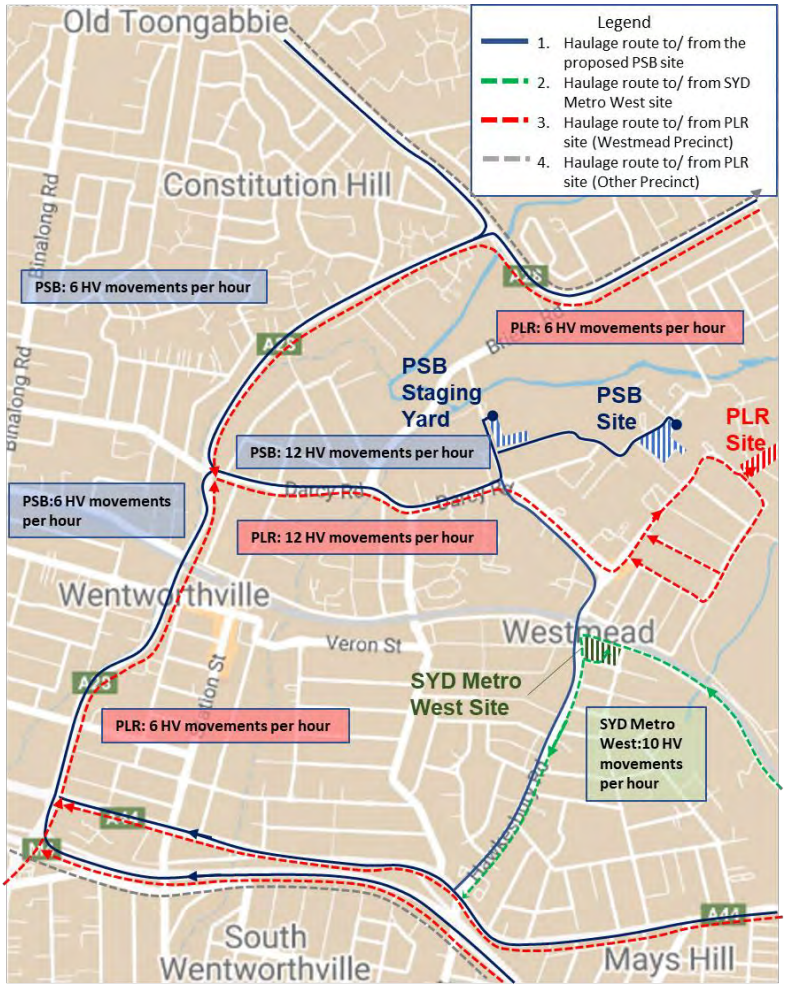

Figure 11 Heavy vehicle routes to/from the PSB site, PLR site and SYD Metro West site

It is noted that number of heavy vehicle movement from PSB site is similar to that from PLR site and SYD Metro West site. It is understood that the infrastructure provided by the NSW State Government would take precedence and that the construction process would only use Hawkesbury Road outside of peak and School Zone hours. There is expected to be a negligible cumulative impact as a result of the works in the area.

3.6 Crane arrangements

Two cranes are prosed to operate on site at locations depicted in Figure 12, each have 143m reach in radius. The cranes will be used to load and unload materials from trucks in both the primary site compound and the Redbank Road loading bay, to the appropriate area in the construction site.

Cranes will be delivered and taken away from site on 19m semi-trailers (swept paths provided in Appendix A).

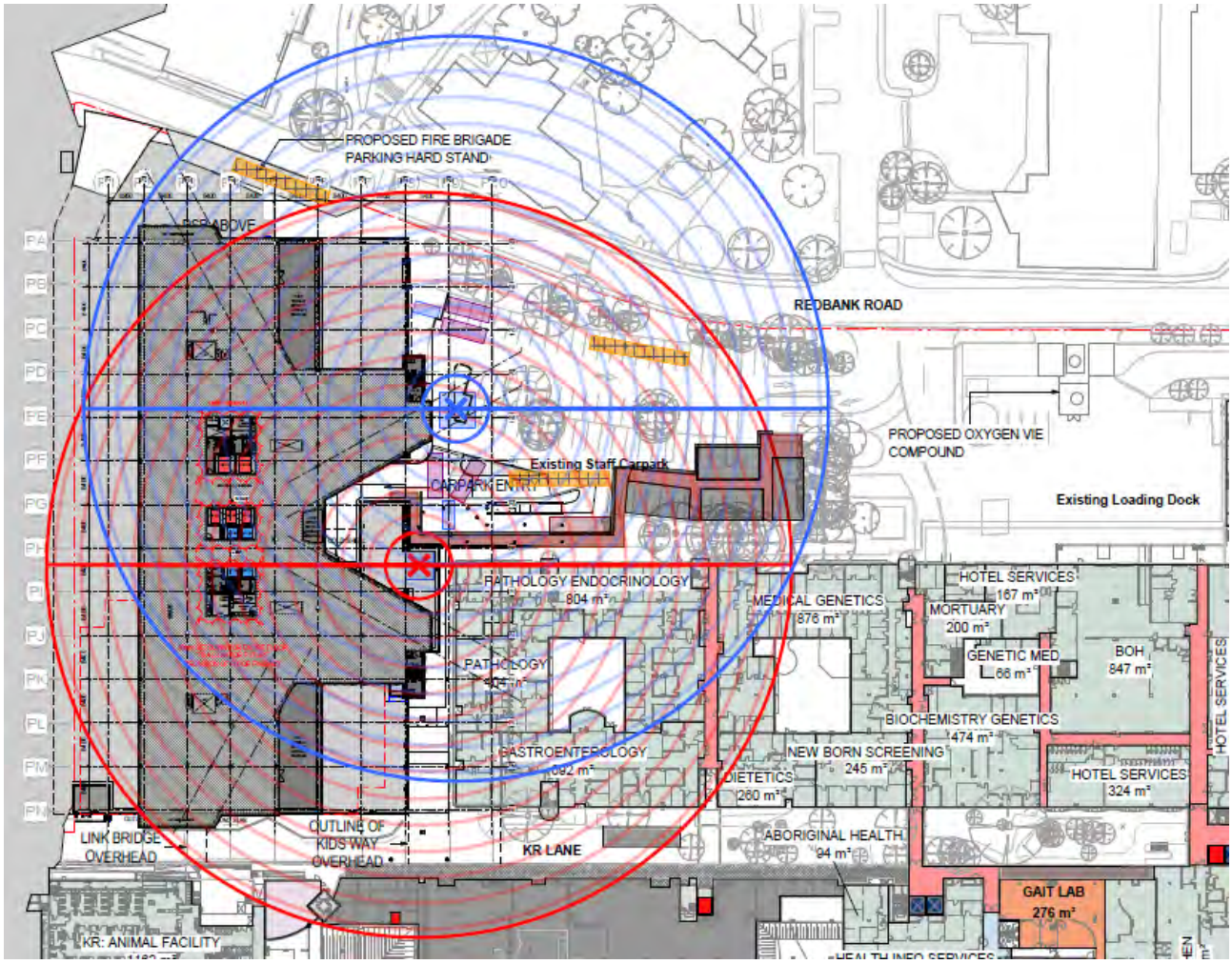

Figure 12 Crane locations and coverage (note lading spaces have changed from what is shown here)

3.7 Worker site access

Construction workers are encouraged to use public and active transport to access the worksite, with limited parking available for private vehicles. Lockable tool storage will to be provided within the site to support active and public transport utilisation.

3.7.1 Public Transport

The site is in close proximity to well established and high frequency public transport services and construction workers will be encouraged to utilise public transport or active transport modes to access the site. Figure 13 shows pedestrian routes in dashed green lines, using footpaths, pedestrian crossings and signalised intersections between the PSB work site and surrounding public transport stops and stations. The map shows bus stops (B), Westmead Train Station (T) and future Parramatta Light Rail (L) stops and route. Blue lines show sections of the NW Transitway, providing separated running for high-frequency bus routes.

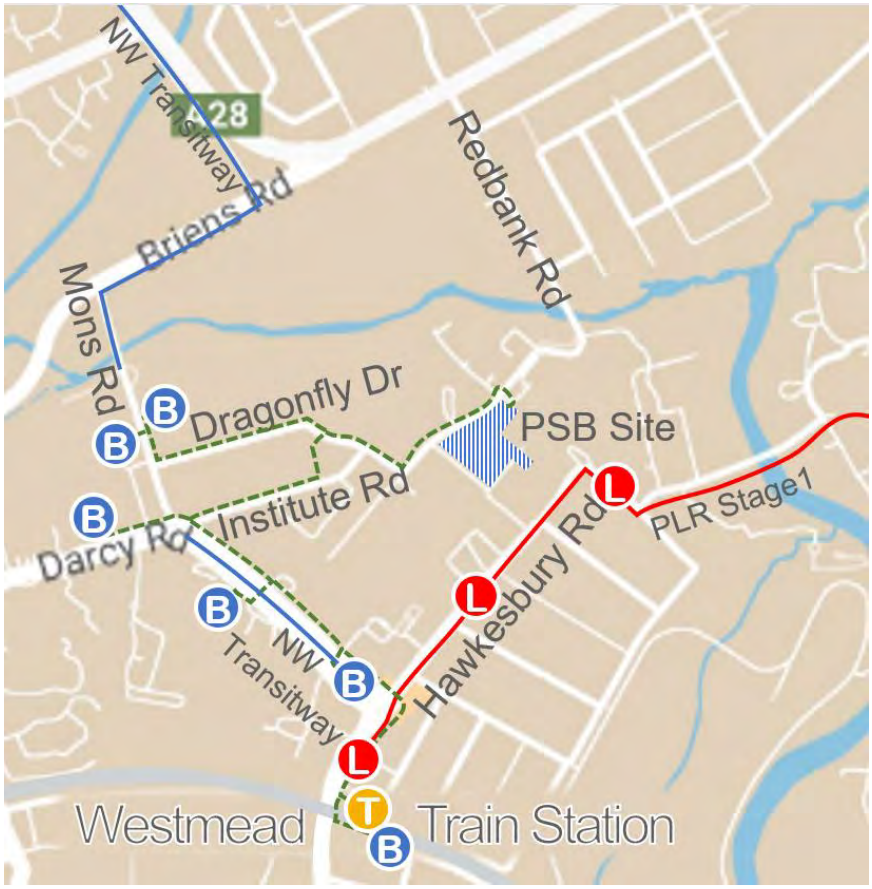

Figure 13: Pedestrian routes (in green) between the PSB site and surrounding public transport stops and stations

Trains - T1 North Shore & Western Line, T3 Bankstown Line and T5 Cumberland Line trains service Westmead station on regular Sydney Trains services. The Blue Mountains Line also stops at Westmead. These services provide connections to the full Sydney Trains network through a number of interchange stations along these routes.

Buses – Nearby bus stops are located on Mons Road, Darcy Road and at Westmead Train Station.

Bus services operating on the North West Transitway pass the staging yard on Mons Road, servicing stops located between the Toongabbie Creek and Dragonfly Drive.

Table 4: Mons Road bus stop services; Stop IDs 2145561 and 2145562

Number	Route description
660	Parramatta to Castlewood
661	Parramatta to Blacktown via North West Twy & Kings Langley
662	Castle Hill to Parramatta via Bella Vista & North West Twy
663	Rouse Hill Station to Parramatta via Kellyville Ridge
664	Rouse Hill Station to Parramatta via Kellyville
665	Parramatta to Rouse Hill Station
2042	Winston Hills Mall to Darcy Rd PS
2044	Windsor Rd after Railway St to Darcy Rd PS
8005	Darcy Rd PS to Our Lady Mt Carmel PS via Westmead Schools
8610	The Hills Sports HS to Baulkham Hills via Winston Hills

South of the site, the North West Transitway stop at Westmead Hospital, on Darcy Road near the intersection of Hawkesbury Road (Stop IDs 2145559 and 2145560) also services the 660, 661 and 662 North West Transitway bus routes.

Stops on Darcy Road at Parramatta Marist High School and Westmead Private Hospital are serviced by the following bus routes:

Table 5: Darcy Road bus stop services; Stop IDs 214519 and 2145181

Number	Route description
705	Parramatta to Blacktown via Seven Hills
708	Parramatta to Constitution Hill Retirement Community via Pendle Hill
711	Parramatta to Blacktown via Wentworthville
818	Westmead Hospitals to Merrylands
824	Westmead Hospitals to Parramatta via South Wentworthville
2083	Westmead Station to Darcy Rd PS

Bus stops located on Alexandra Avenue, on the southern side of Westmead Train Station, are serviced by the following Bus routes:

Table 6: Westmead Station, Alexandra Avenue bus stop services; Stop IDs 214511 and 2145557

Number	Route description
660	Parramatta to Castlewood
661	Parramatta to Blacktown via North West Twy & Kings Langley
662	Castle Hill to Parramatta via Bella Vista & North West Twy
663	Rouse Hill Station to Parramatta via Kellyville Ridge
664	Rouse Hill Station to Parramatta via Kellyville
665	Parramatta to Rouse Hill Station
705	Parramatta to Blacktown via Seven Hills
708	Constitution Hill Retirement Community to Parramatta via Pendle Hill
711	Blacktown to Parramatta via Wentworthville
712	Westmead Children's Hospital to Parramatta
N70	City Town Hall to Penrith (Night Service)
N71	Richmond to City Town Hall (Night Service)
2083	Westmead Station to Darcy Rd PS
2540	Macarthur Girls HS to Toongabbie via Constitution Hill

Light Rail (future) The Parramatta Light Rail (Stage 1) is currently being developed and will include stops on Hawkesbury Road at Westmead Hospital and near Westmead Train Station. PLR Stage 1 will provide a regular service between Westmead and Carlingford via Parramatta North, Parramatta and Camelia. Services are due to begin in 2024.

3.7.2 Active transport

For those who live within a local catchment, opportunities to securely lock a bicycle on site will be available. Streets surrounding the site have footpaths provided on at least one side of the road, with crossing opportunities at signalised intersections and pedestrian crossings. Figure 13 shows safe routes between public transport stops and the site. Construction workers are discouraged from walking through hospital buildings or internal roadways that do not provide safe pedestrian infrastructure to access the site area.

3.7.3 Private Vehicle

Where public and active transport are not viable options for a construction worker, they will be required to park within the designated parking area, on the northern side of Dragonfly Drive and accessed from Mons Road. Construction workers are not permitted to park within any other surrounding carparks or public roads. The appointed contractor will be responsible for adhering to the above parking objectives in consultation with Health Infrastructure and Sydney Children's Hospital Network.

3.8 Impacts to public transport

Construction works on the Parramatta Light Rail Stage 1 has progressed to finishing stages in the Westmead area with Hawkesbury Road south of Darcy Road now returned to normal function. As a result, heavy vehicle routes to the PSB site via the staging yard should utilise the most direct routes via roadways suitable for heavy vehicle movements. However, vehicles should be instructed not to travel on Hawkesbury Road during AM and PM peaks, especially school hours.

Mons Road, from north of the staging yard entrance to the A28 is closed to general traffic, operating as a dedicated busway for the NW Transitway. Management of construction vehicle access to the staging area should be mindful of minimising delays to public transport buses between the last stop on Mons Road and the Transitway where it crosses Toongabbie Creek. Similarly, heavy vehicles approaching Darcy Road on Hawkesbury Road should be mindful of the Transitway lanes on approach to the signalised intersection and should be positioned to minimise conflict with buses.

3.9 Impacts to pedestrians and cyclists

Pedestrian access along Redbank Road is restricted to the northern side between Dragonfly Drive and the pedestrian crossing immediately east of the site access point. This arrangement was in place prior to the handover of the site and will be retained throughout construction of the PSB. No changes to the existing pedestrian access and circulation arrangements are proposed. Drivers should be aware that the roadways within the hospital campus are public roads and accessible to all road users, including those on bicycles. Drivers of construction vehicles are to ensure the safety of all other road users is prioritised when moving throughout the hospital campus.

4. Management measures

The following proposed traffic management principles should be adopted during the construction period:

- Traffic controllers will allow for priority emergency vehicle movements around the construction sites.
- Constructing vehicles will follow directions given by traffic controllers, be on alert and give way to pedestrians when driving through the health campus.
- Construction vehicles entering or leaving the site are to use arterial roads wherever possible, via the identified construction vehicle routes.
- “Heavy Vehicle – Load Safety Inspection Checklist” attached in Appendix B is to be completed by vehicle drivers prior to arrival onsite.
- Construction workers are encouraged to use active travel, public transport or carpool to site.
- Coordination with adjacent developments and authorities.
- As part of the development process, the contractor is maintaining regular consultation with all relative stakeholders, including weekly meetings and site inspections with representatives of Westmead Hospital and Disruption Notices for works associated with the construction site.

Drivers wishing to access the site for any reason will need to report to the traffic controllers and receive instructions and guidance to first arrive at the staging yard. Scheduling will be the main management method in ensuring multi-vehicle arrivals will not occur. No queuing or marshalling of

trucks is permitted on public roads. A radio set-up will manage multiple vehicles advising when the site is clear for vehicles queued in the staging yard.

A proposed Driver Code of Conduct has been prepared for communication to Heavy Vehicle Drivers. The Code of Conduct is attached in Appendix C and with the Heavy Vehicle / Load Safety Inspection Checklist outlines actions to:

- Minimise the impacts of earthworks and construction on the surrounding road network
- Minimise conflicts with other road users
- Minimise Traffic Noise
- Ensure truck drivers use the specified routes

Traffic Control Plan (TCP) has been prepared and attached in Appendix D.

Appendix A

19m semi-trailer swept paths

A.1 SKT04 – 19m articulated truck entry and exit to staging area

A.2 SKT01 – 19m articulated truck entry and parking at buildings side loading area

A.3 SKT03 – 19m articulated truck internal turn around and parking at Redbank Rd side loading area

A.4 SKT02 – 19m articulated truck internal turn around and parking at Redbank Rd hardstand loading area

A.5 SKT05 – Medium Rigid Vehicle Entry and Parking (southern pump station)

A.6 SKT05 – Medium Rigid Vehicle Exit (southern pump station)

A.7 SKT05 – Medium Rigid Vehicle Entry and Parking (northern pump station)

A.8 SKT05 – Medium Rigid Vehicle Exit (northern pump station)

A3

Legend

- Body Envelope
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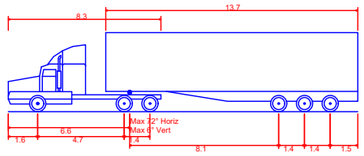
- 600mm Envelope
- Wheel Envelope

Design Vehicle(s)



AV - Articulated Vehicle

Overall Length	19.000m
Overall Width	2.500m
Overall Body Height	4.301m
Min Body Ground Clearance	0.418m
Track Width	2.500m
Lock to Lock Time	6.00 sec
Curb to Curb Turning Radius	12.500m

Issue	Date	By	Chkd	Appd
B	19/10/22	R T	J E	J E
A	13/07/22	J G	E C	E C

For information

ARUP

Arup, Level 5, 151 Clarence St
Sydney, NSW, 2000
Tel +61(02)9320 9320 Fax +61(02)9320 9321
www.arup.com.au

Client
RobertsCo

Job Title
Westmead Paediatrics Hospital
Stage 2 - CPTMP

Drawing Title
19m Articulated Truck
Entry to bottom loading space

Scale at A3 1:645

Discipline Transport

Drawing Status
Draft

Job No	Drawing No	Issue
271985	**SKT04**	**B**

Do not scale

A3

PROPOSED FIRE BRIGADE PARKING HARD STAND

P6 P7 P8 P9 P10

AV - Articulated Vehicle

REDBANK ROAD

Existing Staff Carpark

PROPOSED OXY
COMPOUND

PATHOLOGY ENDOCRINOLOGY
804 m²

MEDICAL GENETICS
876 m²

HOT
MORTUA
200 m²

Legend

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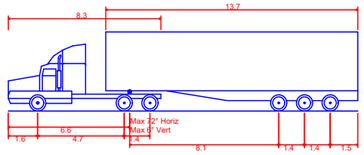
- 600mm Envelope
- Wheel Envelope
- AV Bay
- MRV Bay

Design Vehicle(s)



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Issue	Date	By	Chkd	Appd
C	20/10/22	C L	J E	J E
B	19/10/22	R T	J E	J E
A	13/07/22	J G	E C	E C

For information

ARUP

Arup, Level 5, 151 Clarence St
Sydney, NSW, 2000
Tel +61(02)9320 9320 Fax +61(02)9320 9321
www.arup.com.au

Client
RobertsCo

Job Title
Westmead Paediatrics Hospital
Stage 2 - CPTMP

Drawing Title
19m Articulated Truck
Entry and Parking

Scale at A3 1:400

Discipline Transport

Drawing Status **Draft**

Job No	Drawing No	Issue
271985	**SKT01**	**C**

Do not scale

A3

PROPOSED FIRE BRIGADE
PARKING HARD STAND

P7 P8 P9 P10

REDBANK ROAD

Existing Staff Carpark

PROPOSED OXYG
COMPOUND

PATHOLOGY ENDOCRINOLOGY
804 m²

MEDICAL GENETICS

HOTEL

MORTUARY

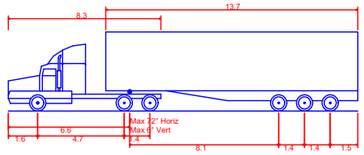
BITUMEN
PATH
CONC
WALL

AV- Articulated Vehicle

Legend

- Body Envelope
- 300mm Envelope
- 600mm Envelope
- Wheel Envelope
- AV Bay
- MRV Bay

Design Vehicle(s)



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Track Width	2.500m
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Curb to Curb Turning Radius	12.500m

Issue	Date	By	Chkd	Appd
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B	19/10/22	R T	J E	J E
A	13/07/22	J G	E C	E C
For information				

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Client
RobertsCo

Job Title
Westmead Paediatrics Hospital
Stage 2 - CPTMP

Drawing Title
19m Articulated Truck
Parking

Scale at A3 1:400

Discipline Transport

Drawing Status **Draft**

Job No	Drawing No	Issue
271985	**SKT03**	**C**

Do not scale

A3

PROPOSED FIRE BRIGADE
PARKING HARD STAND

P1 P2 P3 P4 P5 P6 P7 P8 P9 P10

PSB ABOVE

REDBANK ROAD

Existing Staff Carpark

PATHOLOGY ENDOCRINOLOGY
804 m²

MEDICAL GENETICS
876 m²

PATHOLOGY
404 m²

BACKFILL

Legend

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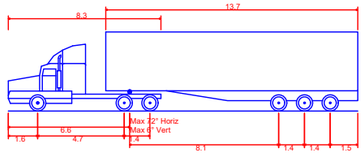
- Wheel Envelope
- AV Bay
- MRV Bay

Design Vehicle(s)



AV - Articulated Vehicle

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Overall Width	2.500m
Overall Body Height	4.301m
Min Body Ground Clearance	0.418m
Track Width	2.500m
Lock to Lock Time	6.00 sec
Curb to Curb Turning Radius	12.500m

Issue	Date	By	Chkd	Appd
C	20/10/22	C L	J E	J E
B	19/10/22	R T	J E	J E
A	13/07/22	J G	E C	E C

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Tel +61(02)9320 9320 Fax +61(02)9320 9321
www.arup.com.au

Client
RobertsCo

Job Title
Westmead Paediatrics Hospital
Stage 2 - CPTMP

Drawing Title
19m Articulated Truck
U-turn and Exit

Scale at A3 1:500

Discipline Transport

Drawing Status **Draft**

Job No	Drawing No	Issue
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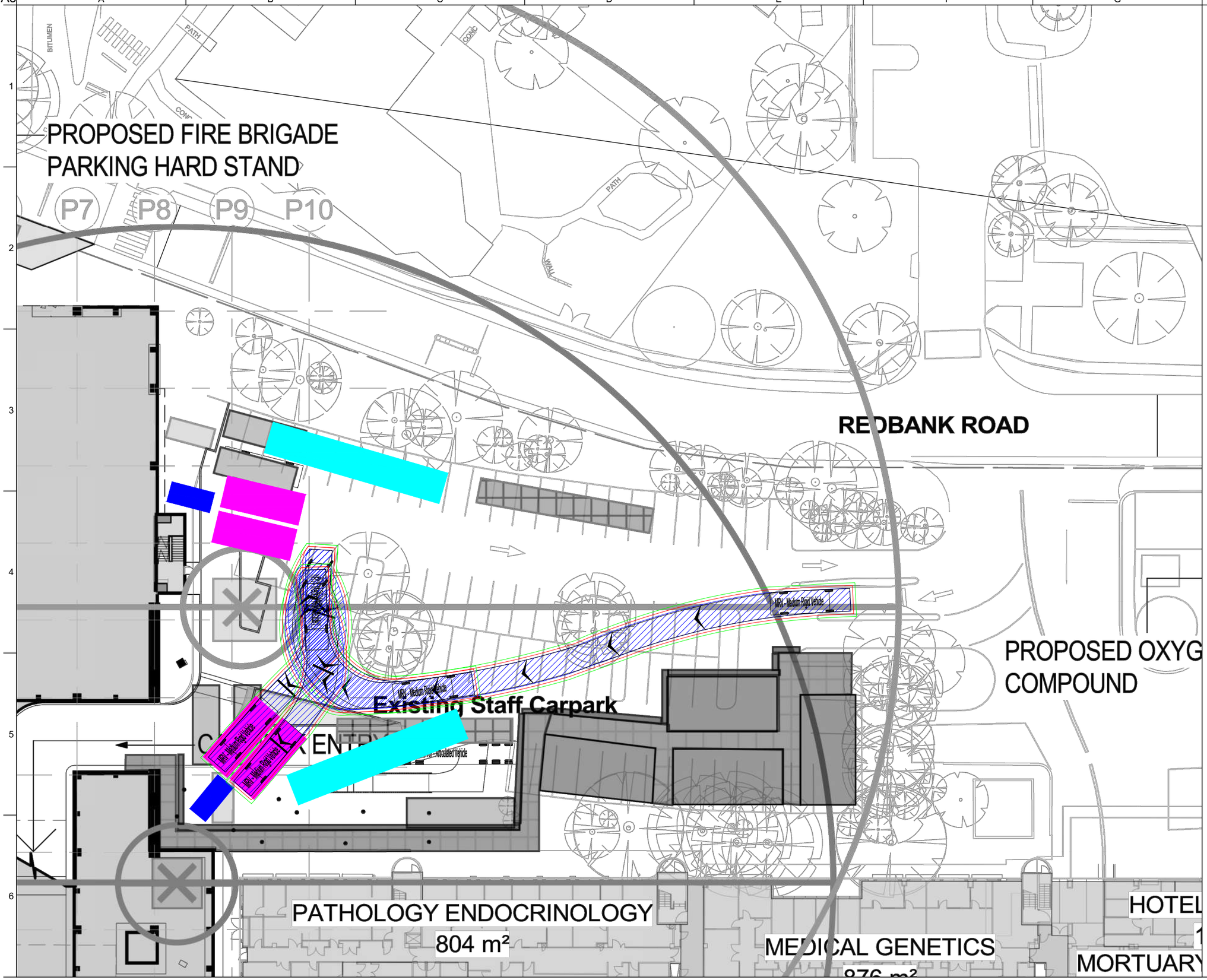
Do not scale

A3



Legend

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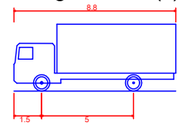
- 600mm Envelope
- Wheel Envelope
- AV Bay
- MRV Bay

Design Vehicle(s)



MRV - Medium Rigid Vehicle

Overall Length	8.800m
Overall Width	2.500m
Overall Body Height	3.400m
Min Body Ground Clearance	0.428m
Track Width	2.500m
Lock to Lock Time	4.00 sec
Curb to Curb Turning Radius	10.000m

Issue	Date	By	Chkd	Appd
C	20/10/22	C L	J E	J E
B	19/10/22	R T	J E	J E
A	13/07/22	J G	E C	E C
For information				

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www.arup.com.au

Client
RobertsCo

Job Title
Westmead Paediatrics Hospital
Stage 2 - CPTMP

Drawing Title
Medium Rigid Vehicle
Entry and Parking

Scale at A3 1:400

Discipline Transport

Drawing Status
Draft

Job No	Drawing No	Issue
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Do not scale

A3

A B C D E F G

1 2 3 4 5 6

PROPOSED FIRE BRIGADE
PARKING HARD STAND

P7 P8 P9 P10

REDBANK ROAD

Existing Staff Carpark

PROPOSED OXYG
COMPOUND

PATHOLOGY ENDOCRINOLOGY
804 m²

MEDICAL GENETICS

HOTEL

MORTUARY

BITUMEN PATH CONC WALL

MRV - Medium Rigid Vehicle

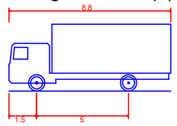
MRV - Medium Rigid Vehicle

Articulated Vehicle

Legend

- Body Envelope
- 300mm Envelope
- 600mm Envelope
- Wheel Envelope
- AV Bay
- MRV Bay

Design Vehicle(s)



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Curb to Curb Turning Radius	10.000m

Issue	Date	By	Chkd	Appd
C	20/10/22	C L	J E	J E
B	19/10/22	R T	J E	J E
A	13/07/22	J G	E C	E C
For information				

ARUP

Arup, Level 5, 151 Clarence St
Sydney, NSW, 2000
Tel +61(02)9320 9320 Fax +61(02)9320 9321
www.arup.com.au

Client
RobertsCo

Job Title
Westmead Paediatrics Hospital
Stage 2 - CPTMP

Drawing Title
Medium Rigid Vehicle
Exit

Scale at A3 1:400

Discipline Transport

Drawing Status
Draft

Job No	Drawing No	Issue
271985	**SKT06**	**C**

Do not scale

A3

PROPOSED FIRE BRIGADE
PARKING HARD STAND

P7 P8 P9 P10

REDBANK ROAD

PROPOSED OXYG
COMPOUND

Existing Staff Carpark

PATHOLOGY ENDOCRINOLOGY
804 m²

MEDICAL GENETICS

MORTUARY

HOTEL

MRV - Medium Rigid Vehicle

AV - Articulated Vehicle

BITUMEN

PATH

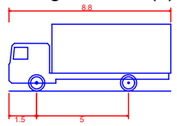
CONC

WALL

Legend

- Body Envelope
- 300mm Envelope
- 600mm Envelope
- Wheel Envelope
- AV Bay
- MRV Bay

Design Vehicle(s)



MRV - Medium Rigid Vehicle

Overall Length	8.800m
Overall Width	2.500m
Overall Body Height	3.400m
Min Body Ground Clearance	0.428m
Track Width	2.500m
Lock to Lock Time	4.00 sec
Curb to Curb Turning Radius	10.000m

Issue	Date	By	Chkd	Appd
C	20/10/22	C L	J E	J E
B	19/10/22	R T	J E	J E
A	13/07/22	J G	E C	E C
For information				

ARUP

Arup, Level 5, 151 Clarence St
Sydney, NSW, 2000
Tel +61(02)9320 9320 Fax +61(02)9320 9321
www.arup.com.au

Client
RobertsCo

Job Title
Westmead Paediatrics Hospital
Stage 2 - CPTMP

Drawing Title
Medium Rigid Vehicle
Entry and Parking

Scale at A3 1:400

Discipline Transport

Drawing Status **Draft**

Job No	Drawing No	Issue
271985	**SKT07**	**C**

Do not scale

A3

PROPOSED FIRE BRIGADE
PARKING HARD STAND

P7 P8 P9 P10

REDBANK ROAD

PROPOSED OXYG
COMPOUND

Existing Staff Carpark

PATHOLOGY ENDOCRINOLOGY
804 m²

MEDICAL GENETICS

MORTUARY

HOTEL

MRV - Medium Rigid Vehicle

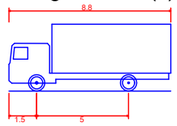
AV - Articulated Vehicle

BITUMEN
PATH
CONC
WALL

Legend

- Body Envelope
- 300mm Envelope
- 600mm Envelope
- Wheel Envelope
- AV Bay
- MRV Bay

Design Vehicle(s)



MRV - Medium Rigid Vehicle

Overall Length	8.800m
Overall Width	2.500m
Overall Body Height	3.400m
Min Body Ground Clearance	0.428m
Track Width	2.500m
Lock to Lock Time	4.00 sec
Curb to Curb Turning Radius	10.000m

Issue	Date	By	Chkd	Appd
C	20/10/22	C L	J E	J E
B	19/10/22	R T	J E	J E
A	13/07/22	J G	E C	E C

For information

ARUP

Arup, Level 5, 151 Clarence St
Sydney, NSW, 2000
Tel +61(02)9320 9320 Fax +61(02)9320 9321
www.arup.com.au

Client
RobertsCo

Job Title
Westmead Paediatrics Hospital
Stage 2 - CPTMP

Drawing Title
Medium Rigid Vehicle
Exit

Scale at A3 1:400

Discipline Transport

Drawing Status
Draft

Job No	Drawing No	Issue
271985	**SKT08**	**C**

Do not scale

Appendix B

Load safety inspection checklist

HEAVY VEHICLE / LOAD SAFETY INSPECTION CHECKLIST

Project name:	

This heavy vehicle / load safety checklist is to be completed by the heavy vehicle driver for all vehicles / trucks over **4.5t GVM** which are loaded at a Roberts Co Project / Workplace. The checklist is then submitted to a Roberts Co representative to be checked and verified prior to the load leaving site.

Supplier and subcontractor information			
SUPPLIER			
Name			
SUBCONTRACTOR			
Name			
Truck and driver information			
Driver Name:			
Drivers Licence No.:		**Vehicle Reg No.:**	

Heavy vehicle use and purpose	
01	What tasks / activities are intended to be completed with the heavy vehicle?
	Provide details:

Heavy vehicle compliance				
Item No.	**Compliance Documentation Description**	**Driver to Complete**		**Roberts Co Check**
		Yes	**No**	
02	Are you within your log book hours? (Fatigue Management)	☐	☐	☐
03	Are you within your vehicles weight and size limits, correctly loaded and restrained? (Mass dimension, loading)	☐	☐	☐
04	Is your truck road worthy? (Vehicle Standards)	☐	☐	☐

Notes / Comments (Where 'NO' is indicated above, notify the Roberts Co Site Manager and/or Supplier / Subcontractor listed above and report):

Declaration			
I declare that this Heavy Vehicle is roadworthy, load(s) is/are properly loaded within the weight capacity and dimensions of the truck and correctly restrained.			
Supplier / Subcontractor:		**Signature:**	
Position / Role:		**Date:**	
Checked and Verified: (Roberts Co use only)			
Roberts Co Project Representative:		**Signature:**	
Position / Role:		**Date:**	

Appendix C

Heavy Vehicle Driver – Code of Conduct

Heavy Vehicle Driver – Code of Conduct

Purpose and Objectives

This Heavy Vehicle Driver Code of Conduct is provided to minimise the impacts of construction traffic on transport networks and adjoining properties throughout the construction process. This Code sets out acceptable behaviour for heavy vehicle drivers operating in connection with the works being undertaken by RobertsCo for the development of the Paediatric Services Building at Westmead Hospital.

Responsibilities of Drivers

- Driver must record a Plant Pre-start inspection prior to arrival at site
- Drivers must follow ALL road rules and regulations required by law. Drivers must:
    - Hold a current and appropriate licence for the class of vehicle they are operating
    - Comply with speed limits on all roads
    - Comply with all road works speed limits
    - Obey construction traffic signs and devices
    - Obey sign posted (road) load limits
    - Ensure the vehicle does not exceed mass or dimension limits
    - Ensure loads are distributed to remain within the capacity of the vehicle and axles
    - Restrain loads appropriately in accordance with the NTC Load Restraint Guide.
    - Make sure that your vehicle is roadworthy and well maintained
- Drivers must drive safely which includes, but is not limited to:
    - Being medically fit to drive, not under the influence of alcohol and not being under the influence of drugs
    - Driving in a calm, courteous manner that is appropriate with existing road, traffic and weather conditions
    - Not operating any vehicles or machinery while suffering from fatigue
    - Implementing fatigue management and rest laws and procedures
    - Responding to changes in circumstances (such as delays), reporting delays to base (where possible) and implementing short-term fatigue management measures
- Making sure that rest breaks are taken at the prescribed intervals and are effective
- Raising any concerns about the placement of a load or mass of loaded materials with the site supervisor prior to leaving site.
- Drivers must always behave in a professional manner.
- Drivers must adhere to routes nominated by RobertsCo for each specific worksite and they must not use any roads if their weight is over the posted load limit.
- In the instance a driver misses a site entry point, maintain contact via radio with traffic control and circulate the site back to the nominated precinct entry and not reverse within the precinct.

- Drivers should only park or wait in approved areas as directed by the site supervisor. DO NOT queue at worksite gates.
- Drivers are to arrive and depart from worksites as required by the site supervisor. Drivers will be turned away if they arrive outside of the approved hours and the truck operating company will be notified.
- Turn vehicles off when not in use or required to idle for long periods of time. (Note: This requirement does not apply to concrete agitators)
- Drivers must not leave their vehicle unless it is correctly parked, has been turned off, hand brake applied, and the keys removed. (Note: This requirement does not apply to concrete agitators)
- Drivers leaving their vehicle must wear appropriate PPE (safety boots, long pants, Hi-Vis long sleeve shirt, hard hat and safety glasses).
- Vehicles must not transfer dirt or debris onto public roads. Drivers must adhere to the requirements of the Heavy Vehicle / Load Safety Inspection Checklist. If any materials are deposited on public roads you must immediately contact the site supervisor and the to arrange for the road to be cleaned.
- Before leaving any site, it is mandatory to cover truck loads and tailgates and draw bars must be free of loose material.
- If approached by people with enquiries about the Project Works, drivers should remain polite and provide them with the site managers number. Do not provide any other information about the project.
- Drivers must comply with the requirements of the project as outlined by the site inductions.
- As a courtesy to people who may be impacted by driver behaviour, drivers will:
    - Use horns only in an emergency or for safety reasons
    - Not tailgate (drive too close to other vehicles)
    - Not use compression braking if possible where noise is likely to adversely impact on residents, workers and patients
    - Ensure that there is no littering
    - Not block residential driveways or any other access points.

Declaration

I have read and understand the above conditions and will ensure that I abide by this Code of Conduct.

Signed: Date: / /

Print Name: Company:

Appendix D

Traffic Control Plan

VARI GROUP

QUALITY • COMPETENCE • COMPLIANCE

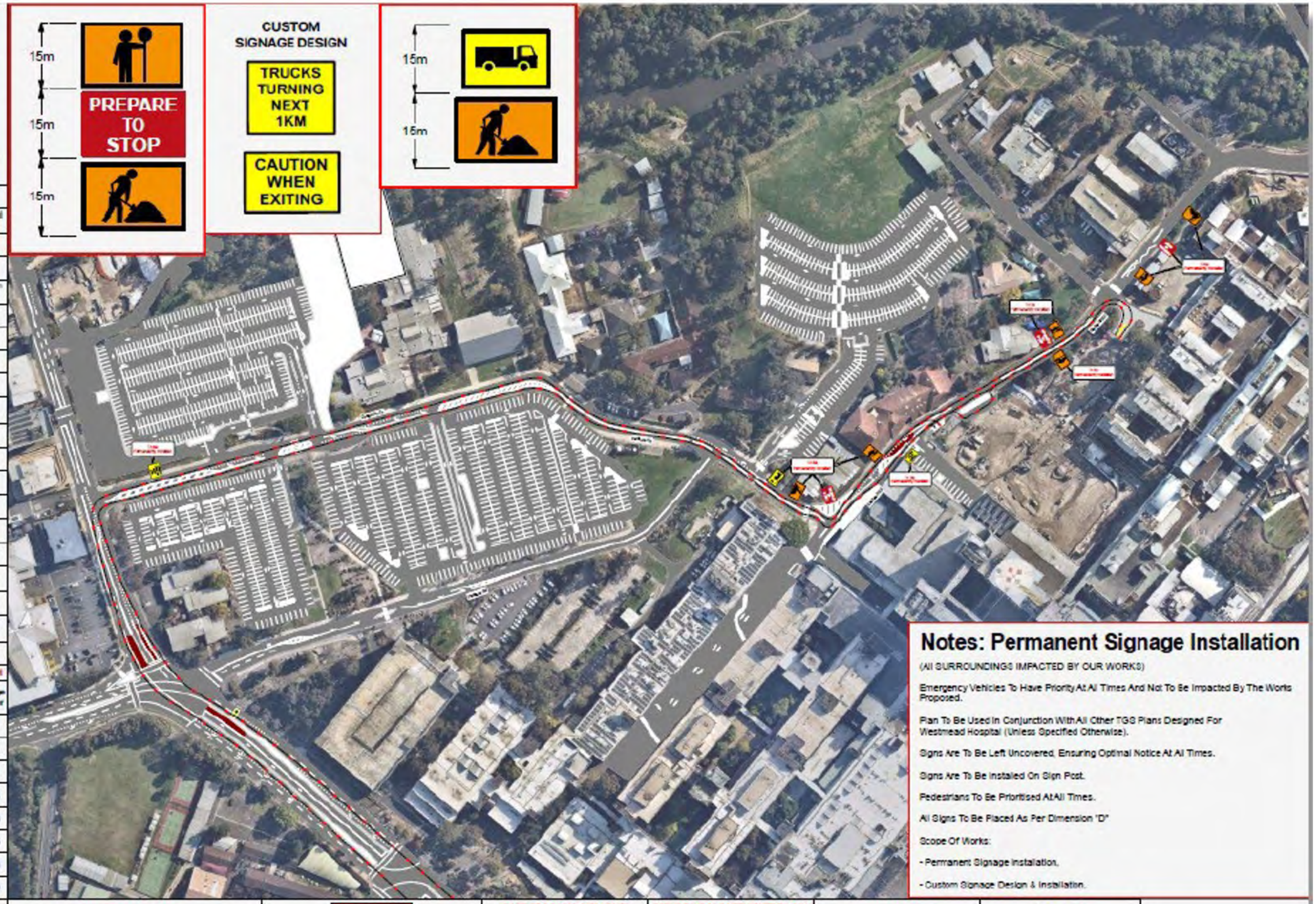
1300 008 274
Traffic@varigroup.com.au

Client:	Roberts Co
Road Name:	Westmead Hospital
Suburb:	Westmead
Road Type:	2 Lane 2 Way
Operation:	Signage Installation
Term:	Long
Speed Limit:	20km/h
Speed Reduction:	N/A
ROL Number:	TBC
ROL Classification:	TBC
Date Prepared:	21/11/22
Date Approved:	21/11/22
Date Revised:	11/01/23
TC@WS REFERENCE BASED ON TCP #92	PWZTMP
N.C.S:	N/A
Designed By:	Noah Nguyen-Luu #1025516
Approved By:	Daniel Marzetti #0052242601
Size:	A1
Plan Reference Number:	01RCWMH11.1
TCs Required:	N/A

RECOMMENDED TAPER LENGTH

Traffic Speed (Km/H)	Traffic Control at beginning of Taper	Later shift taper	Merge Taper
45 or less	15	0	15
45 - 55	15	15	30
55 - 65	30	30	60
65 - 75	NA	70	115
75 - 85	NA	80	130
85 - 95	NA	90	145
95 - 105	NA	100	140
> 105	NA	110	190

CUSTOM SIGNAGE DESIGN



Notes: Permanent Signage Installation

(All Surroundings Impacted By Our Works)

Emergency Vehicles To Have Priority At All Times And Not To Be Impacted By The Works Proposed.

Plan To Be Used In Conjunction With All Other TGS Plans Designed For Westmead Hospital (Unless Specified Otherwise).

Signs Are To Be Left Uncovered, Ensuring Optimal Notice At All Times.

Signs Are To Be Installed On Sign Post.

Pedestrians To Be Prioritised At All Times.

All Signs To Be Placed As Per Dimension "D"

Scope Of Works:

- Permanent Signage Installation.
- Custom Signage Design & Installation.

N W E S

GENERAL NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH AS1742.3 & TCAWS 2010
2. ALL TRAFFIC CONTROL DIAGRAMS TO BE READ CONJUCTION WITH THE TCAWS 2010.
3. NON APPLICABLE EXISTING SIGNAGE SHALL BE COVERED E.G. SPEED SIGNS DUE TO THE TEMPORARY SPEED ZONE.
4. ALL SIGNAGE DISTANCE SHALL COMPLY WITH AS 1742.3 & TCAWS 2010 S.I.N ACCORDANCE WITH TCAWS 2010 TRAFFIC CONTROLLERS TO ASSIST PEDESTRIANS WITH MOVEMENT THROUGH LAND AND THE WORKSITE.
5. SIGNAGE SHALL BE PLACED ON THE SIDE OF THE ROAD ADJACENT TO THE TRAFFIC FLOW.
7. REMOVAL OF TRAFFIC CONTROL SIGNS AND DEVICES SHOULD BE UNDERTAKEN IN THE REVERSE ORDER OF ERECTION, PROGRESSING FROM THE WORK AREA OUT TOWARD THE APPROACHES.

Dimension "D"

SPEED OF TRAFFIC (KN/H)	AS.1742.3	TC@WS
45 OR LESS	15m	15m
46 - 55	15m	50m
56 - 65	46m	60m
GREATER THAN 65	EQUAL TO POSTED SPEED LIMIT	

QUEUE MANAGEMENT

AT ALL TIMES DURING THE COURSE OF THE WORK, TRAFFIC QUEUES SHALL BE MONITORED TO ENSURE THAT TRAFFIC DOES NOT EXCEED BEYOND THE LIMITS OF ADVANCED WARNING SIGNS.

TOLERANCES

POSITIONING OF SIGNS MINIMUM 10% LESS THAN THE DISTANCE OR LENGTH GIVEN MAXIMUM 25% MORE THAN THE DISTANCE OR LENGTHS GIVEN SPACING OF DELINEATING DEVICES MAXIMUM 10% MORE THAN THE SPACING GIVEN NO MINIMUM.

VEHICLE MOVEMENT PLAN

ALL WORK VEHICLES TO ENTER AND EXIT WORKSITE UNDER THE DIRECTION OF TRAFFIC CONTROLLERS WITH THE TRAFFIC FLOW ON DESIGNATED UHF CHANNEL.

TGS IMPLEMENTATION

VARI GROUP DOES NOT ACCEPT LIABILITY FOR OR ENDORSE THE USE OF THE TGS UNLESS IMPLEMENTED DIRECTLY BY AN AUTHORISED REPRESENTATIVE OF VARI GROUP, HOLDING VALID QUALIFICATIONS TO CARRY OUT SUCH WORKS.

LANE WIDTHS

THE MIN LANE WIDTH TO BE PROVIDED THROUGH OR PAST THE WORKSITE FOR VEHICLES SHALL BE 3.0m (3.5m DESIRABLE)

Emergency Vehicles To Have Priority At All Times And Not To Be Impacted By The Works Proposed.

Legend

roberts co

PSB – Children's Hospital Westmead

Construction Noise and Vibration Management Plan

23rd August 2022

Ref: 44311

PREPARED FOR:

Client Contact: Ky Phung
Client Name: Roberts Co

PREPARED BY:

Julia Knight/Ali Ahmadi

Stantec

Revision

Revision	Date	Comment	Prepared By	Approved By
001	23/08/2022	Draft for Review	Ali Ahmadi/Julia Knight	Meisha Stevens

WGE is a proud member of the Association of Australian Acoustical Consultants (AAAC).

AAAC members are competent and capable in the acoustic field. Members of the AAAC provide professional unbiased advice and recommendations in order to deliver practical innovative and cost effective solutions to their clients.

AAAC members are bound to a specific code of professional conduct which can be consulted on the AAAC website: http://www.aaac.org.au/au/aaac/ethics.aspx

Contents

1. Introduction

Stantec Australia have been engaged to prepare a Construction Noise and Vibration Management Sub Plan (CNVMSP) for the proposed construction works of the Paediatric Services Building (PSB) at the Children's Hospital Westmead.

The works as described below are expected to occur across approximately 12 months of work. The works are to be split into the following stages:

- CC1 – CC3
  - Substructure, slabs on ground, inground services, waterproofing in ground
  - Facade
- CC4 a-e
  - Building and fitout services

Certain tasks will be carried out concurrently with other tasks for time periods that are significant in duration. In a given combination of events, the noise emitted by performing the tasks simultaneously will be considered.

This Construction Noise and Vibration Management Plan provides:

- Criteria for the noise and vibration generated during all works phases;
- A quantitative assessment of the airborne noise generated by the work for the proposed development and its impact on nearby receivers;
- Strategies to mitigate the noise and vibration generated during the construction works phases;
- Complaints handling and community liaison procedures.

This assessment discusses the predicted impact of the construction noise and vibration generated by the construction equipment on the nearest most-affected receivers.

This report has been prepared with the following references:

- Interim Construction Noise Guideline (ICNG), NSW DECC, 2009;
- Noise Policy for Industry (NPI), NSW EPA, 2017
- Assessing Vibration: A Technical Guideline, NSW DEC, 2006
- AS 2436:2010 *Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites*
- British Standard BS 5228: Part 1:1997 *Noise and Vibration Control on Construction and Open Sites*
- British Standard BS 7358:1993 *Evaluation and Measurement for Vibration in Buildings – Part 2: Guide to Damage Levels from Ground-borne Vibration*
- German Standard DIN 4150-Part 3 *Structural vibration in buildings – Effects on structures*

The predicted noise levels are based on the proposed construction program and equipment lists provided in this report.

2. Project Description

The proposed PSB will enable the expansion and replacement of existing paediatric services at CHW, providing additional surgery and critical care services. The PSB will be an important addition to the Westmead Health Precinct enhancing the provision and quality of paediatric health services to the growing Western Sydney population.

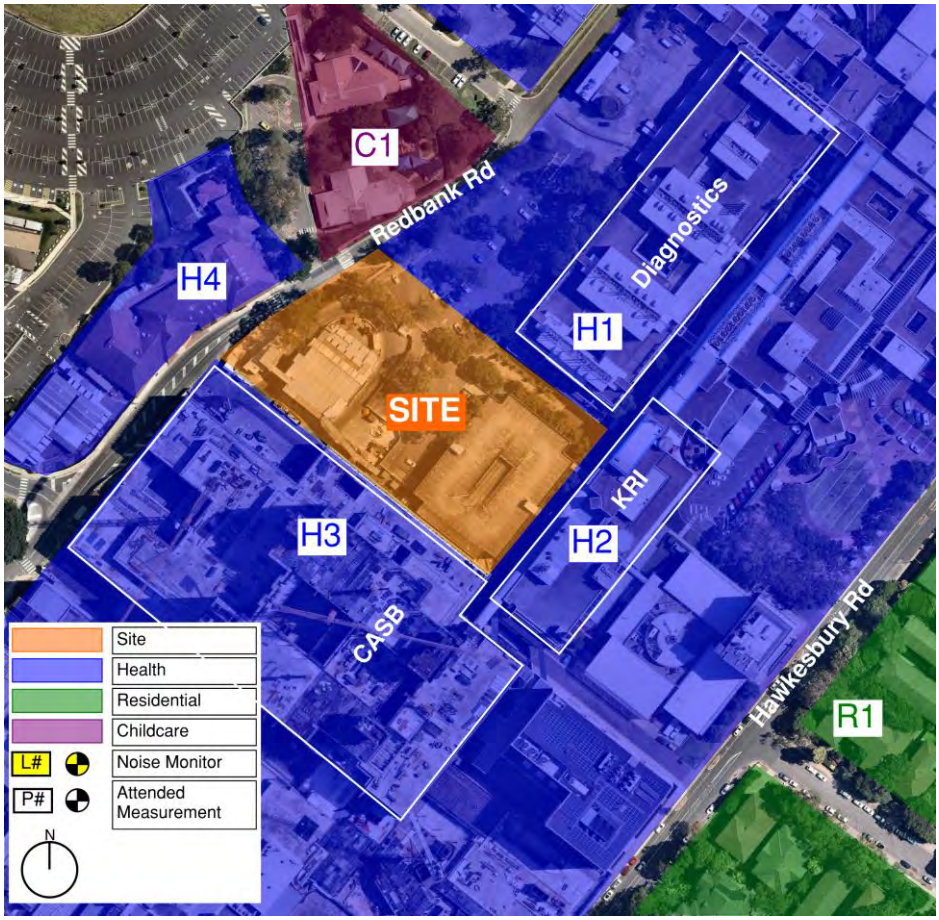
The project includes the construction of a new Paediatric Services Building (PSB) located adjacent to the CASB, and on the site of the former P17 carpark.

The nearest potentially affected noise receivers have been identified in Table 1 and shown in Figure 1.

Table 1: Summary of attended noise measurements

Receiver ID	Receiver Description
H1	Hospital Building (Diagnostics/Block 5 CHW) directly adjacent
H2	Hospital Building (KRI) directly adjacent and Residential properties across Hawkesbury Road
H3	Receiver West, Hospital Building (CASB) directly adjacent.
H4	Hospital building across Redbank Road
C1	Childcare premises across Redbank Road
R1	Resident Catchment Area (NCA) on Hawkesbury Road

Figure 1: Site Map and Measurement Locations



2.1 Existing Noise & Vibration Environment

The local ambient noise and vibration environment is typically that of a suburban environment, and is dominated by road traffic on Redbank Road, which runs along the north-east of the site. There are other lanes, car parks within proximity to the site as well as noise from general hospital operations.

3. Site Noise Investigations

Previous noise monitoring was undertaken at locations illustrated in Figure 2 below during the early works of the Children's Hospital Westmead Stage 2 development by Stantec Australia.

Noise monitoring have been conducted previously by ARUP. These results were obtained prior to the COVID-19 pandemic and prior to major construction works.

Figure 2: Overview of Internal Site and Measurement Locations

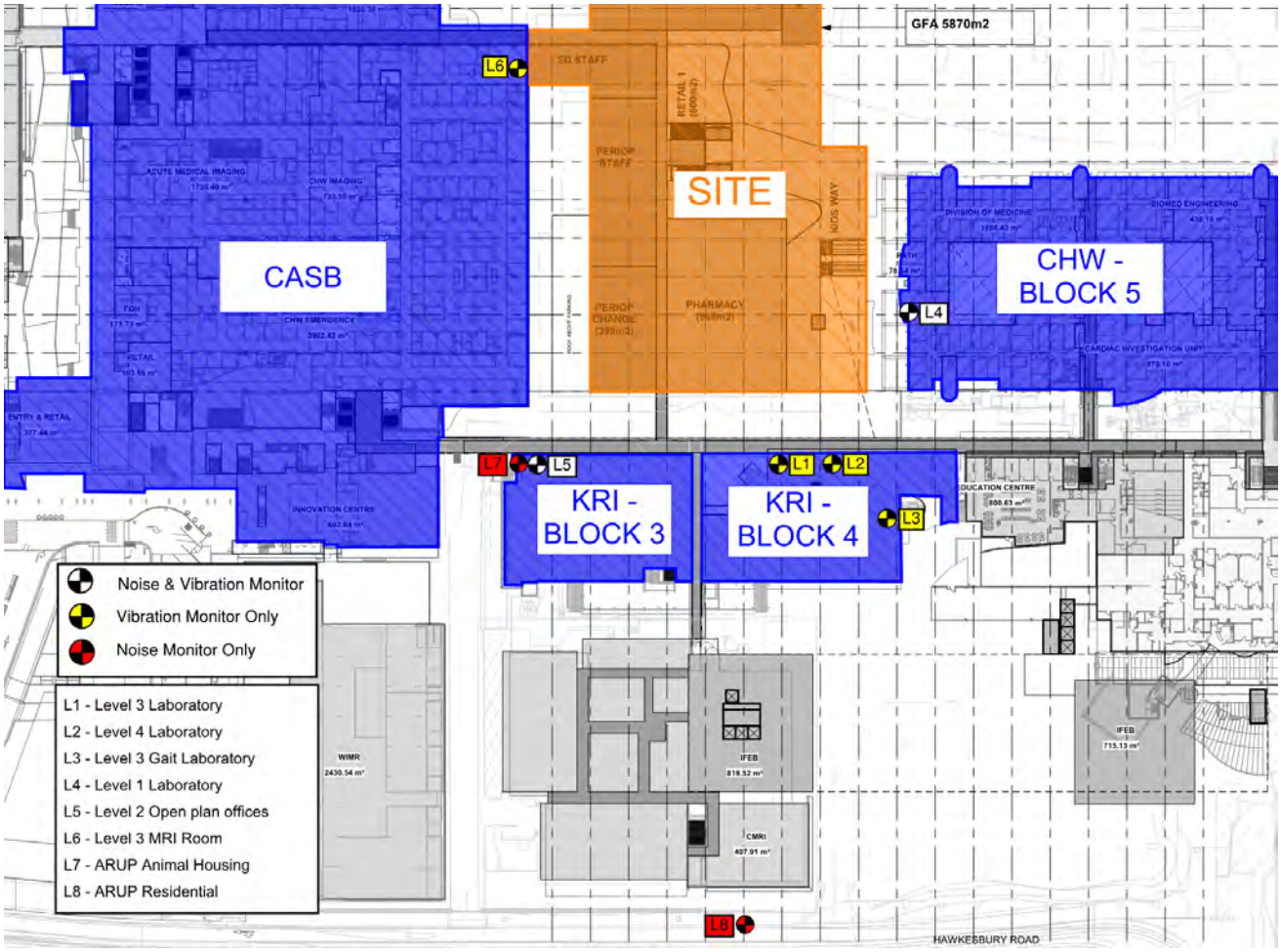


Figure 3: Overview of the External Site and Measurement Location

Source: nearmap.com

3.1 Short-term (Attended) Survey Results

An attended noise measurement of 15-minute duration was conducted on site by Stantec Australia to characterise the noise intruding into the development and to validate the results of the unattended noise monitoring. A summary of the attended noise measurement taken in the vicinity of the proposed development site and site measurements locations are shown in Figure 3 Table 2 below displays the summary of the unattended noise measurements.

Table 2: Summary of attended noise measurements

Measurement Location	Measurement Time	L_{Aeq} dB(A)	L_{Amax} dB(A)	Comments
L5	07/04/20 2:18pm	44.3	59.0	No construction works were in operation during this measurement.

3.2 Long-term (Unattended) Survey Results

3.2.1 Background Noise Monitoring

Noise monitors were placed at position L4, L5 & L7 as shown in Figure 3 to measure the background and ambient noise that is representative of the surrounding noise-sensitive receivers. Noise monitor L4 and L5 were installed from the 28th of March 2020 to the 7th of April 2020. The results of the unattended background and ambient noise survey is shown in Table 3 below (for the day, evening and night periods).

Table 3: Unattended noise measurements of L4 and L5

Location	Equivalent Continuous Noise Level $L_{Aeq,period}$ - dB(A)			Background Noise Level RBL - dB(A)		
	Day	Evening	Night	Day	Evening	Night
L4	55	52	52	52	52	52
L5	42	40	32	31	40	31
L7	51	52	48	43	44	42

The local ambient noise environment for L4 included the operation of noisy medical equipment throughout the majority of the day, evening and night periods. The local ambient noise environment for L5 included nearby construction noise and general day-to-day office activities throughout the majority of the day, evening and night periods. Note that any rain affected data during the period of logging has been excluded from the calculations.

ARUP has previously conducted long-term unattended (baseline) measurements during the EIS in October 2016, which is presented in the noise monitoring report “Ford Civil Contractor (FCC) Hawkesbury Road Widening Works - Noise Monitoring Noise monitoring report - 2019-10-16 to 2019-11-15” report AC09 Issue 1, 11 December 2019.

This is important because the results of the monitoring were obtained prior to the COVID-19 pandemic and prior to major construction works, including the widening of the Hawkesbury Road project. The results of the monitoring conducted will be more relevant to typical background noise and traffic noise characteristics of the area under typical conditions.

Please refer to Table 4 for the long-term unattended (baseline) measurements reported by ARUP dated 11 December 2019 and Figure 3 for the location of these monitors.

Table 4: Arup Unattended Noise Survey Results

Location	Equivalent Continuous Noise Level $L_{Aeq,period}$ - dB(A)			Background Noise Level RBL - dB(A)		
	Day	Evening	Night	Day	Evening	Night
L8	60	60	55	49	48	47

3.2.2 Baseline Vibration Monitoring

Vibration monitors were placed at positions L1, L2, L3, L4, L5 & L6 as shown in Figure 2 to measure the current vibration impact affecting the surrounding vibration sensitive receivers and equipment. All vibration monitors were installed from the 28th of March 2020 to the 7th of April 2020. The results of the unattended baseline vibration survey are shown in Table 5 below.

Table 5: Baseline vibration measurements

Location	Velocity (mm/s)		Criteria (ASHRAE 2011)
	Average	Max	
L1	-	-	0.05
L2	0.11	0.20	0.05
L3	0.03	0.21	0.05
L4	0.04	0.66	0.05
L5	0.03	0.54	0.4
L6	0.06	0.79	0.05

4. Noise & Vibration Criteria

4.1 Construction Noise Criteria

The *Interim Construction Noise Guideline* (ICNG) by NSW DECC recommends the following standard hours of construction:

- Monday to Friday: 7am to 6pm
- Saturday: 8am to 1pm
- Sunday and public holidays: no work

The noise criteria associated with construction and its related activities are shown in Table 6, as presented in Section 4.1.1 Table 2 of the ICNG.

Table 6: Construction Noise Criteria at Residences

Time of Day	Management Level $L_{Aeq,15min}$	How to Apply
Recommended Standard Hours:	Noise Affected RBL + 10dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured **$L_{Aeq,15min}$** is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level. • The proponent should also inform all potentially impacted residences of the nature of works to be carried out, the expected noise levels and duration as well as contact details.
	Highly Noise Affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur in, taking into account: - Times identified by the community when they are less sensitive to noise (such as before and after school, for works near schools, or mid-morning or mid-afternoon for works near residences) - If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

Outside Recommended Standard Hours	Noise Affected RBL + 5dB	• A strong justification would typically be required for works outside the recommended standard hours. • The proponent should apply all feasible and reasonable work practices to meet the noise affected level. • Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community. • For guidance on negotiating agreements see section 7.2.2. of the ICNG

Note: Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30m away from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30m of the residence. Noise levels may be higher at upper floors of the noise affected residence.

Section 4.1.3 of the ICNG sets out the noise management levels for other land uses, including commercial premises and Hospital wards and operating theatres. The internal noise levels should be assessed at the most affected occupied point and the external noise levels are to be assessed at the most affected point within 50 m of the area boundary. However, for other noise-sensitive receivers (e.g. hotels), the guideline recommends the 'maximum' internal noise levels recommended in Australian/New Zealand Standard AS/NZS 2107:2000 *Acoustics—Recommended design sound levels and reverberation times for building interiors* (AS2107:2000), in determining relevant noise levels.

Based on the criteria in the tables above, the following noise management levels in Table 7 should be applied to the noise sensitive receivers. These criteria apply to airborne noise emissions related to construction activity during the recommended standard hours only. Where internal noise levels cannot be measured, external noise levels may be used. A conservative estimate of the difference between internal and external noise levels is 10 dB for buildings other than residences.

Table 7: Project Specific Construction Noise Management Levels

Receiver	Land Use	Internal noise level criteria	Noise Management Level (external), $L_{Aeq,15min}$	Highly Noise Affected Level, $L_{Aeq,15min}$
H1-4	Hospital wards and operating theatres	45 dB(A) *ICNG*	55 dB(A)	N/A
C1	Childcare	45 dB(A) *AS/NZS 2107*	55 dB(A)	N/A
R1	Residential	N/A	59 dB(A)	75 dB(A)

4.2 Construction Vibration Criteria

The vibration emitted from construction works should be such that it does not exceed the maximum limits set out in the criteria presented in Table 8 to Table 11.

4.2.1 Human Comfort – Continuous and Impulsive Vibration Criteria

Structural vibration in buildings can be detected by occupants and can affect them in many ways including reducing their quality of life and their working efficiency. Complaint levels from occupants of buildings subject to vibration depend upon their use of the building and the time of the day. The guide on preferred values for human comfort have been extracted from the NSW DEC *Assessing Vibration: A Technical Guideline* (2006). The criteria for continuous and impulsive vibration are summarized in Table 8.

Table 8: Criteria for Exposure to Continuous and Impulsive Vibration

Place	Time	Vibration Acceleration (m/s^2)			
		Preferred		Maximum	
Continuous Vibration		z axis	x and y axis	z axis	x and y axis
Residences	Day- or night-time	0.010 0.007	0.0071 0.005	0.020 0.014	0.014 0.010
Critical areas[1]	Day- or night-time	0.0050	0.0036	0.010	0.0072
Offices, schools, educational	Day- or night-time	0.020	0.014	0.040	0.028
Impulsive Vibration		z axis	x and y axis	z axis	x and y axis
Residences	Day- or night-time	0.30 0.10	0.21 0.071	0.60 0.20	0.42 0.14
Critical areas[1]	Day- or night-time	0.0050	0.0036	0.010	0.0072
Offices, schools, educational	Day- or night-time	0.64	0.46	1.28	0.92

1. Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring.

Disturbance caused by vibration will depend on its duration and its magnitude. This methodology of assessing intermittent vibration levels involves the calculation of a parameter called the Vibration Dose Value (VDV) which is used to evaluate the cumulative effects of intermittent vibration. The criteria applicable when considering periods of intermittent vibration are presented in Table 9.

Table 9: Acceptable Vibration Dose Values for Intermittent Vibration (1.75 m/s)

Location	Daytime		Night-time	
	Preferred Value	Maximum Value	Preferred Value	Maximum Value
Residences	0.20	0.40	0.13	0.26
Critical areas[1]	0.10	0.20	0.10	0.20
Offices, schools, educational	0.40	0.80	0.40	0.80

1. Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring.

4.2.2 Structural Damage – Vibration Criteria

Ground vibration criteria are defined in terms of levels of vibration emission from construction activities that will not damage surrounding buildings or structures. It should be noted that human comfort criteria are normally expressed in terms of acceleration whereas structural damage criteria are normally expressed in terms of velocity. The human comfort criteria are also often exceeded before a risk of structural damage.

Structural damage criteria are presented in German Standard DIN 4150-Part 3 *Structural vibration in buildings – Effects on structures* and British Standard BS 7385-2:1993 *Evaluation and Measurement for Vibration in Buildings*. The British Standard BS 7385-2:1993 establishes vibration values for buildings based on the lowest vibration levels above which damage has been credibly demonstrated. These values are evaluated to give a minimum risk of vibration-induced damage, where minimal risk for a named effect is usually taken as 95% probability of no effect. The aforementioned values are summarised in Table 10.

Table 10: Transient Vibration Guide Values for Cosmetic Damage – BS 7385-2:1993

Type of Building	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures Industrial or light commercial type buildings	50mm/s	N/A
Unreinforced or light framed structures Residential or light commercial type buildings	15mm/s	20mm/s (50mm/s at 40Hz and above)

Table 11 indicates the vibration limits presented in DIN 4150-Part 3 to ensure structural damage does not occur.

Table 11: Guideline Value of Vibration Velocity (vi) for Evaluating Effects of Short-Term Vibration – DIN 4150-Part 3

Line	Type of Structure	Vibration velocity, v_i, in mm/s			
		Foundation At a frequency of			Plane of floor of uppermost full storey
		Less than 10Hz	10 to 50Hz	50 to 100Hz *	All Frequencies
1	Buildings used for commercial purposes, industrial buildings, and buildings of similar design	20	20 to 40	40 to 50	40
2	Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
3	Structures that, because of their particular sensitivity to vibration, do not correspond to those listed in lines 1 and 2 and are of great intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8
*For frequencies above 100Hz, at least the values specified in this column shall be applied.					

5. Construction Noise Assessment

5.1 Proposed Early and Enabling Construction Activities

At this early stage, the constructible plan and staging is not available. For the purpose of this assessment, the noise impact from the following anticipated general construction works is considered:

Stage 1 – CC1 – CC3: Substructure, slabs on ground, inground services, waterproofing in ground and Façade;

Stage 2 – CC4 a-e: Building and fitout services.

It is noted that Stage 2 comprises internal works and is unlikely to generate significant noise emissions. As such, construction noise during the Stage 3 has not been assessed further in this further.

5.2 Construction Hours

The hours of work are expected to occur during '*Standard Hours'* as per ICNG:

- Monday to Friday: 7am to 6pm
- Saturday: 8am to 1pm
- Sunday and public holidays: no work

If construction hours outside the recommended Standard Hours are required, an assessment of noise outside of Standard Hours will be required.

5.3 Construction Evaluation Scenarios

Noise levels for each stage of the construction works is predicted and evaluated based on the following scenarios:

Worst-case: in this scenario, some of the loudest equipment are assumed to be operating towards the boundary of the construction site (closest distance to a receiver).

Average-case: in this scenario, most of the equipment are assumed to be operating towards the middle of the site. This scenario is expected to represent the average noise expected from the entire site at a receiver and expected to representative of the longer-term average noise emissions. It is noted that a receiver is not expected to be constantly exposed to the Average-case noise levels. This situation represents typical average construction noise emissions.

5.4 Expected Construction Equipment

The noise sources likely to be associated with the proposed works and the assumed operating duty rates for each equipment item are presented in Table 12. The equipment noise levels have been extracted from:

- AS 2436:2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites;
- AS 2436:1981 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites.

Table 12: Construction Equipment Noise Levels

Stages	Equipment	Sound Power Level – dB(A)	Average-case		Worst-case	
			Quantity	Usage in 15-minute (% Time)	Quantity	Usage in 15-minute (% Time)
CC1 and CC3	Diesel Tower Cranes[1]	105	1	25%	1	25%
	Double labour/materials hoist	105	1	25%	1	10%
	Concrete boom pumps (inside building)	105	2	50%	1	50%
	Line pump	113	1	50%	-	-
	Scaffolding (Electric hand tools)	102	2	25%	1	25%

Note: 1- A total noise reduction of 15dB is applied (Sound Power Level of 90dB). An appropriate silencer on the muffler and acoustic screen around the engine bay are required to attenuate the noise from the machine.

5.5 Noise Model

The following assumptions were made:

- The height of the receivers has been assumed as 1.5m from ground level at the boundary of the residential receivers and most affected façade of other sensitive receivers;
- The predicted noise levels at the nearby sensitive receivers have been assessed with the acoustic recommendations as shown in Section 8.1 implemented.
- The effect of other mitigation measures (respite periods, flex shield barriers to any scaffolding which may be present) has not been included within the model;
- The noise levels have been assessed using neutral weather conditions;
- Sound power levels and the operating duty rates are provided in Table 12.

5.6 Construction Noise Results

The predicted construction noise levels have been presented in **Error! Reference source not found.** and Table 13. For the assessment purposes, the Evaluation Scenarios, 'Worst-case' and 'Average-case', are assessed at each identified receiver.

Table 13: Predicted Noise Levels – Construction

ID	Receiver	Predicted Noise Level Range		NML	Noise Management Level Exceedance (dB)		Highly Noise Affected Criteria	Compliance	
		Average-Case	Worst-case		Average-case	Worst-case		Average-case	Worst-case
H1	Hospital	69	74	55	14	19	N/A	Yes*	Yes*
H2	Hospital	66	72	55	11	17	N/A	Yes*	Yes*
H3	Hospital	70	74	55	15	19	N/A	Yes*	Yes*
H4	Hospital	65	68	55	10	13	N/A	Yes*	Yes*
C1	Childcare	65	68	55	10	13	N/A	Yes*	Yes*
R1	Residential	49	48	59	-	-	75	Yes*	Yes*

* Complies with highly noise affected criteria although exceeding the relevant NML

5.7 Discussion and Assessment

Based on the results of this assessment, the following conclusions were made:

- Noise levels are predicted to be compliant with the Highly Noise Affected criteria (75 dBA) during all the assumed stages of work at the nearest identified residential receivers for both average- and worst-case scenarios.
- ICNG does not set out the Highly Noise Affected Criteria for non-residential receivers. Nevertheless, it should be noted that noise levels are predicted to be compliant with the Highly Noise Affected criteria (75 dBA) during all the assumed stages of work at the nearest identified non-residential (i.e. hospital and childcare) receivers for both average- and worst-case scenarios.
- Noise levels are predicted to be compliant with the NML during all the assumed stages of work at the nearest identified residential receivers for both average- and worst-case scenarios.
- Noise levels during all the assumed stages of work are expected to exceed the Noise Management Level by up to 15 dB during the average noise emissions; and up to 19 dB during the Worst-Case assessment scenario;
- Highest noise levels are produced during the use of concreate pumps.

Based on the above, the proposed construction works have the potential to give rise to adverse noise impacts at identified non-residential receivers. Therefore, efforts should be made on site to assist in reducing the overall noise emissions on site, as per the recommendations in Section 8. It is noted, however, the Average-case scenario is expected to represent the average noise expected from the entire site at a receiver and expected to representative of the longer-term average noise emissions. Therefore, this situation represents typical average construction noise emissions which is predicted to be below the Highly Noise Affected criteria at the nearest identified residential receivers.

6. Construction Traffic Noise Generation

construction traffic prediction is not available. However, based on the existing noise levels during the Day period, a typical heavy vehicle movement of four trucks per hour is assumed. On this basis, the traffic noise generated in association with the construction of the proposed development is unlikely to increase by 2dB. As an indication a 3dB increase would be based on a doubling of traffic in the area.

7. Construction Vibration Assessment

Based on the proposed construction equipment presented in Table 12, no vibration-intensive plant is identified. Therefore, human discomfort and/or cosmetic structure damage due to the vibration emission associated with the construction of the proposed development are unlikely. On this basis, vibration monitoring for the proposed works is not required.

8. Noise & Vibration Management Strategies

8.1 Project Specific Recommendations

Project specific recommendations and required mitigation methods have been listed below. Further general noise mitigation and management measures are provided in Section 8.2.

8.1.1 Noise

For Diesel Tower Cranes, an appropriate silencer on the muffler and acoustic screen around the engine bay are required to attenuate the noise from the machine. For the purpose of this assessment, a total noise reduction of 15dB is assumed for the proposed Diesel Tower Cranes. On this basis the assumed Sound Power Level of 90dB is for the prediction and assessment presented in this report.

Where high noise impacts are expected, the ICNG requires that all feasible and reasonable work practices be employed. It is noted that the performance of noise barriers are compromised where there is a direct line of sight to a noise source. However, to protect the receiver closer to the ground level, localised noise barriers should be utilised when the following equipment are in use:

- Concrete pumps

The construction of the barrier should be impervious of gaps and cracks, which would compromise its performance, and it should be comprised of acoustically suitable materials such as 17 mm plywood. The barrier is able to reduce the noise levels experienced at the ground-level receivers directly around the site by 3-7 dB. Barriers should be mobile and extend to a height 1 m above noise source. These barriers should envelop the work location to ensure no direct line of sight to nearby receivers (ground level). Practical and feasible measures should be taken to allow the noise barrier to be located within 4 m of the noise source.

In addition to the sound attenuating barrier, at least one respite period 12:00pm – 1:00pm should be offered per day during the most intensive periods of hammering and rock breaking. Frequent and proactive communication with the sensitive receivers is also encouraged, thus enabling tuning the works schedule to accommodate possible important religious events and allowing the tenants to prepare their expectations on the changing noise environment. More details regarding communication with the community can be found in Section 8.3.

8.1.2 Vibration

No receiver is identified within the Human Response and Cosmetic Damage zones in the vicinity of the proposed project. Therefore, vibration monitoring for the proposed works is not required.

However, should different construction equipment to those proposed in Table 12 are to be used, long-term and attended vibration monitoring may be required. This is to ensure that the acceptable levels of vibration are satisfied during the use of the vibration intensive equipment as per vibration limits set out in Section 4.

8.2 General Acoustic Recommendations for Construction

According to AS 2436 – 2010 *Guide to noise and vibration control on construction, demolition, and maintenance sites* the following techniques could be applied to minimize the spread of noise and vibrations to the potential receivers.

8.2.1 Noise

Figure 4 demonstrates the preferred order of actions taken to mitigate excessive construction noise emissions. If a process that generates significant noise levels cannot be avoided, the amount of noise reaching the receiver should be minimized.

Two ways of achieving this are to either increase the distance between the noise source and the receiver or to introduce noise reduction measures such as screens. Practices that will reduce noise from the site include:

- Increasing the distance between noise sources and sensitive receivers.
- Reducing the line-of-sight noise transmission to residences or other sensitive land uses using temporary barriers (stockpiles, shipping containers and site office transportable can be effective barriers).
- Constructing barriers that are part of the project design early in the project to introduce the mitigation of site noise.
- Installing purpose-built noise barriers, acoustic sheds, and enclosures.

Physical methods to reduce the transmission of noise between the site works and residences, or other sensitive land uses, are generally suited to works where there is longer-term exposure to the noise. A few of these methods have been introduced below.

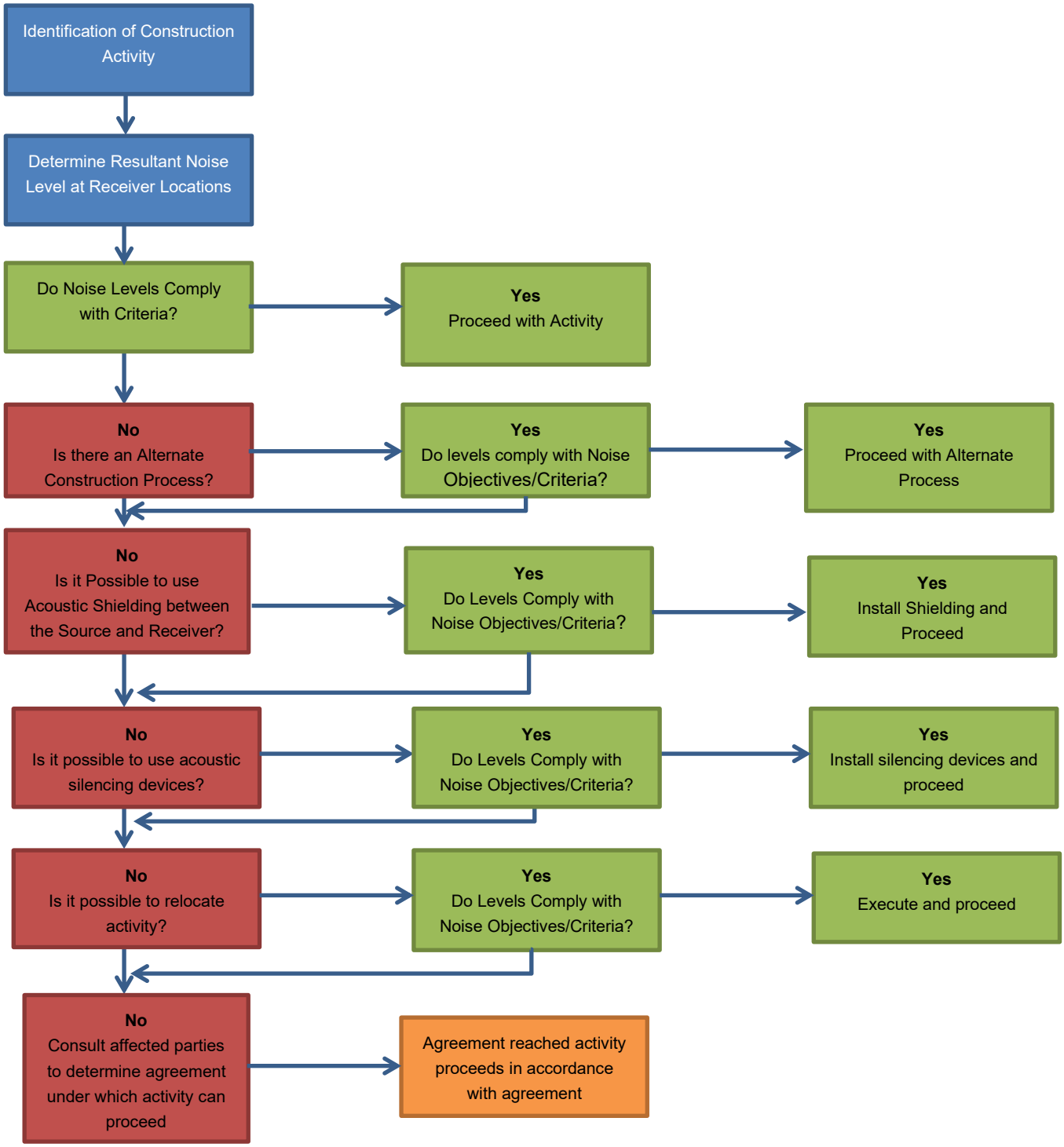


Figure 4: Noise Mitigation Management Flow Chart

Screening

On sites where distance is limited, screening of noise may be beneficial or even the only way to reduce construction noise impacts on the nearby receivers. Below, screening options for various situations have been introduced. Constructing and utilising these screening methods should be taken into account already during the planning stages.

Temporary buildings: One option to introduce screening is to position structures such as stores, storage piles, site offices and other temporary buildings between the noisiest part of the site and the nearest dwellings. Due to shielding provided by these buildings, some of the noise emission from the site can be reduced. If the buildings are occupied, however, sound insulation measures may be necessary to protect site workers inside the buildings.

Hoarding: Another way of implementing screening is to build hoarding that includes a site office on an elevated structure. This option offers superior noise reduction when compared with a standard, simple hoarding. The acoustic performance is further enhanced when the hoarding is a continuous barrier.

Partial building structures: On some sites, partially completed or demolished buildings can be used as noise shields for certain equipment. A noisy, stationary plant can be placed in a basement, the shell of which has been completed, provided reverberant noise can be controlled. Where compressors or generators are used in closed areas, it is also necessary to ensure that the exhaust gases are discharged directly to the outside air and that there is good cross-ventilation to prevent the build-up of poisonous carbon monoxide fumes and to allow an adequate air supply to maintain efficiency when operating the equipment.

Earth mounds and embankments: Where constructing noise barriers and using partial building shells is not practical, a worthwhile reduction in noise can be obtained by siting the plant behind and as close as possible to mounds of earth, which may effectively screen any noise sensitive areas from the plant. These mounds can often be designed into the construction schedule or site arrangement for future landscaping.

Long, temporary earth embankments can provide quite an effective noise screen for mobile equipment moving, for example, on a haulage road. When the earthworks are complete, the earth mounds should be removed, if possible, with smaller quieter excavators. A noise barrier like this may be a more reliable method of noise control than the imposition of restrictions on throttle settings.

Where earth noise barriers are not practical due to lack of space, consideration should be given to the possibility of constructing temporary screens from wood or any equivalent material in surface density.

Equipment operating 24h: When it comes to water pumps, fans and other plant equipment that operate on a 24-hour basis, they may not be an irritating source of noise during the day but can be problematic at night. They should therefore be effectively screened by either situating them behind a noise barrier or by being positioned in a trench or a hollow in the ground. Again, generated reverberant noise must be minimised and adequate ventilation should be ensured.

General remarks:

In many cases, it is not practical to screen earthmoving operations effectively, but it may be possible to partially shield a construction plant at the early stages of the project with protective features required to screen traffic noise.

The usefulness of a noise barrier will depend upon its length, its height, its position relative to the source and the receiver, and the material of which it is made. A barrier designed to reduce noise from a moving source should extend beyond the last property to be protected by at least ten times the shortest distance from the said property to the barrier. A barrier designed to reduce noise from a stationary source should, where possible, extend beyond the direct line of sight between the noise source and the receiver by a distance equal to ten times the effective barrier height, which is the height above the direct line between source and receiver.

If the works are already predominantly located within nominally closed structures, careful consideration should be given to reducing noise breakout at any openings.

Crane (diesel operated)

An appropriate silencer on the muffler and acoustic screen around the engine bay are recommended to attenuate the noise from the machine.

Reversing and warning alarms

Community complaints often involve the intrusive noise of alarms commonly used to provide a safe system of work for vehicles operating on a site. Beeper reversing alarm noise is generally tonal and may cause annoyance at significant distances from the work site.

There are alternative warning alarms capable of providing a safe system of work that are equal to or better than the traditional "beeper", while also reducing environmental noise impacts. The following alternatives should be considered for use on construction sites as appropriate:

- Broadband audible alarms incorporating a wide range of sound frequencies (as opposed to the tonal-frequency 'beep') are less intrusive when heard in the neighbourhood.
- Variable-level alarms reduce the emitted noise levels by detecting the background noise level and adjusting the alarm level accordingly.
- Non-audible warning systems (e.g. flashing lights, reversing cameras) may also be employed, provided that safety considerations are not compromised.
- Proximity alarms that use sensors to determine the distance from objects, such as people or structures, and generate an audible alarm in cabin for the driver.
- Spotters or observers.

The above methods should be combined, where appropriate.

8.2.2 Vibration

Vibration can be more difficult to control than noise, and there are few generalizations that can be made about its control. It should be kept in mind that vibration may cause disturbance by causing structures to vibrate and radiate noise in addition to perceptible movement. Impulsive vibration can, in some cases, provide a trigger mechanism that could result in the failure of building components that had previously been in a stable state.

During the demolition works and the erection of new structures, some vibrations (transmitted through the structure from the demolition sites) are expected, being more of a concern for the surrounding sensitive receivers. Vibrations can also trigger annoyance, which might get elevated into action by occupants of exposed buildings, and should therefore be included in the planning of communication with impacted communities.

It should be remembered that failures, sometimes catastrophic, can occur as a result of conditions not directly connected with the transmission of vibrations, e.g. the removal of supports from retaining structures to facilitate site access. BS 7385-2 provides more information on managing ground-borne vibration and its potential effects on buildings. Where site activities may affect existing structures, a thorough engineering appraisal should be made at the planning stage.

General principles of seeking minimal vibration at receiving structures should be followed in the first instance. Predictions of vibration levels likely to occur at sensitive receivers are recommended when they are relatively close, depending on the magnitude of the source of the vibration or the distance associated. Relatively simple prediction methods are available in textbooks, codes of practice and standards, however, it is preferable to assess site transmission and propagation characteristics between source and receiver locations through measurements.

Guidance for measures available for the mitigation of vibration transmitted can be sought in more detailed standards, such as BS 5228-2 or policy documents, such as the NSW DEC *Assessing Vibration: A technical guideline*. Identifying the strategy best suited to the control of vibration follows a similar approach to that of noise: avoidance, control at the source, control along the propagation path, control at the receiver, or a combination of these. It is noted that vibration sources can include stationary plants (pumps and compressors), portable plants (jackhammers and pavement vibrators), mobile plants, pile-drivers, tunnelling machines and activities, and blasting, amongst others. Unusual ground conditions, such as a high water-table, can also cause a difference to expected or predicted results, especially when considering the noise propagated from piling.

8.3 Complaint Handling Procedures and Community Liaison

It is recommended that the builder directly contact adjacent noise sensitive receivers and provide them with the following information:

- The contact details for a nominated representative to make noise / vibration complaints.
- Explain the timeframe for the construction works and the proposed activities, i.e. the proposed start / stop dates of work and a description of the noise producing equipment that will be used.
- Notify the noise sensitive receivers and Council in a timely manner should there be any need for an changes to the proposed arrangements.
- Provide them with a copy of this report as approved by the Council.
- A complaint management record shall be maintained of all noise complaints received and any remedial actions undertaken, if any.
- Where noise is demonstrated as being compliant with criteria, this should not limit the proponent in undertaking further additional reasonable and feasible steps to reduce noise emissions.

To assist in the management of noise and vibration complaints various procedures are to be followed. These include:

- Clearly visible signage identifying any key personnel along with their contact details to be erected along the perimeter of the building site including:
    - A 24-hour contact name, phone number and email address provided for the resident to address any complaint. The signage will declare; “For any enquiry, complaint or emergency relating to this site at any time please contact…”
- Give complaints a fair hearing.
- Have a documented complaints process, including an escalation procedure so that if a complaint is not satisfied there is a clear path to follow. An example of a complaint response procedure is provided in Appendix A
- Call back as soon as possible to keep people informed of action to be taken to address noise problems. Call back at night-time only if requested by the complainant to avoid further disturbance.
- Implement all feasible and reasonable measures to address the source of the complaint.
- A register is to be kept by the contractor to keep a record of complaints and detail any information associated with them. The contents of the register will include:
    - The name and the address of the complainant
    - Time and date of the complaint
    - The nature of the complaint (Noise/Vibration)
    - Subsequent details
    - Remedial action undertaken

The contents of the register will be maintained and updated with any new complaint without delay. The investigation of the complaint and any remedial actions will be performed by the builder and the owner’s representative, where necessary.

In the event of noisy works scheduled, the builder will notify residents 5 business days in advance. The contractor shall liaise with Council’s Health & Building Unit when excessive complaints are being experienced and where this Management Plan require a change.

8.4 Noise & Vibration Monitoring Strategy

8.4.1 General Methodology

Noise and vibration levels should be monitored from time to time to ensure that noise generated as a result of remediation and construction activities does not disturb local businesses and residents.

Monitoring may be in the form of regular checks by the builder or indirectly by an acoustic consultant engaged by the builder and in response to any noise or vibration complaints. Where noise and vibration criteria are being exceeded or in response to valid complaints, noise and / or vibration monitoring should be undertaken. This would be performed inside the premises of the affected property and on site adjacent to the affected receivers.

Monitoring is to be undertaken by an experienced noise and vibration monitoring professional or an acoustic consultant. The results of any noise or vibration monitoring are to be provided to the relevant party or person in a timely manner allowing the builder to address the issue and respond to the complaints.

Noise and vibration monitoring can take two forms:

- Short-term monitoring
- Long-term monitoring

Both approaches are elaborated below.

Short-term monitoring

Short-term monitoring consists of attended monitoring when critical stages of the construction are occurring. This normally provides real-time assistance and guidance to the subcontractor on site, telling them when the noise and vibration criteria are exceeded. Thus, the selection of alternative method on construction or equipment selection is allowed in order to minimise noise and vibration impacts.

Long-term monitoring

Similarly to short-term monitoring, long-term monitoring provides real-time alerts to the builder / site manager when the noise and vibration criteria are exceeded. Instead of someone being on site measuring, noise and vibration loggers are used.

Typically, the noise and vibration loggers stay on site for a period of several months for the critical construction stages of the project. Sometimes the period of construction noise and vibration monitoring is dictated by the local authorities through the DA conditions.

Both methodologies are complementary and normally used simultaneously providing a significant amount of data via the long-term monitoring, but also providing information on the sources of noise and vibration generating exceedances via the short-term or attended monitoring.

9. Conclusion

A Construction Noise and Vibration Impact Assessment has been provided for the assumed typical construction works of the project located adjacent to the CASB, and on the site of the former P17 carpark.

The details of the noise and vibration assessments undertaken to predict the impacts on sensitive receivers have been presented in Sections 5, to 7.

- Noise levels are predicted to be compliant with the Highly Noise Affected criteria (75 dBA) during all the assumed stages of work at the nearest identified residential receivers for both average- and worst-case scenarios.
- ICNG does not set out the Highly Noise Affected Criteria for non-residential receivers. Nevertheless, it should be noted that noise levels are predicted to be compliant with the Highly Noise Affected criteria (75 dBA) during all the assumed stages of work at the nearest identified non-residential (i.e. hospital and childcare) receivers for both average- and worst-case scenarios.
- Noise levels are predicted to be compliant with the NML during all the assumed stages of work at the nearest identified residential receivers for both average- and worst-case scenarios.
- Noise levels during all the assumed stages of work are expected to exceed the Noise Management Level by up to 15 dB during the average noise emissions; and up to 19 dB during the Worst-Case assessment scenario;
- Highest noise levels are produced during the use of concreate pumps.

Based on the above, the proposed construction works have the potential to give rise to adverse noise impacts at identified receivers. Therefore, efforts should be made on site to assist in reducing the overall noise emissions on site, as per the recommendations in Section 8. It is noted, however, the Average-case scenario is expected to represent the average noise expected from the entire site at a receiver and expected to representative of the longer-term average noise emissions. Therefore, this situation represents typical average construction noise emissions which is predicted to be below the Highly Noise Affected criteria at the nearest identified residential receivers.

A construction traffic noise impact on the souring roads has been assessed. The traffic noise generated in association with the construction of the proposed development is unlikely to give rise to adverse impacts.

The vibration levels are expected to comply with both the human comfort vibration targets and cosmetic vibration targets. Therefore, vibration monitoring for the proposed works is not required. However, should different construction equipment to those proposed in Table 9 are to be used, long-term and attended vibration monitoring may be required. This is to ensure that the acceptable levels of vibration are satisfied during the use of the vibration intensive equipment as per vibration limits set out in Section 4.

To reduce the noise and vibration impacts on the sensitive receivers, noise and vibration management strategies have been proposed in Section 8. Erecting a sound attenuating barrier around the site and localised barriers around stationary equipment are recommended.

The information presented in this report shall be reviewed if any modifications to the features of the development specified in this report occur, including and not restricted to selection of equipment/machinery and modifications to the proposed construction program.

Appendix A Complaints Response Procedure (example)

All complaints regarding the relevant stage of the construction noise and/or vibration must be recorded in a form with the contact details of at least two main points of contact (e.g. the appointed contractor/developer) provided to the affected parties.

All construction noise and/or vibration complaints should be documented and the following information should be recorded:

- The name, address and contact details of the complainant;
- Time and date the complaint was received and who received it;
- Time and date of the activity that caused the complaint;
- The complainant's description of the activity and its effects;
- Any relief sought by the complainant (e.g. scheduling of the activity).

All complaints should be investigated by the appointed contractor/developer representative as soon as practicable using the following steps:

- Assess if the problem can be resolved by reducing noise levels through implementation of the various work practises detailed in this Construction Noise Management Plan.
- Advise the complainant of the action taken and record all details of the conversation.
- Identify the relevant activity and review the activity log to verify the complaint (or otherwise)
- Where it is not practical to stop work immediately, the complainant should be kept updated regularly during the time it takes to stop the activity.
- Review the predicted noise and/or vibration levels to determine if the activity was identified.
- Review the mitigation and management measures in place to ensure they have been applied.
- Review the relief sought by the complainant. Adopt further mitigation and management measures as appropriate.
- Consider attended monitoring to verify the underlying reference level assumptions
- Report the findings and recommendations to the Project Manager, implement changes and update this CNVMP as appropriate
- Report the outcomes of the investigation to the complainant, identifying where the relief sought by the complainant has been adopted or the reason(s) otherwise.

Level 6, Building B
207 Pacific Highway
St Leonards NSW 2065
Tel +61 2 8484 7000

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Waste Management Plan
Children's Hospital at Westmead Stage 2 Development
Paediatric Services Building

Date: June 2023

Document Details

Title	Construction Waste Management Plan
Client	NSW Health Infrastructure
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Principal Contractor	Roberts Co (NSW) Pty Ltd. (RCo)
Roberts Co Project No.	20014
Principal Contractor ABN	61 620 108 483
Project Address	Children's Hospital at Westmead, Redbank Road, Westmead

Document Authorisation

James Stavropoulos	Luke Tracey	Miles Mesic
PROJECT DIRECTOR	**SITE MANAGER**	**PROJECT HSE MANAGER**
14 June 2023	14 June 2023	14 June 2023
Date	**Date**	**Date**

TABLE OF CONTENTS

1 DOCUMENT CONTROL

All changes made to the Project Construction Waste Management Plan are recorded in the amendment table below. The version number and date of revision for the current document revision are shown in the-footer of the document.

1.1 Revision History

Revision	Date	Description of changes	Prepared by	Approved by
01	15.07.2022	Initial version	Miles Mesic	James Stavropoulos
02	14.06.2023	Update to revised RCo Management Plan template	Miles Mesic	James Stavropoulos

1.2 Management reviews

Review date	Details	Reviewed by
15.07.2022	Initial Version	James Stavropoulos
14.06.2023	Review of updated Management Plan template	James Stavropoulos

1.3 Controlled copies

Name	Position	Date	Revision
James Stavropoulos	Project Director	15.07.2022	01
James Stavropoulos	Project Director	14.06.2023	02

2 DEFINITIONS AND ABBREVIATION

Term/Abbreviation	Definition
CWMP	Construction Waste Management Plan
HSE	Health, Safety and Environment
EPA	Environment Protection Authority
OEH	Office of Environment and Heritage
RCo	Roberts Co
The Project	CHW STAGE 2 - PAEDIATRIC SERVICES BUILDING

Table 01 – Terms of reference, definitions and abbreviations.

3 PURPOSE AND APPLICATION

This Construction Waste Management Plan (CWMP) for the CHW STAGE 2 - Paediatric Services Building (The Project) describes the Roberts Co system for managing and minimising waste impacts of its activities, meeting its legislative and contractual obligations. In particular, the plan has been developed to address requirements of **Condition B18** from the project conditions of approval.

DA Consent No.	Consent Condition of Approval
B18	A) The recording of quantities, classification (for materials to be removed) and validation (for materials to remain) of each type of waste generated during construction and proposed use for materials to remain. B) Information regarding the recycling and disposal locations & C) Confirmation of the contamination status of the development areas of the site based on the validation results.

Table 02 – Development Application – Condition of Approval

3.1 Project Scope

The Project will incorporate the following: [insert bullet point short description, e.g.:]

– The Paediatric Services Building (PSB) will enable the expansion and replacement of existing
– paediatric services at Children's Hospital at Westmead, providing additional surgery and critical care
– services. The PSB will be an important addition to the Westmead Health Precinct, enhancing the
– provision and quality of paediatric health services to the growing Western Sydney population.
– The PSB is a high-rise state-of-art paediatric hospital consisting of:
– – Loading Dock, back of house and logistics services accessed via Redbank Road (Level 2)
– – New front of house and retail facilities accessed via Hawkesbury Road (Level 2 and 3)
– – A new Pharmacy and Surgical Short Stay Unit (Level 3)
– – A new Perioperative service (Level 4)
– – Shell floors for future Inpatient Units (Level 6 and 13).
– – New PICU and NICU (Level 7 and 8)
– – New Oncology Inpatient Units, and patient and family focused retreat areas and a Day Oncology
– Unit (Level 10 and 11)
– – New Medical and Surgical Inpatient Units (Levels 9, 11, 12), inclusive of family accommodation.
– – Short-stay parking.
– – Integration to surrounding health and research buildings via pedestrian link bridges to the CASB
– and KR/CHW.
– – Public domain and associated landscaping.

– The project also includes a number of interfaces with other contracts and contractors on adjacent and
– related lots within the precinct, such as the refurbishment works to the existing Children's Hospital, and
– the Combined Civil works contract.

4 OBJECTIVES AND TARGETS

4.1 Objectives

The objective of this CWMP is to ensure that all risks associated with construction waste management are considered and managed effectively during construction.

This CWMP seeks to ensure that construction waste is managed effectively to prevent any negative environmental impact on the surrounding environment or receiving resource recovery and waste facilities.

This CWMP aims to satisfy the following objectives:

– Address the requirements of planning approval condition **B18**;

– Address the requirements of the relevant environmental legislation as it applies to this project;

– Summarise potential impacts on the environment from the proposed works, and;

– Document environmental procedures to control potential environmental impacts.

4.2 Targets

The following targets have been identified in terms of waste management for the project;

– Waste products are recovered and reused on site where reasonable and practical;

– Undertaken recovery / recycling of all recyclable materials such as concrete, steel, aluminium, paper and plastics. This may be undertaken on site or at an offsite recovery facility;

– All residual waste products are sent to appropriately licensed destinations for recycling, reuse, treatment or disposal;

– No contamination incident occurring as a result of waste storage, transport or disposal;

– No rejection of loads by the receiving facility for non-compliant wastes;

– Regulated wastes stored, transported, tracked and disposed of as per regulated waste legislation;

– No construction waste/litter to leave the site in an uncontrolled manner;

– Documentation of the intended management of wastes e.g., avoid, reduce, reuse, recycle or dispose to ensure waste is managed in accordance with accepted standards and appropriately implemented waste control measures, and;

– Implementation of waste minimisation initiatives where practical.

5 LEGAL AND OTHER REQUIREMENTS

The waste legislation and regulatory framework relevant to the appropriate jurisdiction can be found in via the following links:

NSW	Waste Avoidance and Resource Recovery 2001 (WARR)1
VIC	Statewide Waste and Resource Recovery Infrastructure Plan (SWRRIP)

Website Links

NSW www.legislation.nsw.gov.au/view/html/inforce/current/act-2001-058

VIC www.sustainability.vic.gov.au/about-us/our-mission/our-strategies/statewide-waste-and-resource-recovery-infrastructure-plan-swrrip

5.1 Environmental Legislation (Acts)

All material that is imported to or exported from the CHW STAGE 2 - PAEDIATRIC SERVICES BUILDING will be undertaken in strict accordance with the requirements of the following;

NSW	Protection of the Environment Operations (POEO) Act 1997
VIC	Environment Protection (EPA) Act 2017

This includes:

– Ensuring waste is classified appropriately and in accordance with relevant guidelines;

– Waste materials are disposed of correctly at the appropriately licensed facilities, and;

– Other materials are removed to facilities lawfully able to accept such materials.

5.2 Environmental Regulations

The proposed works shall be undertaken in accordance with the following regulations;

NSW	Protection of the Environment Operations (Waste) Regulations 2014
VIC	Environment Protection Regulations 2021

5.3 Waste Classification Guidelines, Part 1: Classifying Waste

All wastes generated and proposed to be disposed off-site shall be assessed, classified and managed in accordance with this guideline.

5.4 Asbestos Regulations

Asbestos containing materials shall be undertaken in accordance with the requirements of the:

NSW	– Work, Health and Safety Act 2011 – Work, Health and Safety Regulation 2017 – Code of Practice - How to safely remove Asbestos, December 2011 – Waste Classification Guidelines: Part 1: Classifying Waste (DECC 2008)
VIC	– Occupational Health and Safety Act 2004 – Occupational Health and Safety Regulations 2017 – Compliance Code – Removing asbestos in workplaces 2019

6 WASTE CLASSIFICATION

Waste is generally classified on the basis of its potential harm to the environment. A summary of the waste classification requirements is provided below.

6.1 NSW

Waste Classification	Description
Special Waste	– Special waste includes asbestos waste and waste tyres. – Asbestos waste means any material or material that contains the fibrous form of mineral silicates. – Waste Tyres is any used, rejected or unwanted tyres including shredded or tyre pieces.
Liquid Waste	– Liquid waste means any waste that: – Has an angle of repose of less than 5 degrees, or – Becomes free-flowing at or below 60 degrees Celsius or when it is transported, or – Is not generally capable of being picked up by a spade or shovel.
General Solid Waste (putrescible)	– Household waste that contains putrescible organics waste from litter bins collected by local councils.
General Solid Waste (non-putrescible)	– Glass, plastic, rubber, plasterboard, ceramics, bricks, concrete or metal – Paper or cardboard – Grit, sediment, litter and gross pollutants from stormwater treatment devices, stormwater management systems that has no free liquids – Garden & wood waste – Containers previously containing dangerous goods, as defined under the Australian Code for the Transport of Dangerous Goods by Road and Rail, where residues have been appropriately removed by washing or vacuuming drained – Oil filters (mechanically crushed), rags and oil-absorbent materials that only contain non-volatile petroleum hydrocarbons and have no free liquids – Drained motor oil containers that do not contain free liquids – Synthetic fibre waste from fibreglass, polyesters and other plastics and is packaged securely to prevent dust emissions, that is confirmed as not being asbestos waste – Virgin excavated natural material – Building and demolition waste – Asphalt waste, including asphalt from road construction and waterproofing works – Cured concrete waste from batch plants – Fully cured and set thermosetting polymers and fibre-reinforcing resins, glues, paints, coatings and inks

Table 03 – Waste Classifications (NSW)

Further details on the classification of waste can be found in the OEH's Waste Classification Guidelines 2008.

6.2 VIC

Waste Classification	Description
Priority waste (non-reportable)	Timber treated with hazardous substances, including sawdust. Biosolids that meet specifications of Permit Conditions. Industrial wastewaters (excluding sewage)
Industrial waste (non-priority)	Untreated timber, including sawdust.
Reportable Priority waste (transaction) & Reportable Priority waste (transport)	Treated sewage solids and sludge that does not meet specifications of Permit Conditions. Sludges or slurries, including drilling muds containing hazardous substances.

Table 04 – Waste Classifications (VIC)

Further details on the classification of waste can be found in the EPA VIC Waste Classification assessment protocol 2021.

7 WASTE MANAGEMENT

7.1 Waste Sources

The following information in this section outlines the anticipated waste and management options to address the generated waste. All waste will be removed progressively with minimal amount stored on site.

Waste that is not removed immediately will be stored in designated areas in proprietary storage facilities until it is reused or removed.

Waste will be classified according to the OEH Waste Classification Guidelines (2008) and the EPA VIC Waste Classification assessment protocol (2021).

Waste Category	Waste Generated	Classification
Waste produced from the demolition of the existing structures and roadways	– Concrete – Asphalt / bitumen – Steel – Brick – Internal fittings	General Solid
Waste from on-site maintenance and servicing of plant and equipment – note minor servicing only. Major servicing to be completed off site. (non-liquid)	– Drained and crushed oil filters and grease tubes – Used and defective parts – Oil soaked rags – Used oil absorbent materials	General Solid
Waste from crib sheds and office areas	– Food scraps, waste wrappers, waste-paper towels	General Solid Putrescible
Office and packaging waste (non-liquid)	– Paper, cardboard, glass, plastic (no food scraps etc)	General Solid
Waste from construction activities (non-liquid)	– Waste is not contaminated or mixed with any other type of waste and does not contain asbestos – Plasterboard – Concrete pour residues – Aggregates – Damaged and off cuts of PVC pipes – Rejected or defective precast concrete – Steel waste – Used Geotextile – Timber waste	General Solid
Any waste that meets the criteria for assessment as dangerous goods under the Australian Code for the Transport of Dangerous Goods by Road and Rail	– Poisonous (toxic) substances and corrosive substances – Non-sag epoxy mortar binder – Synthetic rubber-based adhesive – Epoxy resins – Batteries	Hazardous

Table 05 – Sources of Waste

7.2 Waste Minimisation and Recycling

The following strategies will be implemented on site to minimise the generation of waste:

- Include project waste strategy in the project induction;
- Establishment of a combined waste collection system by a reputable service provider;
- Appropriate quantities of materials will be ordered to minimise wastage;
- Quality of materials supplied will be controlled to reduce rework and problems due to quality and additional material consumption;
- Prefabricated elements used where practical and reasonable;
- Establishment of comingled recycling receptacles for packaging and food container waste;
- Waste steel will be separated and disposed of into the steel recycling bin provided on site;
- Form work will be reused as often as possible;
- Waste timber and formwork will be sent to a recycling facility;
- Waste concrete will be sent to a recycling facility;
- Any green waste is to be mulched and removed from site. Where possible, with regard to the species, it is to be reused for landscaping purposes off site, and;
- Recycling of general waste such as paper, cardboard, aluminium cans and similar materials from offices and site facilities. Source separation will be provided for these facilities as shown below.

7.3 Waste Storage and Handling

During demolition and excavation, waste will be removed by a suitably licensed contractor and sent to pre-approved waste and resource recovery facilities. The handling, storage and transport of hazardous materials and waste shall be in accordance with Roberts Co Project Work, Health and Safety Management Plan, the National Code of Practice, the relevant Safety Data Sheet (SDS) on the product and the hazardous materials management procedures.

During construction, Roberts Co will provide the appropriate bins required dependent on the stage of the project including (but not limited to skip bins tipper bins, wheelie / Otto bins, recycling bins and food scrap bins throughout the duration of the project.

The type of bin will be required for the various activities being carried out;

- 2m3 bins will be utilised during the structure phase on the decks;
- 1m3 bins during typical floor services and fit out stages, and;
- Otto bins during the finishes to completion.

Storage of waste oils and chemicals shall be in a purpose built secured bunded area. The capacity of the bunded area is to be at least 110% of the chemical stored within. An emergency response spill kit shall be located adjacent to the bunded area.

All storage containers and locations for the various waste streams shall be clearly labelled to ensure that mixing of wastes is avoided.

All material removed during the de-silting of drainage structures and sediment structures shall be disposed of in an approved disposal area on site.

Where spoil material is to be removed from the site for offsite disposal, Roberts Co must ensure that the waste is classified in accordance with the OEH Waste Classification Guidelines.

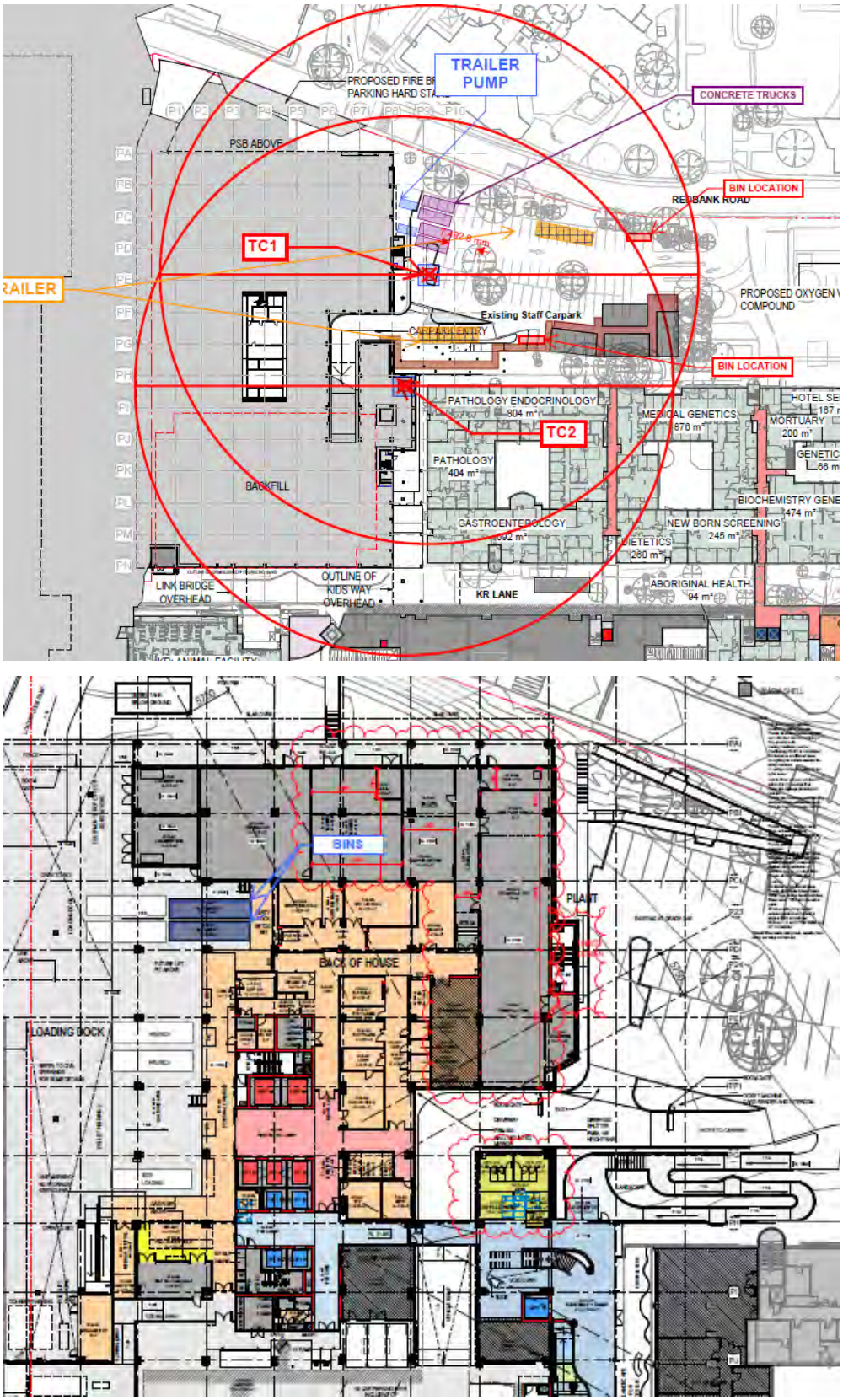

Figure 1 – Construction Waste storage and recycling areas.

7.4 Waste Forecast – Construction Phase

The objectives during demolition, excavation and construction waste management are to;

– Reduce the demand for waste disposal during demolition and construction;

– Maximise resource recovery through reuse and recycling;

– Assist in achieving Federal and Local Government waste minimisation targets in accordance with overarching regulations and plans;

– Document wastes that may be generated as part of the demolition and construction works (identification and proposed disposal method and destination), and;

– Aim to be awarded 2 credit points for Waste Management as stipulated under Green Star Office version 3. Two credit points are awarded where 90% of waste, by weight, generated on-site during the construction phase is re-used or recycled.

The above target will be achieved through maintained and consistent reuse and recycling efforts throughout the entire construction phase. Other construction and demolition related issues such as impact of the development on surrounding land used and public streets are addressed in the Construction Management Plan.

7.5 Types and quantities of waste

The following estimates of waste type and quantities have been made based on the anticipated extent of demolition and construction works. Demolition and Construction waste generation data has been provided by RCo based on similar projects of comparable type and size.

7.5.1 Excavation types and quantities of waste materials

Only 7.5% of the waste generated during the demolition phase is expected to be landfilled while over 92% is expected to be recycled and a small quantity (around 0.1%) reused.

Table 05 identifies the types of materials likely to be generated during excavation. Accurate records of amount, type and destination of waste materials will be recorded and retained throughout the scope of works.

Material types	Anticipated Quantities
Sandstone (VENM)	m3
Soil (ENM)	m3
Soil (VENM)	m3
Concrete, Bricks, Tiles,	m3

Table 05 - Proposed waste material types and estimated generation.

7.5.2 Construction types and quantities of waste materials

An indicative forecast of generated waste generated throughout the construction activities is located in table 06 below. The table (06) represents the waste material type, estimated volumes calculated in recyclable percentages. The anticipated recycling and reuse rate for construction waste is 90% as per the project waste objective target set out in section 7.4 of this plan.

The estimated generation of construction waste is based on an average of 342m3 per month over a 22-month construction duration. Therefore, an estimated waste total of 7,524m3 will be generated with the following estimated breakdown of waste type.

Waste Material types	Percentage (Approx.)
Heavy Recyclable Materials (soil, dirt, sand, rubble, brick, concrete, tiles, marble, stone)	28%
Light Recyclable Materials (cardboard, paper, plastic, plasterboard)	24%
Metals (ferrous, non-ferrous)	13%
Recyclable Timber / Green Waste	25%
Land Fill Waste	10%
Total Recycled Waste	90%

Table 06 - Waste Management and Resource Recovery Plan. A 90% recycling and reuse rate is expected.

8 WASTE RECORDS

Records of waste disposal must be maintained. All material that leaves the site must be classified and its disposal or recovery location recorded. Waste records are recorded on a central register.

Where any external waste contractors are used by Roberts Co, a copy of the relevant environment protection licence and disposal forms shall be obtained and verified.

All records will be filed, stored, and archived in accordance with the Roberts Co project filing index. In any case, records will be maintained for a minimum of four (4) years.

BINGO INDUSTRIES

Monthly Waste Report
Djurwa Pty Ltd-Roberts Co Westmead
Site: 26 Mons Rd, WESTMEAD

DJURWA

Waste Type (tonnes)	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Totals
Recyclable Bricks/ Tiles	0.000	0.000	1.596	9.936	0.816	0.163								12.511
Recyclable Concrete	0.000	0.000	1.995	12.420	10.200	40.800								65.415
Recyclable Soil / Sand / Rubble Fines	0.000	0.000	1.862	2.898	3.808	3.808								12.376
Recyclable Metals (ferrous)	0.000	0.000	4.988	5.175	1.020	4.080								15.263
Recyclable Metals (non-ferrous)	0.000	0.000	1.663	2.070	0.850	0.340								4.923
Recyclable Timber	11.700	0.000	9.576	9.315	4.080	14.280								48.951
Recyclable Green Waste	1.638	0.000	1.995	0.000	0.000	0.000								3.633
Recyclable Cardboard / Paper	1.560	0.000	1.995	4.761	1.360	0.952								10.628
Recyclable Plastic	1.170	0.000	1.330	4.140	1.020	1.768								9.428
Recyclable Plasterboard	0.000	0.000	3.458	3.726	1.224	0.000								8.408
General Waste (landfill)	1.248	0.000	2.660	4.140	1.360	2.720								12.128
Total Recycled Waste (tonnes)	16.068	0.000	30.457	54.441	24.378	66.191	0.000	0.000	0.000	0.000	0.000	0.000	0.000	191.535
Total Landfill Waste (tonnes)	1.248	0.000	2.660	4.140	1.360	2.720	0.000	0.000	0.000	0.000	0.000	0.000	0.000	12.128
Total Waste (tonnes)	17.316	0.000	33.117	58.581	25.738	68.911	0.000	0.000	0.000	0.000	0.000	0.000	0.000	203.663
Total Waste (cubic metres)	78	0	133	207	68	136								622.000
Total Recycled Waste (percentage)	92.79%	0.00%	91.97%	92.93%	94.72%	96.05%								
Total Recycled Waste (percentage) To Date														94.05%

ARUP

Roberts Co (NSW) Pty Ltd

Children's Hospital at Westmead Stage 2 Development, Paediatric Services Building

Main Building Works – Construction Soil and Water Management Plan & Construction Flood Emergency Response Sub-Plan

Reference: CHW-ARP-CV-RP-PS-9-XX010

Rev A | 9 November 2022

Job number 271985

Arup Australia Pty Ltd | ABN 76 625 912 665

Arup Australia Pty Ltd
Level 5
151 Clarence Street
Sydney
NSW 2000
Australia
arup.com

ARUP

Document Verification

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Job number	271985
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Draft	14/09/2022	**Description**	Draft Issue		
			Prepared by	**Checked by**	**Approved by**
		Name	Veness Catic	Andrew Crouch	Andrew Crouch
		Signature			
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		Signature			
		Filename			
		Description			
			Prepared by	**Checked by**	**Approved by**
		Name			
		Signature			

Issue Document Verification with Document ✓

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1. Introduction

1.1 Overview

The Children's Hospital at Westmead Stage 2 Redevelopment will be part of the Westmead Health Precinct adjacent to Westmead Hospital.

The proposed Paediatric Services Building will enable the expansion and replacement of existing paediatric services at The Children's Hospital at Westmead, providing additional surgery and critical care services. The Paediatric Services Building will be an important addition to the Westmead Health Precinct, enhancing the provision and quality of paediatric health services to the growing Western Sydney population.

The project includes the construction of a new Paediatric services Building located adjacent to the Westmead Central Acute Services Building, and on the site of the former P17 car park. The Paediatric Services Building will address the following principles:

- Achieving Sydney Children's Hospital Network's strategic vision, clinical priorities and project objectives;
- Maximising the fit-out of clinical space and extent of acute services within the Paediatric Services Building and the Westmead Central Acute Services Building, enabling the priority services identified in the Clinical Services Plan to be bough on-line with minimal further investment (if any) in line with forecast demand;
- Addressing key adjacencies and clinical links between the Westmead Central Acute Services Building and the existing Children's Hospital at Westmead;
- Providing optimised clinical and back of house adjacencies;
- Enabling the most efficient future location of Inpatient Units and realisation of the "acute services zone" developed via the Westmead Central Acute Services Building and Paediatric Services Building as per the Children's Hospital at Westmead Masterplan, through the provision of two shell floors to accommodate future Inpatient Units and provide decant capacity for Lot 3 services impacted by the Parramatta North Programme.

The Construction Soil and Water Management Plan (CSWMP) and Construction Flood Emergency Response Sub-Plan (CFERSP) has been prepared to address the requirements for SSD 10349252 Condition B19 and B20, specifically the Stage 2 Crown Certificate (for construction), works entail the building's superstructure.

1.2 Proposed Development

The proposed Paediatric Services Building site lies between the recently constructed Westmead Central Acute Services Building to the southwest and the existing Westmead Children's Hospital Block 6 to the northeast of the site. The site has frontage to the southern side of Redbank Road.

Figure 1 Building aerial showing the PSB development site including site compound

The Paediatric Services Building Main Works (Stage 3) work will follow the approved completion of the Early Works Package (Stage 1) for the building's substructure, aligning with the SSD Staging Report.

1.3 Construction Soil and Water Management Principles

Erosion and sediment control measures are a specific consideration of the broader construction management plan (CMP) that are designed to minimise the risk of scour, erosion, and sedimentation. These risks are increased during necessary construction activities including demolition, land disturbance, cutting and filling.

Likewise, these risks are also increased when developing a site that is prone to overland flows and flooding. The Arup Children's Hospital Westmead Paediatric Services Building Flood Impact Assessment (reference: CHW-ARP-CV-RP-PS-91-XX012) provides an assessment of the existing site conditions and identifies regions of the development site at risk from overland flows and flooding.

The CSWMP addresses the following:

- Outlines existing site conditions;
- Provides clear soil and management objectives specifically related to the project;
- Provides erosion and sediment control techniques that will be implemented during the demolition phase of the development; and
- Informs the construction management plan including the site establishment, access and egress and material management to reduce the risk of disruption and damage to the development.
- Inspection and Test Plans (Examples in Appendix B, Landcom 2004).

1.4 Qualification

This CSWMP and the FERSP were prepared and reviewed by suitably qualified and experienced engineers from the Arup Civil team, who hold good working knowledge of the relevant standards, specifications and conditions applicable to this project.

2. Environmental Requirements

This plan has been developed in accordance with the following guidelines:

- Landcom "Managing Urban Stormwater – Soils and Construction" Volume 1; 4th edition; dated March 2004.
- NSW Government "Protection of the Environment Operations Act 1997 No 156"; dated December 2020.
- NSW Government Department of Land and Water Conservation "Guidelines for Erosion and Sediment Control on Building Sites"; dated January 2000.
- City of Parramatta "Development Control Plan (DCP)"; dated October 2011.
- ANZECC & ARMCANZ "Australian and New Zealand Guidelines for Fresh and Marine Water Quality", October 2000.
- AS/NZS "3500.3 2018 Plumbing and drainage, Part 3: Stormwater drainage"; dated June 2018.
- Commonwealth of Australia (Geoscience Australia) "Australian Rainfall and Runoff: Guide to Flood Estimation"; dated 2019.

2.1 Conditions of Consent

- This CSWMP has been developed to meet the relevant conditions of consent for the Children's Hospital at Westmead Stage 2 Development, Paediatric Services Building Development as follows:

Table 1. Conditions of Consent for SSD 10349252

Condition	Where Addressed
B19. The Applicant must prepare a Construction Soil and Water Management Plan (CSWMSP) and the plan must address, but not be limited to the following:	
a) be prepared by a suitably qualified expert, in consultation with Council;	1.4
b) measures to ensure that sediment and other materials are not tracked onto the roadway by vehicles leaving the site	4.3
c) describe all erosion and sediment controls to be implemented during construction as a minimum, measures in accordance with the publication Managing Urban Stormwater: Soils & Construction (4th edition, Landcom 2004) commonly referred to as the 'Blue Book';	4.3
d) include an Acid Sulfate Soils Management Plan, if required, including measures for the management, handling, treatment and disposal of acid sulfate soils, including monitoring of water quality at acid sulfate soils treatment areas;	4.3.2

e) direct all sediment laden water in overland flow away from the leachate management system and prevent cross contamination of clean and sediment or leachate laden water.	4.3
f) provide a plan of how all construction works will be managed in wet weather events (i.e. storage of equipment, stabilisation of the Site);	4.3.4
g) detail all off-site flows from the site	4.3
h) describe the measures that must be implemented to manage stormwater and flood flows for small and large sized events, including but not limited to 1in 5-year ARI and 1 in 100-year ARI.	4.3.1
B20. The Flood Emergency Response Sub-Plan (FERSP) must address, but not be limited to, the following:	
a) be prepared by a suitably qualified and experienced person(s);	1.4
b) address the provisions of the Floodplain Risk Management Guidelines (EESG);	5
c) include details of: 1. the flood emergency responses for the construction phase of the development; 2. predicted flood levels; 3. flood warning time and flood notification; 4. assembly points and evacuation routes; 5. evacuation and refuge protocols; and 6. awareness training for employees, contractors and users/visitors.	5

3. Existing Site

The Children's Hospital at Westmead Stage 2 Development, Paediatric Services Building, site location and boundary are shown in Figure 2. The site is bounded to the north west by Redbank Road, which is generally aligned in a northeast to southwest direction. Redbank Road is a two-lane two-way road and currently provides access to the existing facilities on the site. This includes access to the existing on grade carpark and multi storey carpark (decommissioned) via and access driveway off Redbank Road.

The southeast boundary of the site is adjacent to KR Lane and the existing Children's Hospital at Westmead (CHW). The southwest boundary is to Research Road and the newly constructed CASB. The proposed site boundary is outlined in Figure 1.

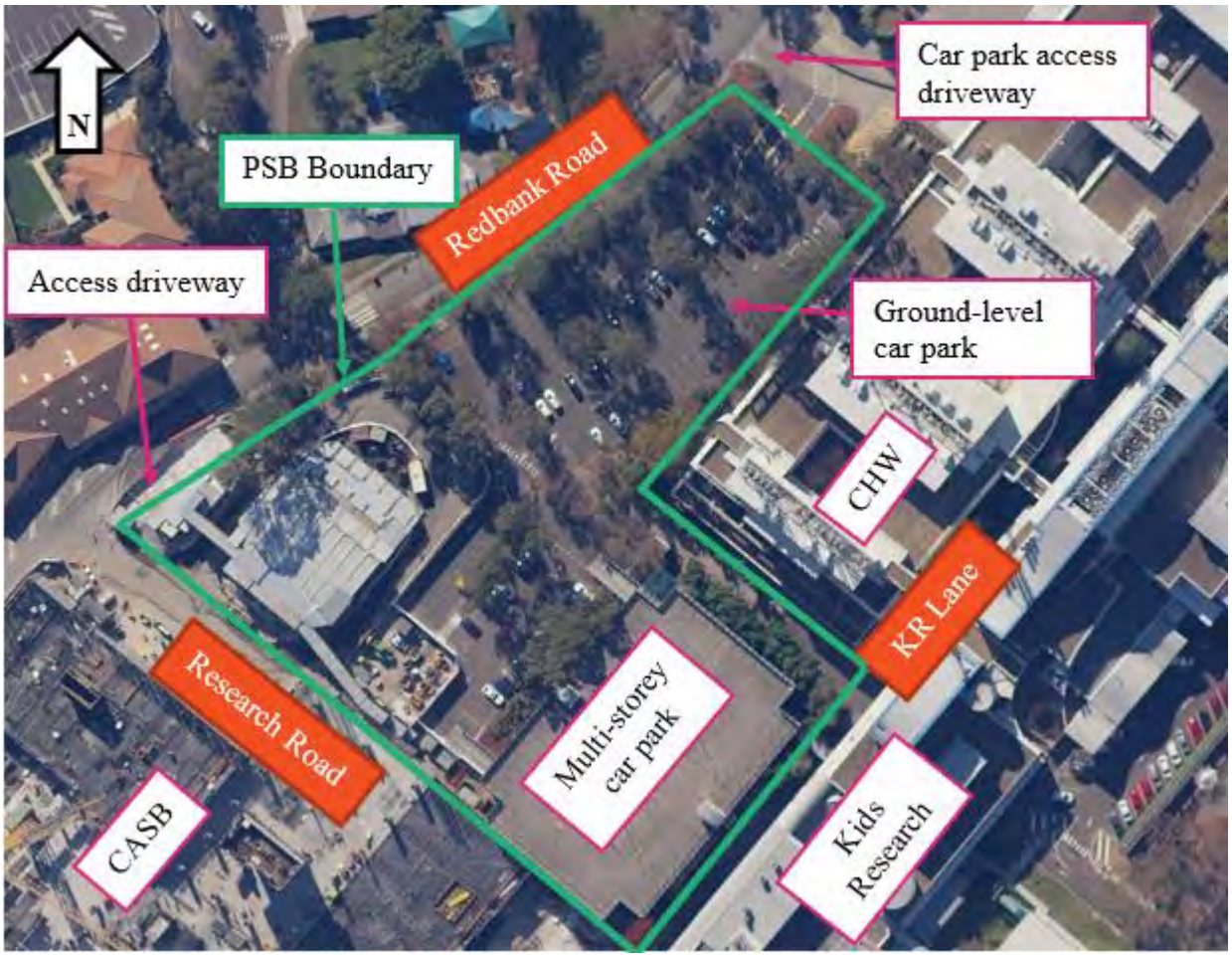


Figure 2 Existing site and boundaries.

3.1 Topography and ground surface conditions

In existing pre-development conditions, the site is higher than the surrounding streets and generally falls in a northerly direction. The lowest area of the site is at the northern end, however there is also a localised low point at the south-east corner of the site adjacent KR Lane. There is a pedestrian access path from this low point travelling along the west and north faces of the existing CHW building and ending at the carpark access driveway north of the site.

The site is predominantly paved with impervious surfaces including parking areas, roads and footpaths. A portion of the on grade carpark on the site is vegetated with garden beds and trees, and is generally pervious. Key features at the site are shown in the Figure 2.

3.2 Surface water and Flooding

Completed flood studies for the Parramatta River have been reviewed in detail to understand the historic patterns and records of former flooding events. The Arup Children's Hospital Westmead Paediatric Services Building Flood Impact Assessment (reference: CHW-ARP-CV-RP-PS-91-XX012) includes detailed discussions of this review. It is recognised that flooding risk to the development site is a function of two separate mechanisms: riverine flooding of Toongabbie Creek, and overland flow flooding from Hawkesbury Road overtopping flow down Research Lane. The site is mainly impacted by overland flow events, with the exception of the PMF whereby the site is impacted by both riverine flooding from Toongabbie Creek and overland flow flooding.

Referring to Figure 3, overland flow flooding around the site is caused by the following:

- Local catchment runoff;
- Hawkesbury Road flow overtopping the road threshold outside the Children's Medical Research Institute (CMRI); and
- Redbank Road acting as an overland flow path.

There is a trapped low point on KR Lane located south-east of the site which is drained by the existing stormwater drain. In the PMF event, the Toongabbie Creek riverine flood extent reaches the carpark north of the site, overtops the pedestrian access path and contributes additional flow to the KR Lane trapped low point.

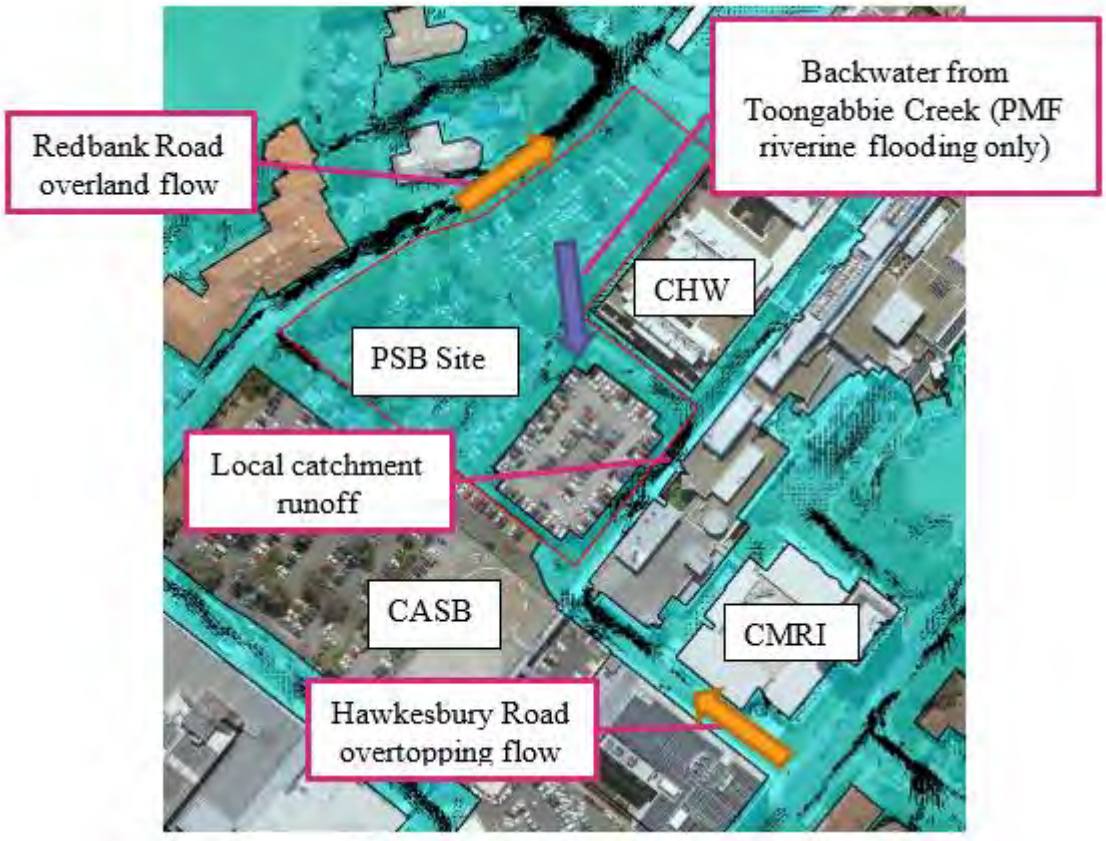


Figure 3 Flood Mechanisms affecting the site.

Figure 4 Westmead TUFLOW Flood Extent (Dark Blue – 1% AEP, Light Blue – PMF).

3.3 Rainfall

Data collected from the Bureau of Meteorology for Parramatta North give the following mean rainfall (Table 2). The data suggests that the wettest months are January to March, with rainfall occurring throughout the year.

Table 2 Mean Rainfall for Parramatta North (BOM 2020)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
mm	101.5	126.4	112.5	88.5	66.4	91.7	46.1	55.5	49.8	68.5	82.8	72.8	966
%	11	13	12	9	7	9	5	6	5	7	9	8	100

3.4 Site Geology

Reference is made to the following available geotechnical reports for a description of the site history, geology, and ground conditions:

- JK Geotechnics (JK) for Health Infrastructure NSW, Preliminary Geotechnical Assessment for Proposed Stage 2 Redevelopment at The Children's Hospital at Westmead, Hawkesbury Road, Westmead, NSW dated 20 January 2021;
- JBS & G Australia for Health Infrastructure NSW, Detailed Site Investigation for The Children's Hospital at Westmead Stage 2 Redevelopment Redbank Road, Westmead, dated 3 October 2019;

The site is described as follows:

- Reference to the Penrith 1:100 000 Geological Series Sheet 9030 indicates the site is mapped to be located on the boundary with Ashfield Shale below the south-eastern portion of the site and the underlying Hawkesbury Sandstone below the north-western portion. The boreholes encountered pavements and fill covering residual silty clay that graded into weathered siltstone, laminate and interbedded siltstone and sandstone within the upper rock profile, with sandstone bedrock of up to high strength encountered with depth.
- A majority of the site is occupied by an at-grade carpark with asphaltic concrete surface between 50mm to 120mm thick overlaying fill of between 0.4m to 6.1m deep within the main portion of the site. Boreholes BH7 & BH8 have a generally shallow layer of fill ranging between 0.4m to 0.7m;
- Below this fill a varying layer of Residual Silty Clay was encountered of various depths;
- Weathered bedrock was encountered at the base of all boreholes ranging from depth of 0.4m to 7.8m
- All boreholes completed by JK Geotechnics are relevant for this site and project.

A summary of ground conditions at the site based on borehole investigations is included in Table 3.

Table 3. Summary of general site stratum.

Stratum	Thickness
Asphaltic concrete Fill	0.05m – 0.12m 0.4m – 6.1m
Alluvial clays sands and gravels	6.1m – 8.4m
Low to medium strength Laminite	8.4m - depth

3.5 Groundwater

Measured groundwater levels from JK Geotechnics indicate ground water levels ranging between 3.5m and 6.25m below ground at the site. Groundwater monitoring wells were completed as part of their investigations and the findings of these is tabulated in their report.

3.6 Soil Contamination

JBS & G Australia undertook a Detailed Site Investigation to assess the potential contamination risks for the site. The results of the Detailed Site Investigation can be summarised as follows:

- Several types of fill materials were encountered across the site;
- Slight hydrocarbon odour and staining was observed in one sample location;
- Bonded ACM (Asbestos Containing Materials) and FA/AF (Fibrous Asbestos / Asbestos Fibres) exceeded the site assessment criteria at a number of sample locations across the lateral and vertical extent of the gravelly clay fill material;
- Concentrations of heavy metals exceeded adopted EIL (Ecological Investigation Levels) in a number of sample locations, but the exceedances do not represent an unacceptable risk requiring remediation or management.

The management strategy for soil contamination on the site is summarised in the site Remedial Action Plan (RAP).

3.7 Acid Sulfate Soils

A review of the 1:250,000 Acid Sulfate Soils (ASS) risk Maps (Series 9130N3, Ed. 2) prepared by Department of Land and Water Conservation (1997) indicates that the site is not located within a risk area. A review of the Parramatta LEP indicates that the site is located on the western boundary of ASS risk Class 5

area. The class 5 risk defines works within 500m of adjacent Class 1, 2, 3, 4 land which are likely to lower the water table below 1m AHD on the adjacent land.

Based on the investigations conducted, there is considered to be a low potential for ASS occurrence at the site.

3.8 Erosion Hazard

The Revised Universal Soil Loss Equation (RUSLE) was used to determine the soil erosion hazard of the site (1).

$A = R\ K\ LS\ P\ C\ \#\ 1$

where, A = computed soil loss (tonnes/ha/yr)

R = rainfall erosivity factor

K = soil erodibility factor

LS = slope length/gradient factor

P = erosion control practice factor

C = ground cover and management factor.

The soil erosion hazard was calculated at 45 tonnes/ha/yr, which signifies a Soil Class of 1 and a Very Low erosion hazard (Landcom 2004).

3.9 Site conditions at completion of early works

At the time of writing (November 2022) the site is occupied by an early works contractor. The contractor is completing the inground civil works, inground structural works and the installation of a marking and capping layers on top of existing contaminated material discovered on the site.

At the completion of the early works, the site will be handed over to Roberts Co, the main works contractor. The site will have existing erosion and sediment control measures in place and a stabilised capping layer installed across the site. This capping layer will provide additional protection for erosion and sediment control. At the handover stage inspection will be completed by both the early works contractor and main works contractor to confirm all early works are completed and all erosion and sediment control measures are in place.

4. Proposed Soil and Water Management Measures

4.1 Erosion and Sediment Control Objectives

The purpose of this project specific CSWMP is to:

- Reduce the risk of land degradation associated with vegetation removal, regrading and related construction activities;
- Control and reduce the risk of erosion of soil material;
- Control and contain sediment and other particulate materials together with soil nutrients near their source;
- Provide temporary drainage measures that will remain stable and operational in a significant storm event;
- Reduce the risk of sediment, construction materials and associated pollutants from being washed into downstream areas and receiving water courses thereby offering protection to these environments; and
- Inform the construction management plan including the site establishment, access and egress, material management to reduce the risk of disruption and damage to the development.

4.2 Erosion and Sediment Controls Descriptions

Each of the following erosion and sediment control measures are proposed to be implemented at the site. This section includes a brief description of each of these measures.

Temporary Construction Access

Ensures controlled movement of construction vehicles. Entry/exit points are constructed such that soil materials from wheels/construction vehicles do not leave the site. All vehicle site access entries/exits should adhere to NSW Government guidelines.

Straw Bales

Act as a barrier to surface water, restricting or diverting flow. Must be noted that when bales cannot be properly embedded into the ground, alternative controls need to be taken to prevent polluted water passing underneath (Landcom 2004). At least four bales are to be utilised to act as an adequate barrier to water at each control point (NSW Govt DLWC 2000).

Sediment Fence

Geotextile fencing set up downstream of land disturbance to capture sediment from overland flow and form a temporary barrier. Suspended solids can be removed once settled. Fences must be constructed with trenches to avoid undermining.

Diversion Bank and Channel

Intercepts and diverts concentrated flow around site. Constructed at upper edges of slope to ensure water is diverted away from cuts and then back to natural overland flow routes.

Inlet sediment trap/ Fabric stocking sediment trap

Prevents flows from entering the existing stormwater drainage system at pit locations. Geosynthetic material separates the sediment from the water.

Stockpile

Area for storing construction materials. It is recommended that stockpiles are located at least 5m from waterways and roads. Diversion banks/channels should be constructed at the upstream of the stockpile, and sediment fences downstream. Covering is recommended to reduce stockpile loss.

Temporary Sediment Tank

Stores stormwater collected from the site and releases at a rate that does not encumber the existing stormwater network.

4.3 Soil and Water Management Implementation

This CSWMP is for the main works component of the Children's Hospital at Westmead Stage 2 Development, Paediatric Services Building. At the time of writing (November 2022) Ford Civil is completing the early works stage of the project. Once the early works stage is complete the site will be handed over to Roberts Co (NSW) Pty Ltd, including all current Erosion and Sediment Control Measures.

As part of the early works stage, Ford Civil will install a marking and capping layer across the site where major excavation works, piling, substructure and groundworks have taken place to provide an encasement for the existing contaminated material located on the site. It is envisioned that Roberts Co will not be required to excavate through this capping layer as all footings and underground services would have been installed during the early works stage.

Roberts Co will be required to maintain erosion and sediment control measures installed as part of the early works that are still required to manage runoff from the site, and implement any changes as required to their site setup and evolution of their site works. Reference should be made to Appendix A – Erosion and Sediment Control Plan and Details, which details erosion and sediment control measures that will be implemented on the site once Roberts Co (NSW) Pty Ltd take position of the site

4.3.1 Surface Water Management

The CSWMP described in the appended drawings (Appendix A) sets out the temporary stormwater management proposals for the early works stage of the project. These measures include the following:

- Temporary Sediment Fences;
- Diversion Channels and Banks;
- Stabilised Temporary Construction vehicle access points;
- Fabric Stockings installed at all stormwater kerb inlets.

Upon completion of the early works, the early works contractor will hand over the site to the main works contractor. All existing Erosion and sediment control measures will be inspected by both parties and accepted at the handover. Once Roberts Co takes over the site they will be required to continue to implement and maintain the existing Erosion and Control Measures.

Temporary de-watering pipes and points will be installed along the edge of the proposed building as works are undertaken. These will be installed on every third floor. Pipe work will be run vertically down the edges building and connect to temporary sediment tanks. The tanks will be connected to the existing stormwater network through the nearest civil stormwater pits. The temporary de-watering points will be removed gradually as the building is made watertight and the external façade is installed.

Discharged water should also comply with City of Parramatta Council guidelines and comply with trigger values in the ANZECC 2000 Guidelines. Under no circumstances should contaminated/untreated water enter the existing stormwater drainage system or Toongabbie Creek.

4.3.1.1 63.2% AEP Event

The approach outlined above in Section 4.3.1 is appropriate for smaller storm events including the 63.2% AEP Event Wet weather procedures outlined in Section 4.3.4 are to be followed both before and after a rainfall event of this magnitude.

4.3.1.2 18.1% AEP Event

Similarly, the approach outlined in Section 4.3.1 should be largely successful for smaller storm events including the 18.1% AEP event. Wet weather procedures outlined in Section 4.3.4 are to be followed both before and after a rainfall event of this magnitude.

4.3.1.3 1% AEP Event

Whilst the approach outlined in Section 4.3.1 should be largely successful for smaller rainfall events and overland flow, one residual risk is the occurrence of a significant overland flow down Research Lane to KR Lane causing a significant flood event at the trapped low point on KR Lane located south-east of the site. For this reason, additional planning measures should be implemented. Upon notice of a major rain and flood event that will occur the contractor should at a minimum put the following measures in place:

- Removal of equipment and materials to higher ground away from the trapped low point at the south east corner of the site, or off site for storage.;
- Securing of any loose items on the site to prevent them from becoming loose during the flood;
- Ensure minimum staff are on site during flood events to secure site and prevent unnecessary risk to a large workforce in case of evacuation;
- Temporary stockpiles to be relocated to be removed offsite t prevent them being impacted by predicted Flood.

4.3.1.4 PMF Event

A PMF event will have major impacts to the site with both overland flow and riverine flooding impacting. Whilst the approach outlined in Section 4.3.1.3 should be largely successful for an event of this magnitude. Removal of all equipment and loose items on the site is recommended to minimise damage to equipment and prevent debris entering flood waters and impacting downstream areas. This should only be done if safe to do so and workers should not be placed in dangerous situations in order to remove equipment or materials form the site prior to the flood event occurring.

4.3.2 Acid Sulphate Soil Management

As outlined in JK Geotechnics Geotechnical Investigation, the site poses a negligible risk of disturbing Acid Sulfate Soil Materials. Therefore, an Acid Sulfate Soil Management Plan is not considered necessary for this project.

4.3.3 Dust Management

Fences will be erected around the project boundary, with additional screens and barriers set up for dusty works. Dry sweeping of materials will be avoided, and water suppression used where necessary to keep surfaces moist.

The site supervisor needs to monitor weather conditions to ensure that dusty work are ceased when windy conditions arise. Unprotected areas are to be kept moist in windy conditions (Landcom 2004).

4.3.4 Wet weather management

It is necessary that the site supervisor be aware of weather forecasts and ensure that sediment tanks are clean/emptied before rainfall events occur. It is advised that the Contractor sign up to *FloodSmart Parramatta*. This is a service that assists with understanding the flood risk of the area and provides warnings via SMS.

Maintenance of sediment and erosion control measures is paramount to limit unwanted sediment runoff during wet weather. The following measures should be carried out before rain:

- Stockpiles are to be covered and any trapped sediment to be removed prior to rainfall events;
- Construction equipment/plant to be removed from flood prone areas and relocated to higher ground;
- Checking sediment and control measures are in place;

- Clearing site of debris.

Additionally, following rainfall events, sediment and control measures should all be checked and repaired as required.

The site accommodation/cabins etc are to be located above RL of 20m (effectively in the southern part of the site). Where practical, stockpiles should also be located above the 5% AEP event.

4.4 Development and Adaptation

It is the responsibility of the contractor to take all steps necessary to protect the environment during the contract works and implement the necessary measures for the control of erosion and sedimentation.

5. Construction Flood Emergency Response Sub-Plan (FERSP)

This FERSP has been developed to guide the main works. The contractor will progressively update the FERSP including evacuation routes, assembly points and refuge protocols as works commence throughout the site works.

5.1 Predicted flood levels

The Arup Children's Hospital Westmead Paediatric Services Building Flood Impact Assessment was used to inform the existing flood behaviour of the area surrounding the site, see appendix E. Section 3.2 outlines both the riverine and overland flood behaviour in the existing conditions.

Predicted peak flood depths across the site range from 0.2m in depth at KR Lane and 0.1m depth at Redbank Road, during local overland flow flooding for the 1% Annual Exceedance Probability (AEP) event.

Predicted peak PMF flood levels across the site range from 0.2m to 0.5m in depth from overland flow flooding and 1.5m to 4.0m of riverine flooding.

5.2 The Children's Hospital at Westmead Disaster Response Plan

The Children's Hospital at Westmead has developed a Disaster Response Plan, to cover all areas of foreseeable emergencies. Section 2.8 of the plan explains the emergency response procedures for a flood emergency. The plan lists the roles and responsibilities and contact numbers of relevant hospital personnel. The contractor shall be aware and implement the Disaster Response Plan in their emergency responses procedures. The Flood responses and action flow chart from The Children's Hospital at Westmead Disaster Response Plan (July 2017) are shown below in Figure 6 below . Any flood response would be managed as a Code Yellow or Code Orange Emergency as required by the Disaster Response Plan.

2.8.2 *Flood Response Action Flowchart*

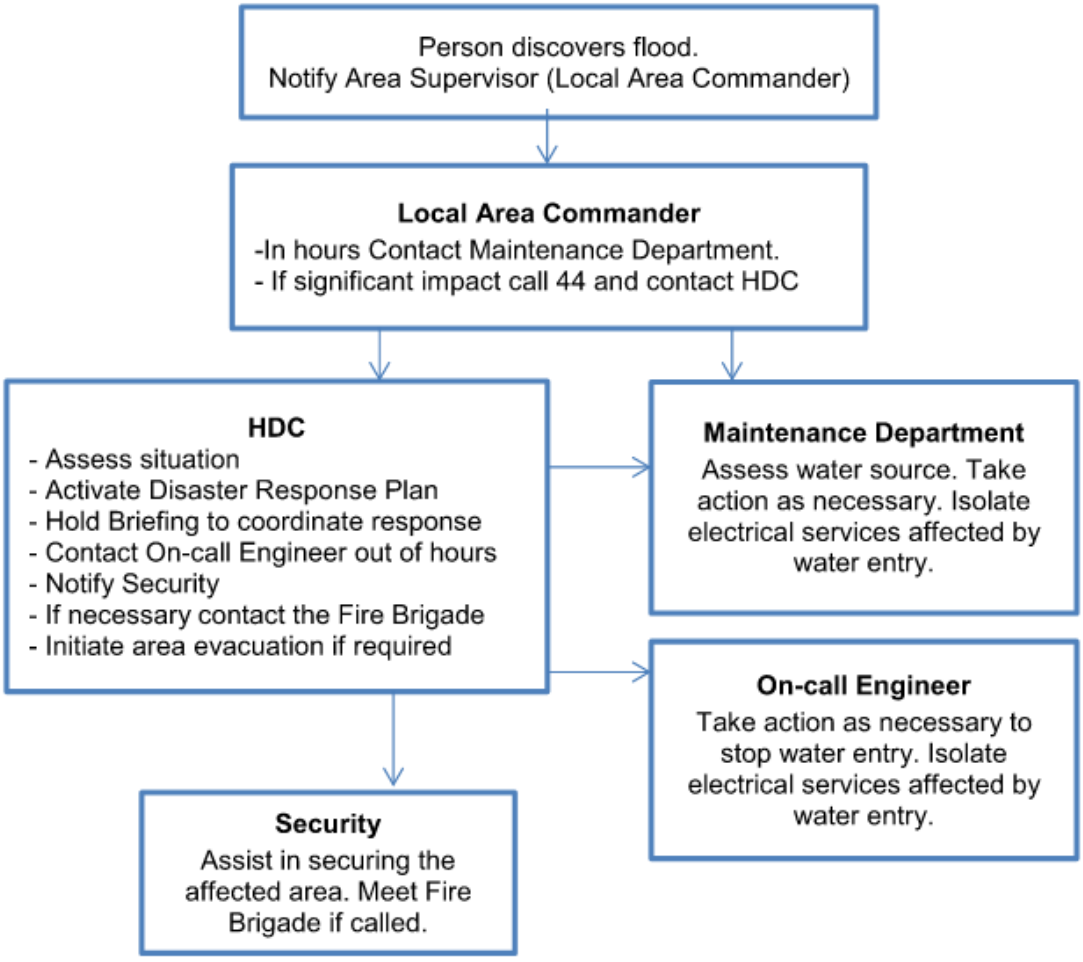


Figure 5 Children's Hospital at Westmead, Disaster Response Plan, Flood Response and Action Flowchart.

The Contractor shall sign up to *FloodSmart Parramatta*. This is a service that assists with understanding the flood risk of the area and provides warnings via SMS. As well as monitoring the information published by *FloodSmart Parramatta*, the Contractor will also monitor BoM and SES to ensure that any flood warnings are responded to promptly.

5.3 Evacuation protocols

The most flood prone parts of the site are near the low point located adjacent to KR Lane along the southern boundary of the site. There are two main forms of evacuation responses:

- Evacuation outside of the floodplain; and
- Shelter in place.

Both methods have advantages and disadvantages and the adopted method will be dependent on factors present at the time of flooding. However, considering the nature of the site, it would be recommended to liaise with the Children's Hospital at Westmead, Hospital Disaster Controller during periods of forecasted inclement weather to prepare for any forthcoming emergencies.

Where required the emergency evacuation plan developed by Roberts Co within the RCo-WHS-PLN-002 Emergency Response Plan. The emergency evacuation procedure is shown in figure 6 below

6.17 Inundated with Water (Flooding)

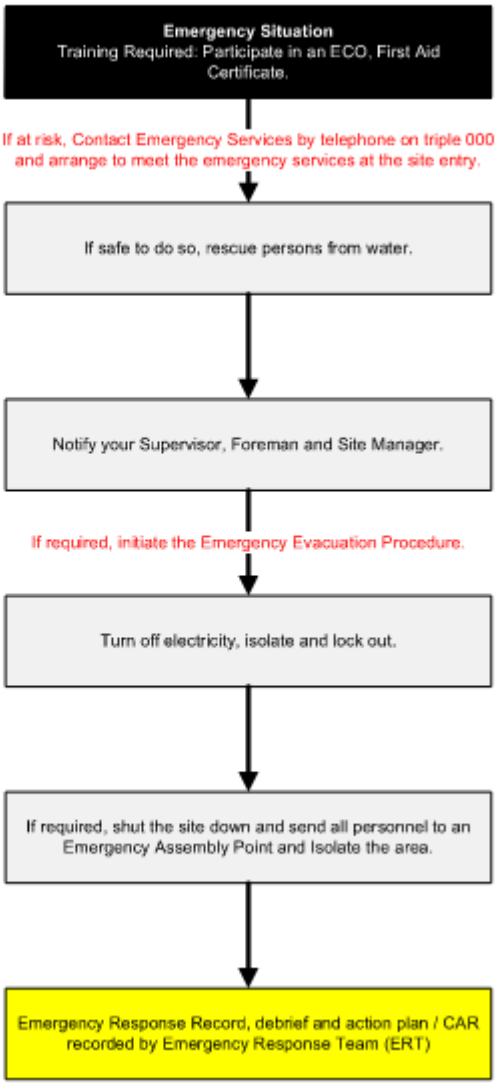


Figure 6 Roberts Co, Flooding Emergency Response Flowchart

Where early notification is given of a weather warning, the Contractor may decide to close down the site, undertake appropriate preparation works and evacuate.

Potential assembly points, evacuation routes and refuge protocols should be determined by the contractor on site depending on the works being undertaken at the time. These assembly points and evacuation routes will be developed in accordance with the NSW Floodplain Risk Management Guidelines, NSW SES guidelines, and The Children's Hospital at Westmead Disaster Response Plan. Important points to consider are:

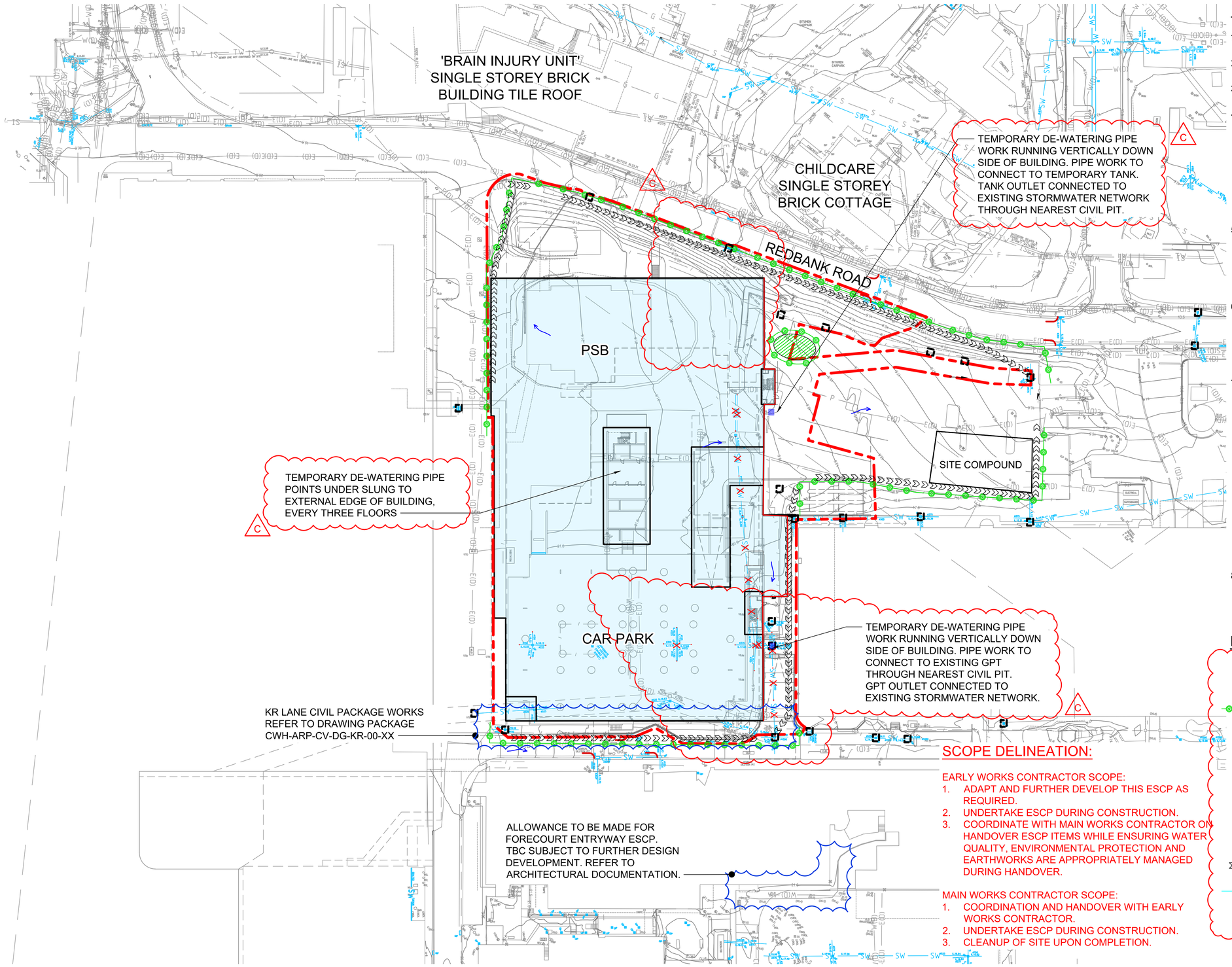
- Considering key levels throughout the site and surrounding roads that are affected by floodwaters;
- Identifying triggers for action (e.g. weather forecasts, FloodSafe notification, observed rain or flooding);
- Identifying routes to reach safe places (including alternative routes); and
- Reviewing the plan regularly (including after significant rainfall).

5.4 Training

Awareness training is mandatory for all employees, contractors and other relevant persons associated with the site. Prior to entering the construction site, the contractor must ensure that all personnel attend induction training covering emergency procedures relating to flooding, including evacuation responses and refuge protocols.

Appendix A

Arup Erosion & Sediment Control Plan and Details



NOTES:

1. FOR GENERAL NOTES REFER TO DRG No. CHW-ARP-CV-DG-PS-00-XX011.
2. FOR GENERAL LEGEND REFER TO DRG No. CHW-ARP-CV-DG-PS-00-XX006.
3. FOR EROSION AND SEDIMENT CONTROL DETAILS REFER TO DRG No. CHW-ARP-CV-DG-PS-00-XX191.
4. IT IS THE CONSTRUCTION CONTRACTOR'S RESPONSIBILITY TO DEVELOP AND ADAPT THIS ESCP TO SUIT THE SITE CONDITIONS, CONSTRUCTION STAGING AND ANY REQUIREMENTS OF CoPC AND OTHER RELEVANT AUTHORITIES. THE ESCP HAS BEEN PREPARED TO BE USED AS A GUIDE ONLY. CHANGES MAY MATERIALISE FOR SEVERAL REASONS INCLUDING ONGOING DESIGN DEVELOPMENT, CONSTRUCTION METHODOLOGY AND THE SEQUENCING OF WORKS.
5. MANAGEMENT AND STAGING OF PERMANENT AND TEMPORARY ESCP STORMWATER IS SUBJECT TO THE CONTRACTOR METHODOLOGY TO ENSURE THE MAXIMUM AMOUNT OF THE SITE CATCHMENT AREA IS DIRECTED TO SEDIMENT BASINS BEFORE DISCHARGING TO THE EXISTING STORMWATER NETWORK.
6. THE CONTRACTOR IS TO VERIFY THE LOCATION AND DEPTH OF IN-GROUND SERVICES BEFORE DISTURBING GROUND FOR ESCP WORKS. EXISTING IN-GROUND UTILITIES INDICATED ON THIS DRAWING ARE BASED ON LTS LOCKLEY'S SURVEY AND ARUP ACCEPTS NO RESPONSIBILITY FOR ITS ACCURACY.
7. THE CONTRACTOR IS RESPONSIBLE FOR ANY AND ALL NECESSARY PROTECTIVE/DIVERSIONARY WORKS FOR THE ESCP TOGETHER WITH ASSOCIATED APPROVALS WHICH SHOULD BE AGREED PRIOR TO WORKS COMMENCEMENT THE CONTRACTOR SHALL FAMILIARISE THEMSELVES WITH THE LOCAL STORMWATER FLOODING CONDITIONS AND RISKS PRIOR TO COMMENCING WORKS ON SITE. AN APPROPRIATE FLOOD RISK MANAGEMENT PLAN SHALL BE DEVELOPED FOR EACH STAGE OF THE PROJECT TO MINIMISE THE RISK OF FLOODING INJURING SITE STAFF OR MEMBERS OF THE PUBLIC, DAMAGING WORKS OR PLANT OR CARRYING MATERIALS OR DEBRIS DOWNSTREAM INTO THE EXISTING STORMWATER NETWORK. THE PROPOSED SYSTEMS MUST BE REVIEWED AND APPROVED BY HI PRIOR TO COMMENCEMENT.
8. SEDIMENT BASINS ARE PROPOSED FOR CONSTRUCTION PHASE ONLY AND ARE TO BE REMOVED AND REINSTATED AS PER EXISTING CONDITION UPON COMPLETION OF WORKS.

LEGEND

- CATTLE GRID / STABLISED CONSTRUCTION ENTRY
- SEDIMENT FENCE
- SEDIMENT TRAP
- FABRIC STOCKING
- TEMPORARY STOCKPILE
- STOCKPILE OVERLAND FLOW
- SEDIMENT BASIN
- DIVERSION BANK AND CHANNEL EXISTING
- STORMWATER - DETECTED
- TEMPORARY SEDIMENT TANK

SCOPE DELINEATION:

EARLY WORKS CONTRACTOR SCOPE:
1. ADAPT AND FURTHER DEVELOP THIS ESCP AS REQUIRED.
2. UNDERTAKE ESCP DURING CONSTRUCTION.
3. COORDINATE WITH MAIN WORKS CONTRACTOR ON HANDOVER ESCP ITEMS WHILE ENSURING WATER QUALITY, ENVIRONMENTAL PROTECTION AND EARTHWORKS ARE APPROPRIATELY MANAGED DURING HANDOVER.

MAIN WORKS CONTRACTOR SCOPE:
1. COORDINATION AND HANDOVER WITH EARLY WORKS CONTRACTOR.
2. UNDERTAKE ESCP DURING CONSTRUCTION.
3. CLEANUP OF SITE UPON COMPLETION.

ISSUE FOR MAIN WORKS

Scales: 0 10 20m — A1 / A3 1:500 / 1:1000

Design Model Version

Issue	Date	By	Chkd	Appd
C	09.11.22	CL	VC	AC
ISSUE FOR MAIN WORKS CSWMP				
B	29.07.22	AN	TT	AC
FOR CONSTRUCTION				

Issue	Date	By	Chkd	Appd
A	13.05.22	AN	TT	AC
FOR CONSTRUCTION				
5	24.09.21	CL	TT	BH
TENDER DESIGN				
4	17.09.21	CL	TT	BH
TENDER DESIGN				

Issue	Date	By	Chkd	Appd
3	27.08.21	JC	TT	BH
DETAILED DESIGN				
2	18.12.20	JC	TT	BH
100% SCHEMATIC DESIGN				
1	19.11.20	JC	TT	LC
DRAFT ISSUE FOR COST PLAN				

Client: NSW GOVERNMENT Health Infrastructure

Engineering Certification (CEng)
Name: .....
Signature: ..... Date: .....

Job Title: CHILDREN'S HOSPITAL WESTMEAD PAEDIATRIC SERVICES BUILDING EARLY WORKS

Scale at A1: 1:500m

Discipline: CIVIL

ARUP
Arup, Level 5, 151 Clarence St
Sydney, NSW, 2000
Tel +61 (02) 9320 9320 Fax +61 (02) 9320 9321
www.arup.com
CONSULT AUSTRALIA Member Firm
Arup Pty Ltd ABN 18 000 966 165

Drawing Title: EROSION & SEDIMENT CONTROL PSB PLAN

Drawing Status: **ISSUE FOR MAIN WORKS**

Job No	Drawing No	Issue
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Do not scale

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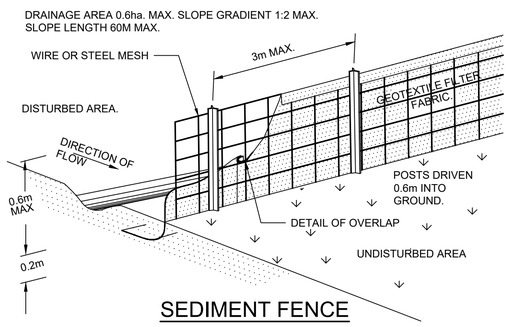
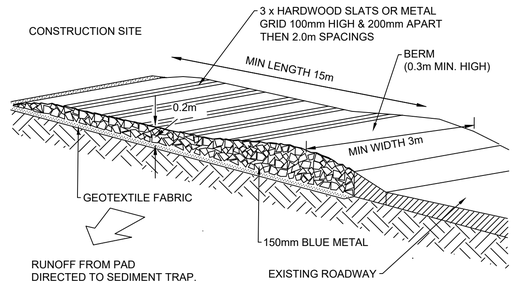
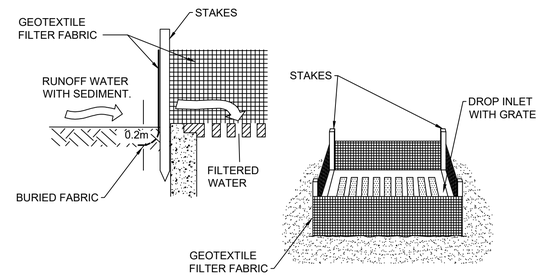


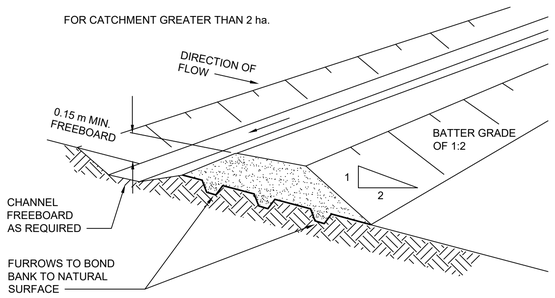
SEDIMENT FENCE



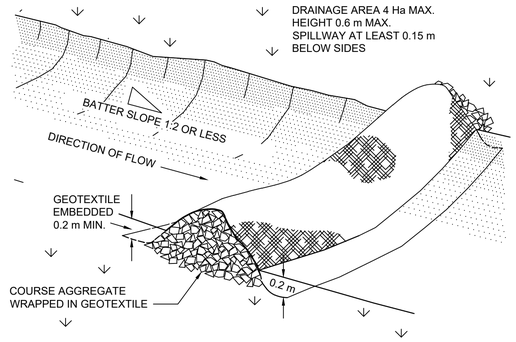
TEMPORARY CONSTRUCTION EXIT



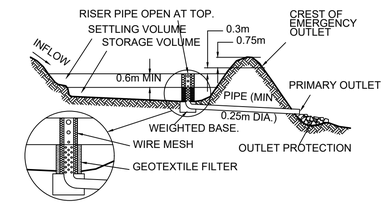
GEOTEXTILE FILTER FABRIC DROP INLET SEDIMENT TRAP



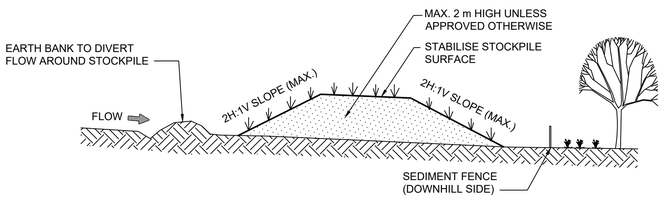
DIVERSION BANK AND CHANNEL



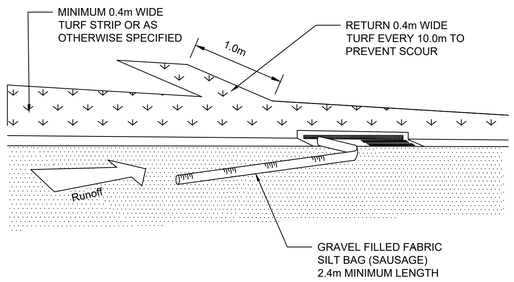
ROCK CHECK DAM



CROSS SECTION OF TYPICAL SEDIMENT BASIN



STOCKPILE



FABRIC STOCKING
KERB INLET SEDIMENT TRAP

CONSTRUCTION DESIGN

Scales: NOT TO SCALE

Design Model Version

Issue	Date	By	Chkd	Appd

Issue	Date	By	Chkd	Appd
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FOR CONSTRUCTION				
A	13.05.22	AN	TT	AC
FOR CONSTRUCTION				

Issue	Date	By	Chkd	Appd
3	17.09.21	CL	TT	BH
TENDER DESIGN				
2	27.08.21	JC	TT	BH
DETAILED DESIGN				
1	18.12.20	JC	TT	BH
100% SCHEMATIC DESIGN				

Client: NSW GOVERNMENT Health Infrastructure

Engineering Certification (CEng)
Name: .....
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Job Title: CHILDREN'S HOSPITAL WESTMEAD PAEDIATRIC SERVICES BUILDING EARLY WORKS

Scale at A1: NOT TO SCALE

Discipline: CIVIL

ARUP
Arup, Level 5, 151 Clarence St
Sydney, NSW, 2000
Tel +61 (02) 9320 9320 Fax +61 (02) 9320 9321
www.arup.com
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Drawing Title: EROSION & SEDIMENT CONTROL PSB DETAILS

Drawing Status: **FOR CONSTRUCTION DESIGN**

Job No	Drawing No	Issue
285966-00	CHW-ARP-CV-DG-PS-00-XX191	B

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Appendix B

Inspection & Test Plan Examples

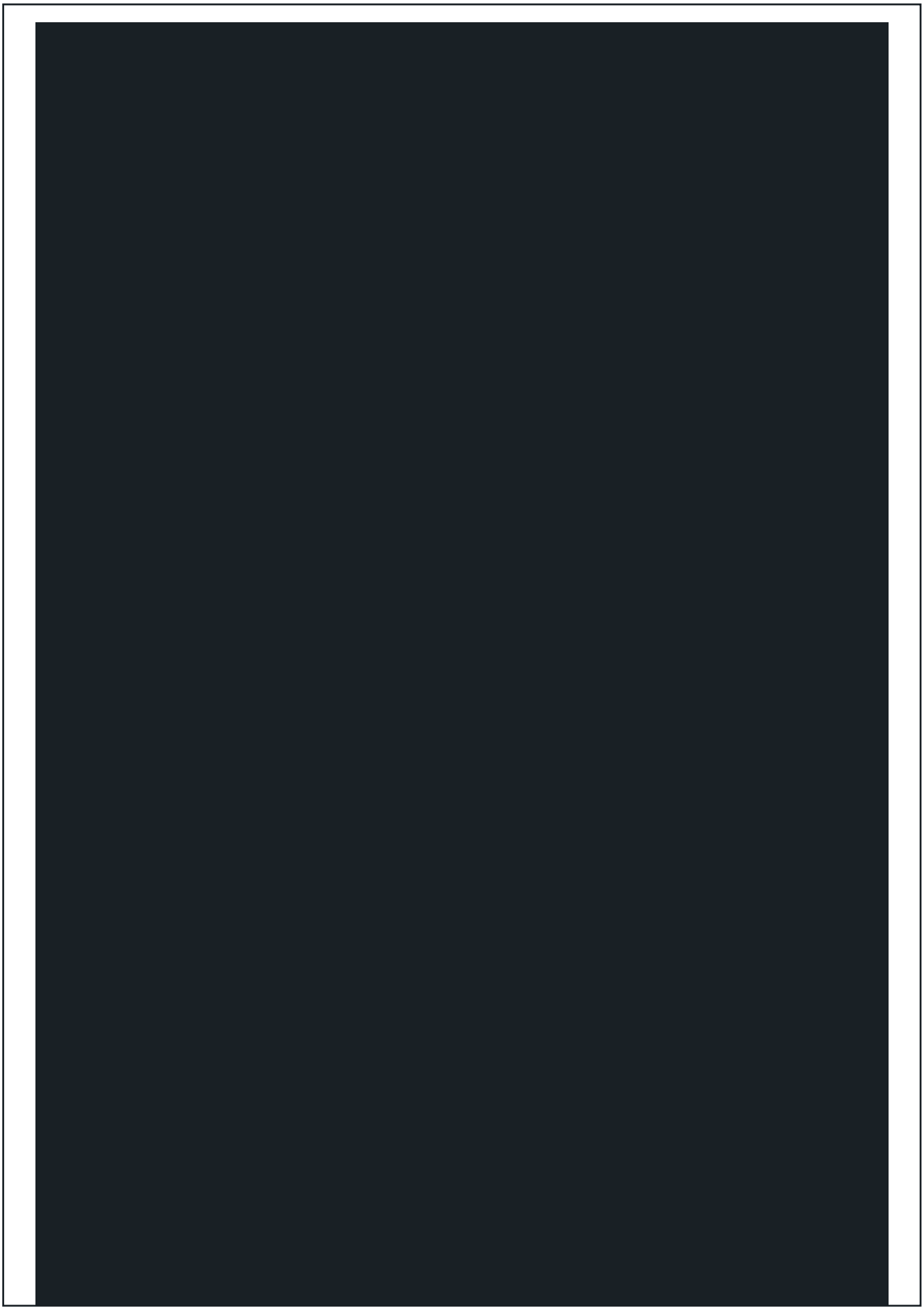

Figure 2.1a

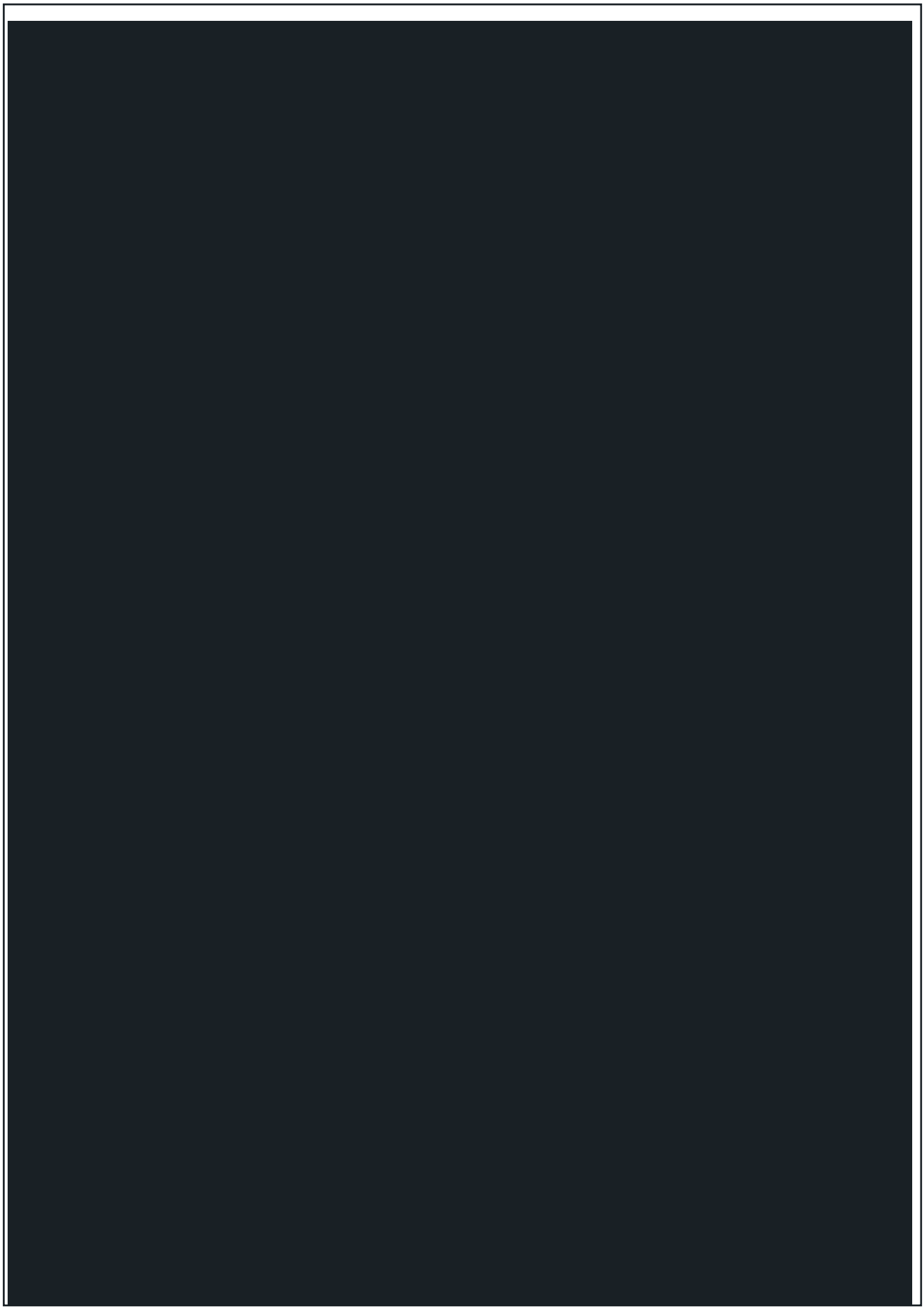

Figure 2.1b

Appendix C

PSB Flood Report

NSW Health Infrastructure

Children's Hospital Westmead Paediatric Services Building

Flood Impact Assessment

CHW-ARP-CV-RP-PS-91-XX012

Rev 01 | 12 February 2021

Job number 271985

Arup Pty Ltd ABN 18 000 966 165

Arup
Level 5
151 Clarence Street
Sydney NSW 2000
Australia
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Document verification

ARUP

Job title		Children's Hospital Westmead Paediatric Services Building		Job number 271985
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			Prepared by	Checked by	Approved by
		Name	Terrence Tang Nathan Cheah	Brian Hetherington	Louise Millward
		Signature			
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		Name	Terrence Tang Nathan Cheah	Brian Hetherington	Louise Millward
		Signature			
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Abbreviations

1D	One-dimensional
2D	Two-dimensional
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AR&R	Australian Rainfall & Runoff
ARI	Average Recurrence Interval
BoM	Bureau of Meteorology
CASB	Central Acute Services Building
CHW	Children's Hospital Westmead
CoPC	City of Parramatta Council
CMRI	Children's Medical Research Institute
DCP	Development Control Plan
DTM	Digital Terrain Model
DEM	Digital Elevation Model
FDM	Floodplain Development Manual
FFL	Finished Floor Level
FPL	Flood Planning Level
HAC	Health Administration Corporation
HI	NSW Health Infrastructure
HPC	Heavy Parallelised Computing
IFD	Intensity-Frequency-Duration
KR	Kids Research
LEP	Local Environmental Plan
LGA	Local Government Area
LHD	Local Health District
LiDAR	Light Detection and Ranging
m AHD	metres Australian Height Datum (AHD)
m/s	metres per second. Unit used to describe the velocity of floodwater

m^3/s	Cubic metres per second. Unit measurement of river flows
MSCP	Multi Storey Car Park
OSD	On Site Detention
PLR	Parramatta Light Rail
PSB	Paediatric Services Building
PMF	Probable Maximum Flood
RMH	Ronald McDonald House
SCHN	Sydney Children's Hospitals Network
SES	State Emergency Service
SGS	Sub-Grid Sampling
SSDA	State Significant Development Application
WSLHD	Western Sydney Local Health District

Reliance Statement

The sole purpose of this report, flood models and the associated services performed by Arup is to undertake the assessment of flood risk to the Paediatric Services Building development in compliance with, and adherence to, applicable planning controls including the Secretary's Environmental Assessment Requirements (SEARS).This work was carried out in accordance with the scope of services set out in the contract (HI9361CIV) between Arup and Health Infrastructure (HI).

In preparing this report and associated flood models, Arup has relied upon, and assumed to be accurate, information (or confirmation of the absence thereof) provided by HI and from other sources, such as City of Parramatta Council (CoPC). Except as otherwise stated in the report, Arup has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Arup derived the data used in this study from information sourced from HI and the public domain at the time or times outlined in the report. The assumptions and limitations associated with the data are:

- The currency, reliability and accuracy of the datasets as well as suitability for their intended use are documented in the accompanying metadata, reports or drawings; and
- It is assumed that care and due diligence have been observed by the source agencies in developing the datasets in accordance with the relevant standards.

Any changes or impacts to the catchment and its associated environment following the issue of this report and model may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report.

Arup has prepared this report and associated flood models in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and with reference to applicable standards, guidelines, procedures and practices at the date of issue of this report and flood model. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made with regards to the data, observations and findings expressed in the report, to the extent permitted by law.

All flood models, whether numerical, analytical or physical, rely on a set of assumptions and requirements to accurately simulate the flow conditions. As no model will provide an exact representation of the complexity of the actual flow, it is important to understand these assumptions, as they form the limitations of that method. Ignoring or violating these assumptions and limitations or failing to critically analyse the model will produce inaccurate results.

No responsibility is accepted by Arup for use of any part of this report in any other context. This modelling data has been prepared on behalf of, and for the exclusive use of HI, and is subject to, and issued in accordance with, the provisions of the contract between Arup and HI. Arup accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

1 Executive Summary

Arup have been commissioned by NSW Health Infrastructure (HI) to undertake a Flood Impact Assessment for the proposed design of the Paediatric Services Building (PSB) as part of the Children's Hospital Westmead (CHW) Stage 2 works. This Flood Impact Assessment describes the pre- and post- development flooding conditions and presents the proposed flood risk management strategy while demonstrating compliance to the Secretary's Environmental Assessment Requirements (SEARs) for the development.

A hydraulic model was developed using TUFLOW modelling software to assess the proposed development for the 10% AEP, 1% AEP, 0.5% AEP, 0.2% AEP and Probable Maximum Flood (PMF) storm events. This has been undertaken by developing a site specific flood model using work previously completed for Central Acute Services Building (CASB) and for Parramatta Light Rail (PLR). This assessment considers potential flood impact from both riverine flooding (i.e. from Toongabbie Creek and Upper Parramatta River) and overland flow flooding within the extents of the Westmead Health Precinct.

Analysis of the PSB pre-development conditions reveal site flooding conditions are predominantly overland flows contained within Redbank Road, KR Lane and the pedestrian footpath along the edge of the existing CHW building. The exception is the PMF river flood event where the extent of flooding reaches the on-grade car park on the northern area of the site and into KR lane through the pedestrian footpath.

Analysis of the post-development conditions reveals site flooding conditions are generally similar to the existing conditions with minor localised affluxes for the overland flow flood events up to the 1% AEP in areas downstream of the site, but not impacting on any properties. For the PMF extreme flood event with an estimated probability of 1 in 10 million, affluxes were also found downstream of the site but largely limited to within the extents of the Westmead Health Precinct which are already subject to extensive flooding for this event. There is minimal change to the flood hazard ratings as a result of the proposed development.

Our proposed approach to flood risk management for the site is as follows:

- The lowest habitable floor level of the building (RL 20.6 m) is higher than the expected 1% AEP plus 0.5 m freeboard as well as PMF levels across the site. In addition:
    - Vehicle and pedestrian entryways into the building from the external ground level will be managed by internal ramping/stairs to mitigate water ingress into the habitable levels of the building;
    - The PSB entryway at the CHW forecourt area will be further assessed as the design develops to mitigate flood risks from the forecourt impacting the entryway or sensitive facilities within the building;
- A flood emergency management strategy will be further developed in consultation with the Sydney Children's Hospitals Network (SCHN); and

- Further design development and operational management of critical servicing infrastructure (i.e. electrical) will be undertaken in the detailed design stages of the project to ensure adequate operation of hospital services in the event of a flood.

As sensitivity analysis, the 0.5% AEP and 0.2% AEP events have been modelled as proxy for the climate change scenarios compared to the 1% AEP event. It was found that the rainfall increase resulted in slight increase in peak flood levels but minimal change to the post-development afflux. A full pipe blockage scenario has also been modelled which saw significant increase in peak flood levels for trapped low points across the Westmead Health Precinct. Nevertheless, the post-development afflux for this scenario remains similar except for KR lane where there is significant reduction in levels but increased afflux downstream at the CHW pedestrian access corridor. This is due to the widening of the footpath to allow more overland flow from KR lane, through this corridor and into the car park entryway and Redbank Road. The proposed PSB level of 20.6 m AHD is still above the 1% AEP level plus 0.5 m freeboard under the full pipe blockage scenario.

A hydraulic assessment was also undertaken to confirm a direct stormwater connection from the PSB development into the existing stormwater network as the stormwater strategy, without the need for on-site detention. The assessment demonstrated that this approach enables the discharge of site flows to Toongabbie Creek prior to the peak river flood event. In addition, discharging the development site flows in this manner would not have significant impacts to the downstream stormwater networks.

We have reviewed several flood event scenarios as required under the SEARs and consider that the outcomes are adequate for the development and do not significantly impact the conditions of the surrounding developments and areas.

The flood emergency management strategy shall be developed in consultation with the Sydney Children's Hospital Networks (SCHN) and the relevant authorities while coordinating with existing strategies in place. Based on the site conditions, a shelter-in-place strategy would be recommended. In addition, critical infrastructure shall be designed to be protected or managed as to not disrupt building services in the event of a flood.

The next steps and further work required include:

- Further design development of the PSB building and forecourt area;
- Updated flood modelling to demonstrate flood risk and impact of PSB and CHW forecourt as design progresses; and
- Consultation with SCHN on developing the site specific flood emergency management plan and coordination with the wider Westmead Health Precinct emergency management plan.

2 Project Introduction

2.1 Purpose of Report

The purpose of this report is to document the Flood Impact Assessment and demonstrate compliance with the SEARs for the proposed PSB development as part of the CHW Stage 2 project.

2.2 Overview of Proposed Development

The PSB project consists of a new building located on the site of an existing multi-storey car park and on-grade car park. The proposed site is bounded by Redbank Road to the west, the newly constructed Central Acute Services Building (CASB) to the south, existing CHW buildings to the east and an existing on-grade car park to the north.

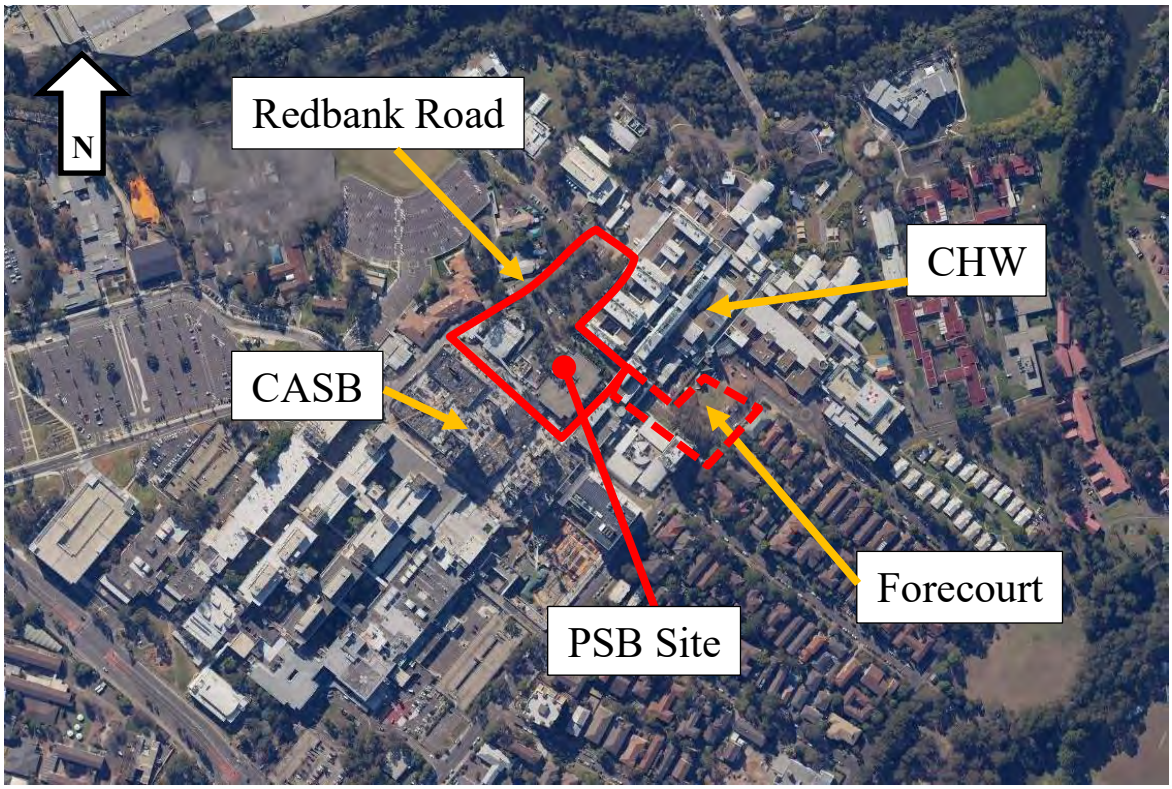


Figure 1 - PSB Locality Plan (NSW Six Maps, 2020)

The proposal seeks consent for the construction of a new Paediatric Services Building (PSB) to be located adjacent to the CASB, and on the site of the decommissioned P17 car park, including development of the Hawkesbury Road forecourt and access links. This includes works associated with CHW forecourt on Hawkesbury Road to provide improved community amenity in the form of a new front entry, improved street frontage and enable a more cohesive main entrance connecting existing CHW, adjoining research facilities, and the PSB.

The scope of proposed PSB works includes:

- Construction of the main PSB which may contain the following uses: perioperative and interventional services, neonatal and paediatric intensive care units, cancer centre, acute inpatient beds, back of house and parent facilities;
- Alterations and additions to existing CHW Kids Research (KR) and CASB buildings adjoining PSB site area to accommodate floor realignment and movement corridors;
- Construction of a new pedestrian canopy link through KR, connecting the main PSB with the CHW forecourt and existing hospital entrance;
- The canopy link is to be lifted 2 storeys above the CHW forecourt;
- A new ground plane / forecourt landscaped area extending from Hawkesbury Road to the proposed PSB; and
- Tree removal to accommodate the construction of the PSB.

3 Assessment Requirements

3.1 Secretary's Environmental Assessment Requirements (SEARs)

The Department of Planning, Industry and Environment has issued Secretary's Environmental Assessment Requirements (SEARs) for the proposed development under the application number SSD-10349252. This report has been prepared with consideration given to the SEARs as follows:

Table 1 - SEARs for flooding and stormwater drainage

SEAR	Where Addressed

16. Stormwater Drainage
• Provide:
  • a preliminary stormwater management plan for the development that:
  • is prepared by a suitably qualified person in consultation with Council and any other relevant drainage authority.
  • details the proposed drainage design for the site including on-site detention facilities, water quality measures and the nominated discharge point.
  • demonstrates compliance with Council or other drainage authority requirements.
  • stormwater plans detailing the proposed methods of drainage without impacting on the downstream properties
• Where drainage infrastructure works are required that would be handed over to Council, provide full hydraulic details and detailed plans and specifications of proposed works that have been prepared in consultation with Council and comply with Council's relevant standards.
	Section 7.1.1 and Appendix B
	There are no drainage infrastructure works that are required to be handed over to CoPC.

17. Flooding • Identify any flood risk on-site in consultation with Council and having regard to the most recent flood studies for the project area and the potential effects of climate change, sea level rise and an increase in rainfall intensity. • Assess the impacts of the development, including any changes to flood risk on-site or off-site, the 1 in 10 year, 1 in 100 year flood levels and the probable maximum flood, or an equivalent extreme event and detail design solutions to mitigate flood risk where required. • Include details of the developments flood risk emergency management, contingency measures, evacuation and access arrangements.	Sections 6.2 and 7 Section 7 Section 7.7

3.2 City of Parramatta Council

The development site is situated within the City of Parramatta Council (CoPC) Local Government Area (LGA). From both historical experience and the predictions of current flood studies, Parramatta is an area known to be at risk of flooding, principally as a function of Toongabbie Creek and Parramatta River.

CoPC provided a response to the SEARs and, as a consequence of the known flood risks, they indicated they will review this flood impact assessment and the overall project in detail during the EIS stage of this SSDA.

The flood assessment and stormwater strategy were presented in a meeting with CoPC and HI on 1 February, 2021. CoPC was generally in support of strategy and outcomes presented. Refer to Appendix D for the meeting minutes and presentation slides.

4 Flood Model Development

The following sections provide an overview of the Westmead Health Precinct model development.

The primary focus of the model is to determine the existing flood conditions for both riverine and overland flow flooding around the PSB site, and the subsequent impact (if any) around the development. Additionally, the model informs on the hydraulic assessment of the stormwater infrastructure and on the proposed stormwater management strategy.

4.1 Input Information for Model

The 1D/2D TUFLOW flood model was built using information collated from various sources including works previously undertaken in the Westmead Health Precinct, adjacent works (by others) and recent information. Having collated and assessed all of the information available, where multiple sources exist, the information which was considered to be of the highest level of accuracy / reliability was used in constructing the model. The input information for the model is as follows:

- City of Parramatta Council flood map (dated 11/05/2016) and Parramatta River MIKE11 model;;
- CASB flood report and model (by Arup; ref: CASB-ARP-CV-RT-0004; dated 22 June 2016);
- PLR Hawkesbury Road works flood model, survey, as-built and other relevant design documentation (dated 2019);
- PLR North Parramatta TUFLOW model
- LTS survey of CHW (ref: 32572 088DT; rev: E; Dated 18/12/2020); and
- Online Pipe CCTV of existing stormwater assets at CHW and Redbank Road (Dated January 2021).

4.2 Modelling Assumptions and Limitations

The following are assumptions and limitations pertaining to the flood modelling approach adopted:

- Australian Rainfall & Runoff 87 (AR&R87) approach has been adopted, which is consistent with previous flood modelling undertaken for CASB and PLR, as well as the CoPC flood results used for model validation. It is understood that CoPC is currently preparing a new Parramatta River flood study based on the recently published AR&R2019 guidelines, though experience from adjacent catchments, i.e. Parramatta CBD, indicated that the AR&R87 approach yields more conservative flood estimates;
- All buildings in the hydraulic model are represented as blockages, meaning that stormwater cannot flow through these areas. This provides a more

conservative representation of the velocities and depths of overland flows which may occur across the site;

- A range of storm durations has been modelled from 10 minutes to 12 hours and the critical storm durations within the extents of the Westmead Health Precinct are as follows:

Table 2 - Critical storm duration (minute) applicable to PSB site

Event Return Period	Critical Storm Duration (Overland Flow Flooding)	Critical Storm Duration (Riverine Flooding)
10% AEP, 1% AEP	15, 25, 90, 120	540
0.5% AEP, 0.2% AEP	15, 30	540
PMF	15, 30, 60	180

- For the majority of the hydraulic model extents, stormwater run-off is applied as “rainfall on grid” (i.e. applied directly to the digital terrain model). Where a direct building connection to the underground stormwater systems is identified, a DRAINS hydrologic model was established to generate the runoff hydrograph for the building roof catchment for direct application to the pipes;
- Coincidental riverine and overland flow flooding have been assumed which is a conservative approach, i.e. 1% AEP local rainfall occurring at the same time as a 1% AEP tailwater condition at Toongabbie Creek and Parramatta River;
- River inflow/tailwater boundary conditions have been derived from the CoPC Parramatta River MIKE11 model and the PLR North Parramatta TUFLOW model;
- Majority of the model setup and assumptions including those related to the grid size (i.e. 2 m for the Digital Elevation Model), model extent, initial water level, Toongabbie Creek/Parramatta River bathymetry, bridge form loss coefficients and levels, surface roughness, initial and continuing losses have been reviewed and retained from the PLR flood model;
- Model assumes blockage factors for pits, i.e. 20% for on-grade pits and 50% for sag pits. A sensitivity test has also been undertaken assessing a full pipe blockage scenario of the stormwater networks to determine the worst-case scenario for flood risk;
- Existing OSD storage tanks/basins incorporated do not simulate orifice control devices as TUFLOW software is not appropriate for this purpose;
- It was observed that the loading dock at the rear of the CHW has an undercroft, which has not been included in the topographical survey. This will lead to potential over-reporting of flood depths in this area. This should be surveyed and included in future revisions of the flood model;

- Details of the CHW Ronald McDonald House (RMH) detention basin are unknown. Any throttling, orifice control and surcharge of this basin is assumed to be due to the 750mm outlet being a throttle;
- It is assumed that the existing and proposed bridges crossing Toongabbie Creek and Parramatta River are able to withstand all flood events including the PMF; and
- The entrance threshold levels of all buildings across the Westmead Precinct are not known, and it is not the intention of this PSB impact assessment to report on these.

TUFLOW version 2020-10-AA Single Precision with HPC (Heavy Parallelised Computing) and SGS (Sub-Grid Sampling) capabilities has been used for the flood modelling herein. Validation of the flood modelling results to ascertain the model suitability for use in the assessment is discussed in Section 6.2.

5 Pre-development Site Conditions

The following sections describe the site layout and stormwater network for the pre-development site conditions.
Refer to Appendix A Figure M.S.1 for the flood model set up plan showing the information used for the Westmead Precinct.

5.1 Site Layout

The proposed site is bounded by Redbank Road to the west, the newly constructed Central Acute Services Building (CASB) to the south, existing CHW buildings to the east and the car park entryway access to the north. The site contains an on-grade car park and a multi-storey car park.

Redbank Road is a public two way road which allows access to the on-grade car park and Research Road into CASB. KR lane is a small road for maintenance vehicles to access plant/services rooms in the rear of the CHW building.

The site is higher than the surrounding streets and generally falls in the northern direction. The lowest area of the site is at the northern end, however there is also a localised low point on the east corner of the PSB site and KR Lane. There is a pedestrian access path from this low point, travelling along the west and north faces of the CHW building and ending at the car park access driveway north of the site.

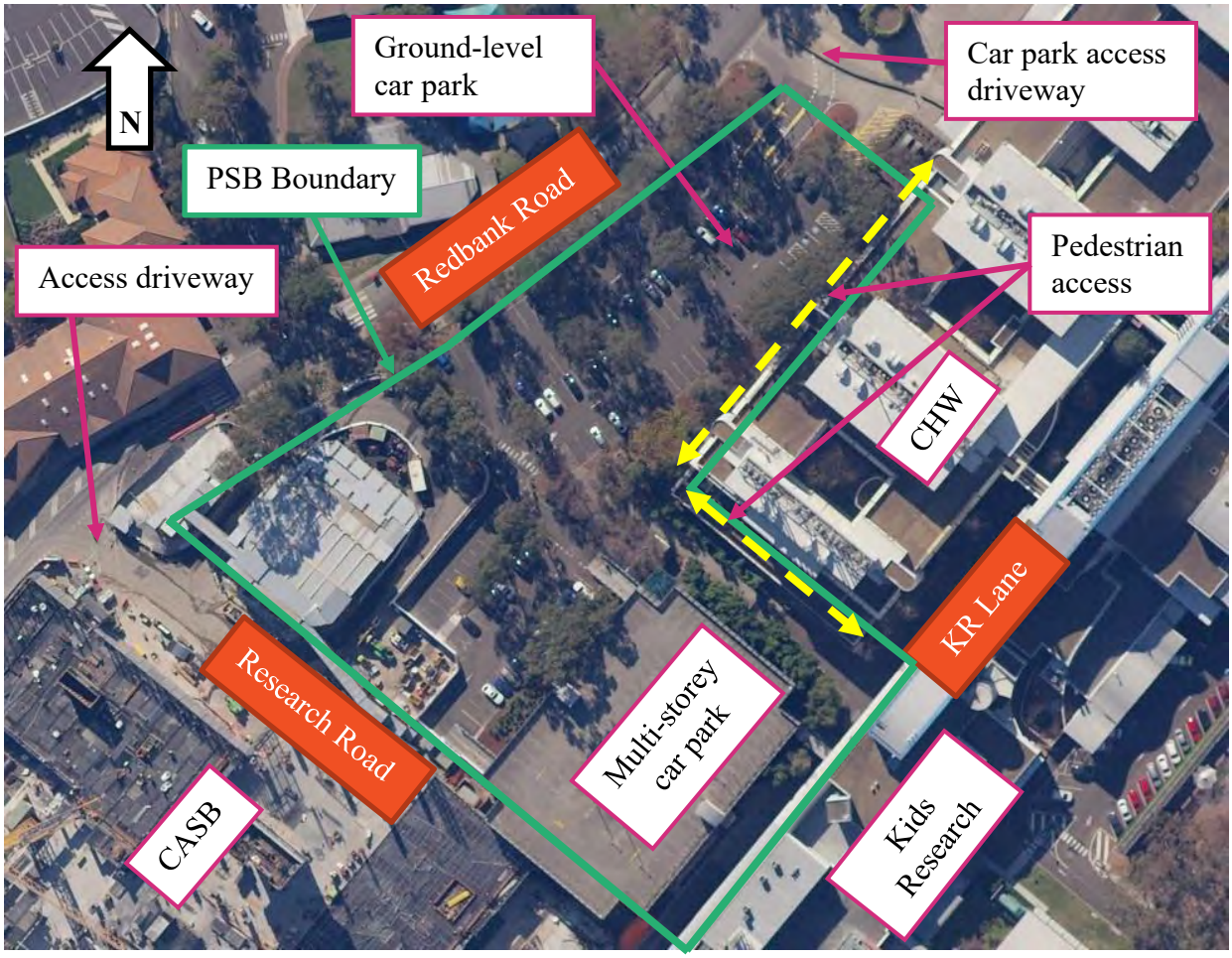


Figure 2 – Existing PSB site plan

5.2 Stormwater

The existing stormwater infrastructure includes multiple stormwater pits and pipes present within the site and roof drainage connections that service the existing CHW building and MSCP. These lines connect to stormwater trunks located at the northern and southern extents of the site. These lines are referred to as Line A and Line B for the purposes of this report and are shown in Figure 3.

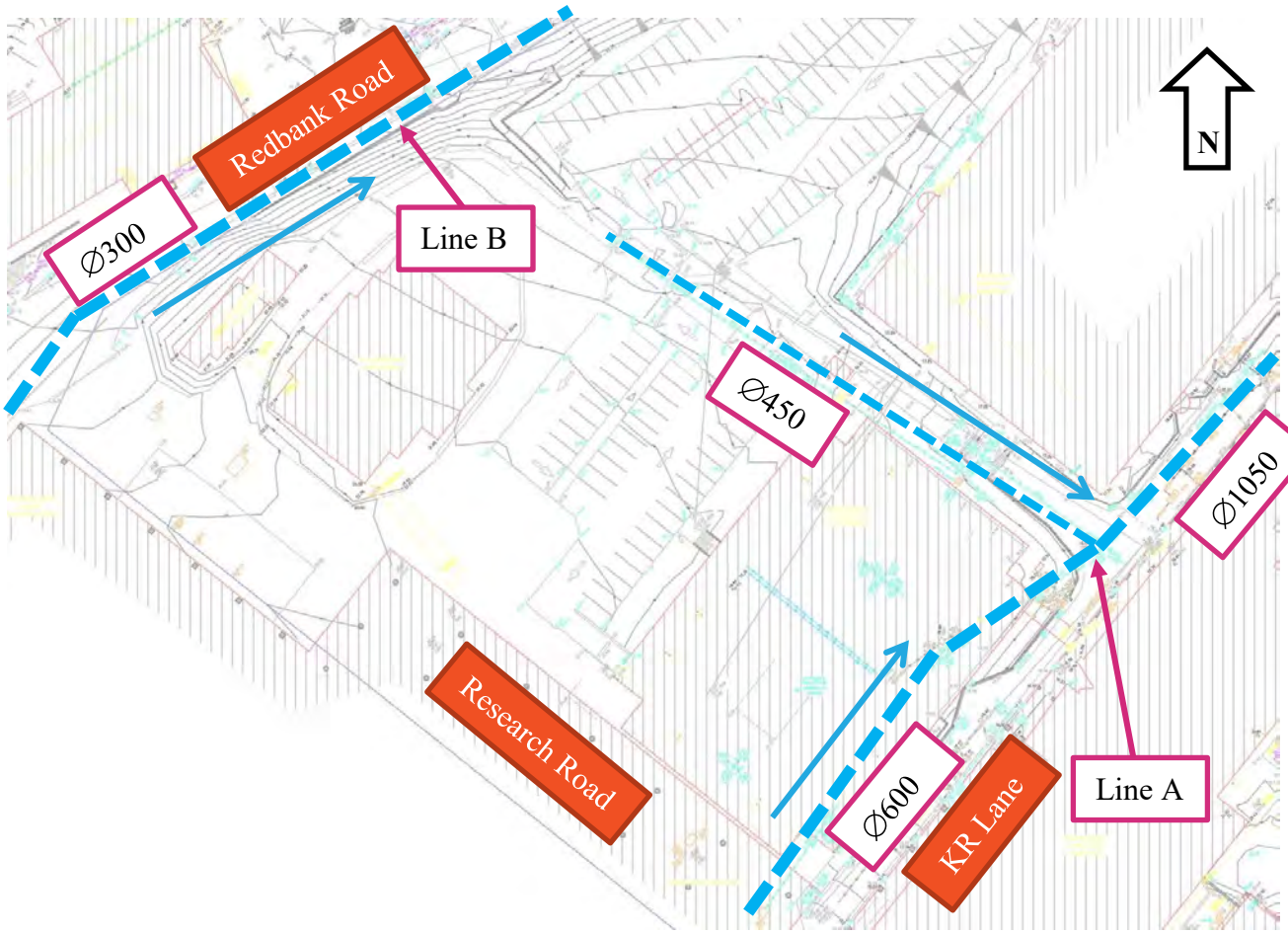


Figure 3 - Extract of the CHW Site Survey (LTS Lockley, 2020)

Stormwater Line A is a ∅1050 pipe is located under the MSCP and KR Lane and runs northeast between the PSB site and existing CHW building. Line A continues in a north-easterly direction under the CHW and discharges to Toongabbie Creek via an existing detention basin adjacent to the new RMH.

Within the existing MSCP building, Line A pipe size increases from ∅525 to ∅600 within the car park to a ∅1050 pipe within KR Lane.

It is understood Line A drains the following existing areas:

- On-grade car park via a ∅450 pipe in a south east direction connecting to the stormwater trunk in KR Lane;
- Multi-storey car park roof via downpipes varying between ∅225 and ∅375;
- Portion of the CHW building roof via downpipes;
- Portion of the Kids Research building roof via downpipes; and
- Runoff from Research Road and KR Lane via grated inlet pits and kerb inlet pits.

Stormwater Line B is located on the eastern side of Redbank Road and directs flows toward a separate point of discharge to Toongabbie Creek. Line B pipe size increases from ∅300 to ∅375 west of the PSB site, to ∅450 adjacent to the on-

grade car park. The pipe increases to ∅750 just prior to collecting the CHW drainage and overland flows from the on-grade car park.

Along the northern face of the CHW building adjacent to the on-grade car park are two branch stormwater lines that collect runoff from the CHW roof and the loading dock. These pipes vary in sizes from ∅300 to ∅375. The pipes converge at a single pit on the eastern edge of the on-grade car park. From this pit, the stormwater flows northwest towards Redbank Road via a ∅675 and ∅750 pipes, where it connects to Line B on Redbank Road. A diagram of the existing stormwater network is provided in Figure 4.

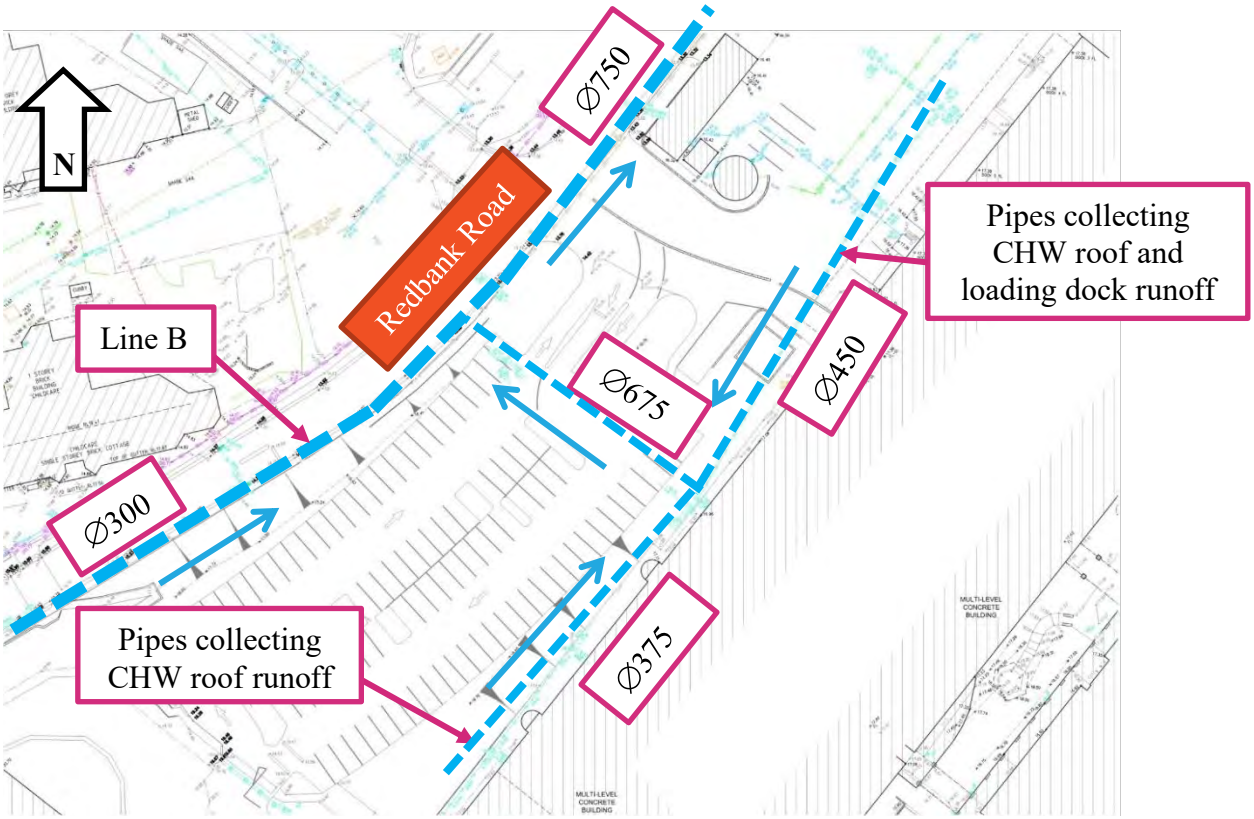


Figure 4 - Extract of CHW Site Survey – Line B (LTS Lockley, 2020)

6 Pre-Development Flooding Conditions

The following sections describe the pre-development flooding conditions. Refer to Appendix A for the existing case flood results maps.

The PSB site is mainly impacted by overland flow flood events, with the exception of the PMF whereby the site is impacted by both riverine flooding from Toongabbie Creek and overland flow flooding.

Referring to Figure 5, overland flow flooding around the PSB site is caused by the following:

- Local catchment runoff;
- Hawkesbury Road flow overtopping the road threshold outside the Children's Medical Research Institute (CMRI); and
- Redbank Road acting as overland flow path.

There is a trapped low point on KR Lane located east of the PSB site which is drained by Stormwater Line A (refer Section 5.2). In the PMF event, the Toongabbie Creek riverine flood extent reaches the car park north of the PSB site, overtops the pedestrian access path and contributes additional flow to this trapped low point.

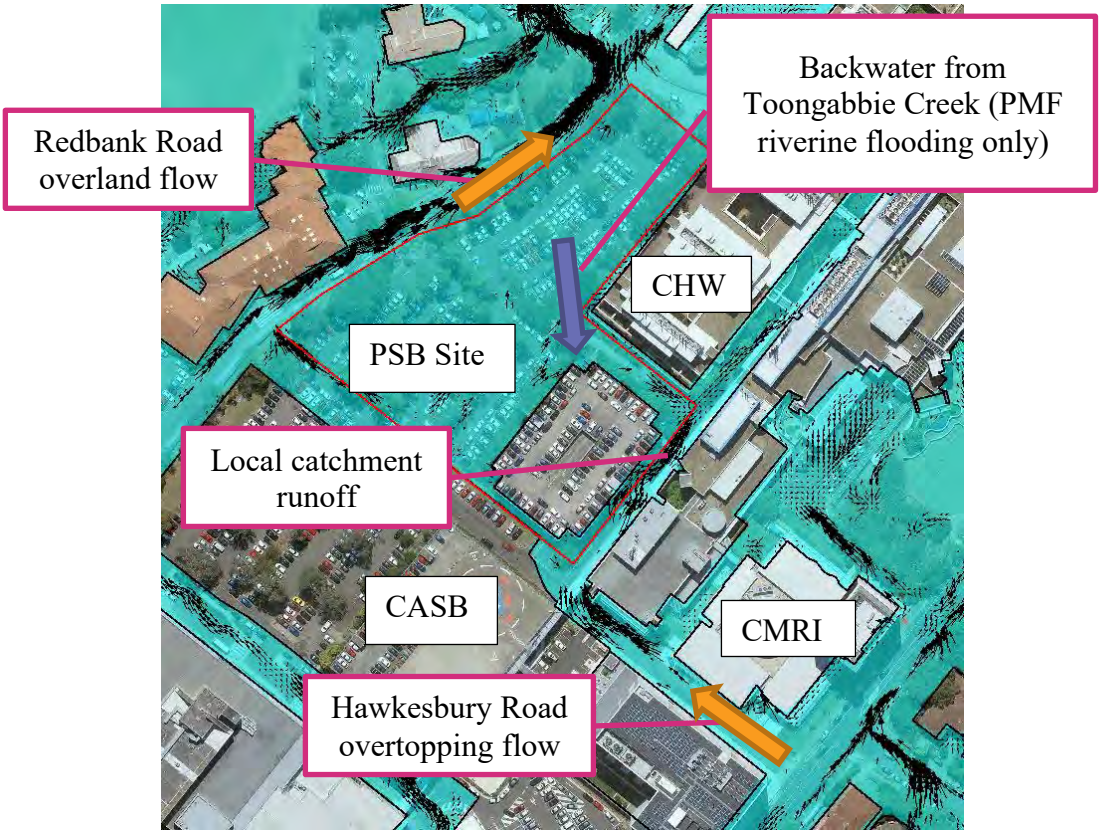


Figure 5 - Flood Mechanisms affecting the PSB Site

6.1 Pre-Development Flood Modelling Results

The following sections describe the flood affectation for the site in detail, mainly due to overland flow flooding unless noted otherwise.

6.1.1 10% AEP Event

The 10% AEP event results indicate localised flooding within the site to be primarily from overland flows as follows:

Redbank Road

- Sheet flow in the order of 0.1 m depth or less along the road carriageway and deepest in the proximity of the car park access.

Existing Car Parks

- Minor localised flood in the order of 0.1 m depth within the existing on-grade car park, which is drained by the car park local drainage.

KR Lane

- Ponding along KR Lane up to 0.16 m at the localised low point located east of the PSB site. It is noted there are grated inlet pits at this low point to discharge into the ∅1050 trunk main.

6.1.2 1% AEP Event

The 1% AEP event results indicate localised flooding within the site as follows:

Redbank Road

- Sheet flow in the order of 0.1 m depth or less along the road carriageway and deepest in the proximity of the car park access.

Existing Car Parks

- Minor localised flood in the order of 0.1 m depth within the existing on-grade car park, which is drained by the car park local drainage.

KR Lane

- Ponding along KR Lane up to 0.2 m at the localised low point located east of the PSB site. It is noted there are grated inlet pits at this low point to discharge into the ∅1050 trunk main.

6.1.3 PMF Event

The PMF event results indicate flooding from both overland and river that impacts the site as follows:

Redbank Road

- (Overland) Up to 0.5 m flood depth at the north end of the road near the car park access driveway; and
- (River) In excess of 4.0 m flood depth at the north end of the road near the car park access driveway.

Existing Car Parks

- (Overland) Up to 0.2 m flood depth in localised areas within the existing on-grade car park; and
- (River) In excess of 1.5 m flood depth within the northern end of the existing on-grade car park.

KR Lane

- (Overland and river) Ponding along KR Lane up to 2.0 m flood depth at the localised low point at the corner of KR lane and the east corner of the PSB site. Flood extent above 1.0 m flood depth covers approximately half of KR Lane;
- (Overland) Flows from this low point on KR Lane travel northward along the west and north perimeter of the CHW building to the car park access driveway with flood depth in the order of 0.75 m; and
- (River) Flows from Redbank Road car park access driveway travel southward along the west and north perimeter of the CHW building into the KR Lane, with flood depth in the order of 1 m.

6.1.4 Pre-Development Flood Hazard

Pre-development flood hazards have been determined for the 1% AEP and PMF events, based on the hazard category recommended by the AR&R2019 guidelines. These guidelines provide a classification of six categories (H1 to H6) and the classification is shown below in Figure 6. These classifications use a combination of flood depth and flood velocity to derive a classification which defines the general vulnerabilities of associated with that hazard category.

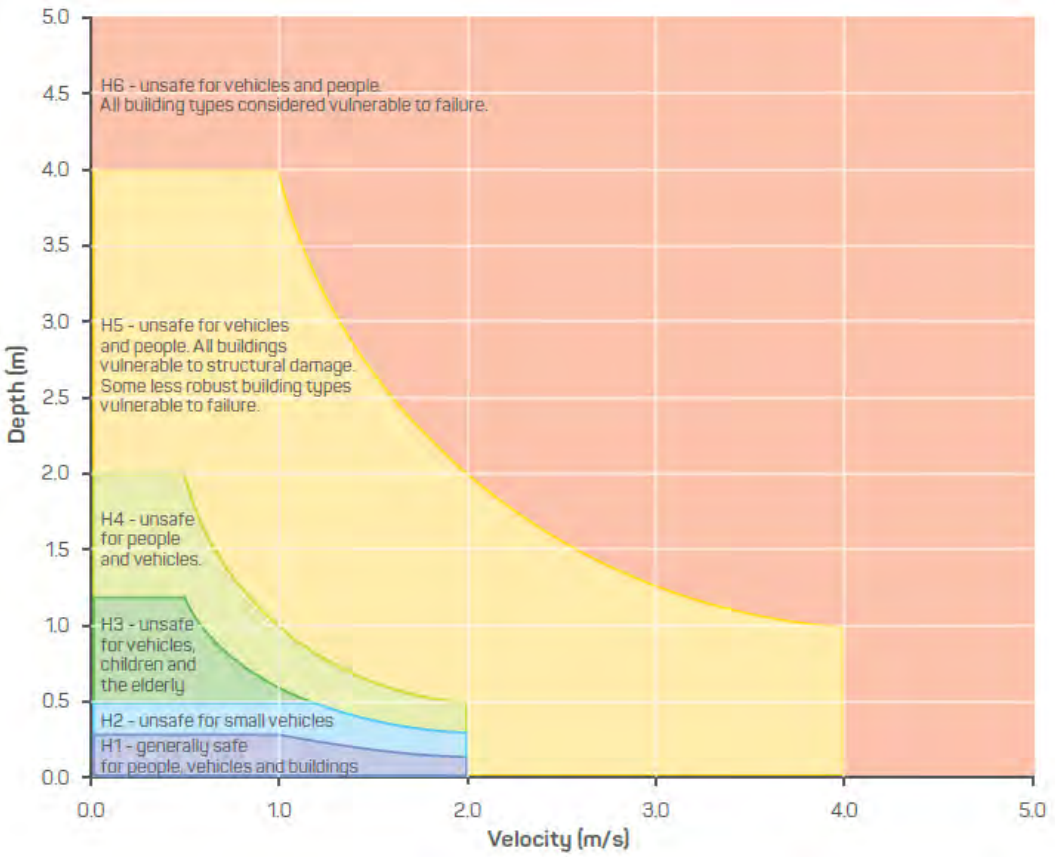


Figure 6 - Flood Hazard Categories based on AR&R2019 guidelines

Notable areas of flood hazard are as follows:

- 1% AEP event:
  - Generally H1 hazard for the overland flow flooding for the PSB site and its surrounds, which is safe flow conditions for people and vehicles.
- PMF event:
  - Up to H5 hazard can be found on Redbank Road and the car park access, and localised spots with H6 hazard for KR lane under overland flow flooding conditions. These flow conditions are unsafe for people and vehicles, and buildings are subject to structural damage and possible failure;
  - Up to H6 hazard can be found on Redbank Road and the car park access, and localised spots with H5 hazard for KR lane under riverine flooding conditions. These flow conditions are unsafe for people and vehicles, and buildings are vulnerable to structural damage and possible failure; and
  - Pedestrian access along the northwest and southwest perimeter of the existing CHW building would experience flow conditions considered unsafe for people. It is recommended that a shelter-in-place approach be adopted as part of the flood emergency management strategy (refer to section 7.7).

6.2 CoPC Information

The peak flood levels documented in the CoPC flood map (refer to Appendix C) have been compared against peak flood levels derived from the flood modelling herein for the existing riverine flood scenario, and they are found to correlate well (Refer to Figure 7). It should be noted that the CoPC flood map is based on results from the MIKE11 Parramatta River model, which is a 1D model and does not capture recent topographical changes in the catchment.

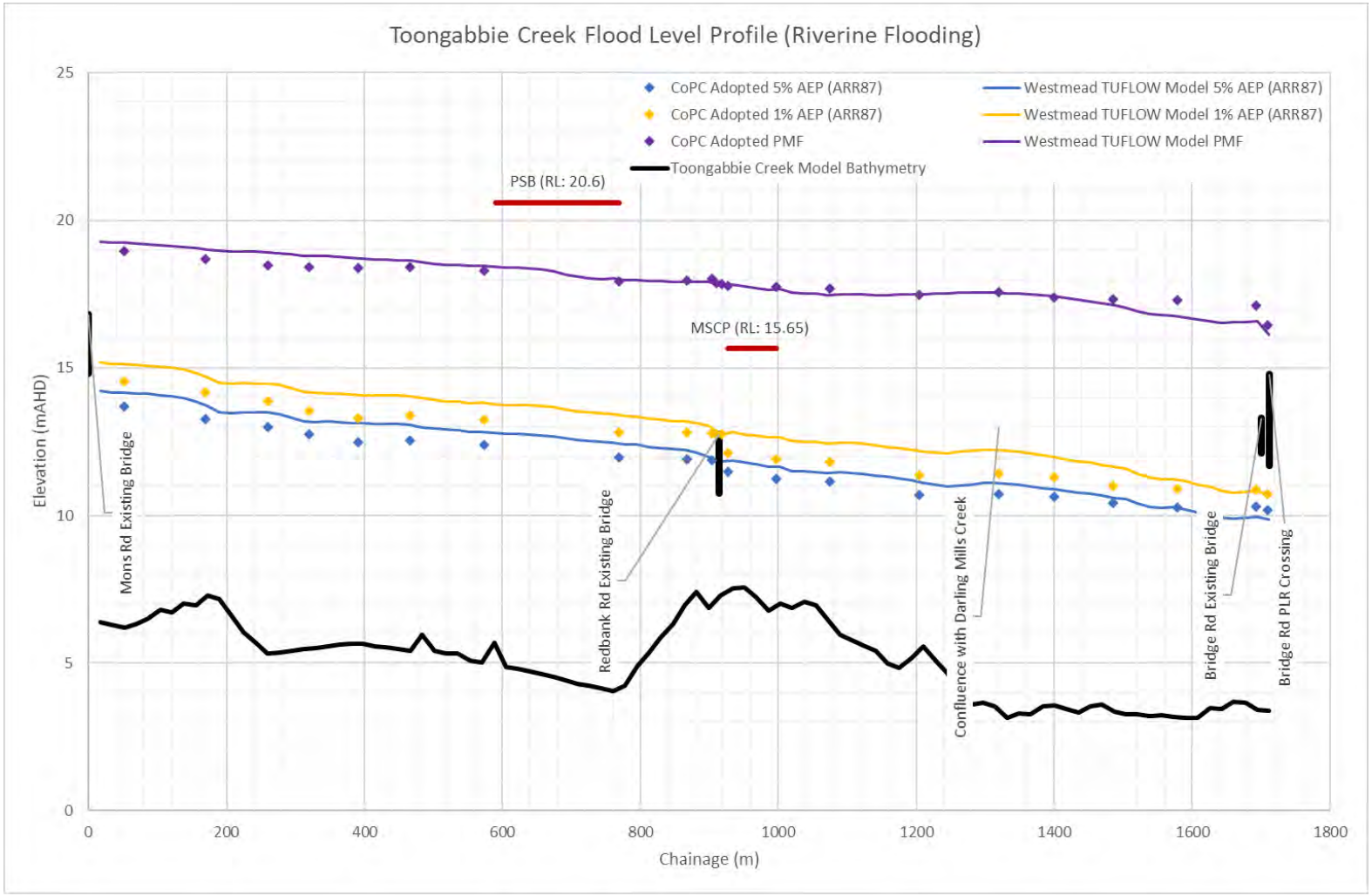
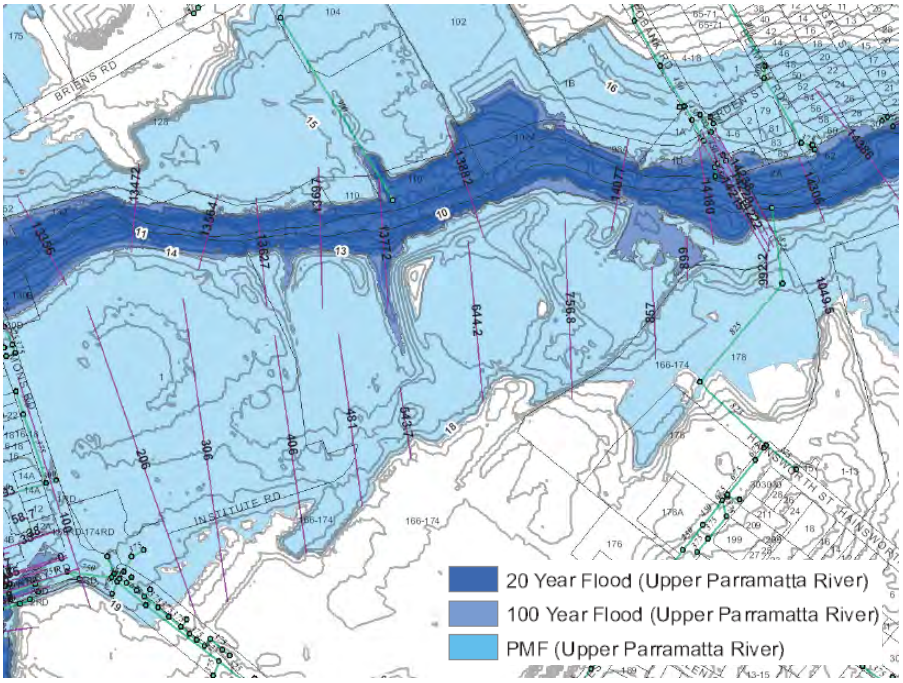


Figure 7 – Toongabbie Creek Longitudinal Profile

A comparison of the flood extents has also been undertaken and shown as Figure 8. The extents generally match up well other than for locations whereby new development has taken place.



CoPC Flood Map

Westmead TUFLOW Flood Extent (Dark Blue – 1% AEP, Light Blue – PMF)

Figure 8 – Flood Extent Comparison

CoPC also provides a publicly available flood hazard map for riverine flooding on their council website. This map indicates that the PSB site resides within a low-risk area as indicated in Figure 9.

The coloured areas displayed within the map indicate the flooding risk as being;

- Red = High hazard flood area within the 1% AEP;
- Orange = Medium and low hazard in the 1% AEP;
- Yellow = Low hazard from the 1% AEP up to the PMF; and
- All other areas = Not expected to experience flooding.

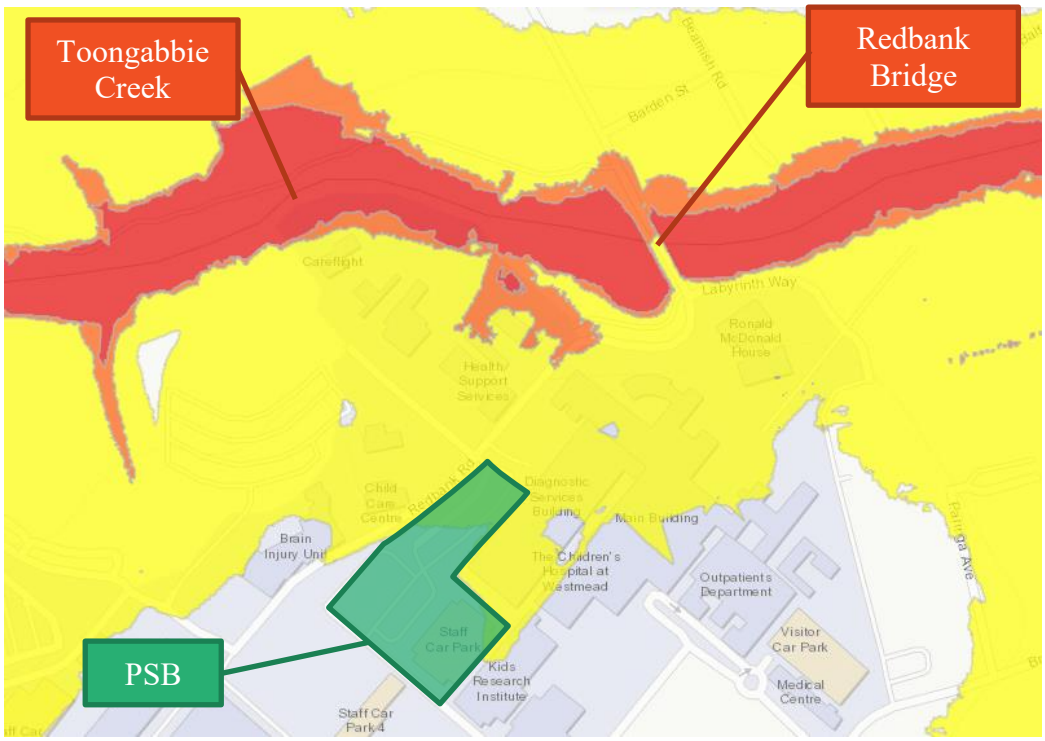


Figure 9 - City of Parramatta Council Flood Risk Mapping (CoPC, 2020) (information from https://www.cityofparramatta.nsw.gov.au/recreation-environment/floodsmart-parramatta/know-your-flood-risk dated 25 May 2020)

It may be noted that this CoPC flood risk map is an estimate only and may not necessarily be updated with the latest information. The flood model undertaken as part of this flood impact assessment would be considered a higher level of accuracy for the purposes of assessing flood hazard for the PSB site.

CoPC Development Control Plan (DCP) prescribes hospital infrastructure as being considered 'Sensitive Uses & Facilities'. Table 2.4.2.1.2 indicates that Sensitive Uses & Facilities may be developed in areas outside the flood hazard zone.

The development site is within the Western Sydney Local Health District (WSLHD) and SCHN land and design development is being undertaken with the relevant health authorities to manage flood risk, not only for the development but also the surrounding areas.

6.3 Notable Areas Impacted by Flooding

The following areas within the wider Westmead Health Precinct are also noted to be impacted by flooding in the pre-development conditions (refer to Figure 10):

- CHW plant rooms along KR Lane;
- Forecourt area (entry into PSB);
- CHW north entryway;
- North substation; and
- Footpath around perimeter of CHW building.

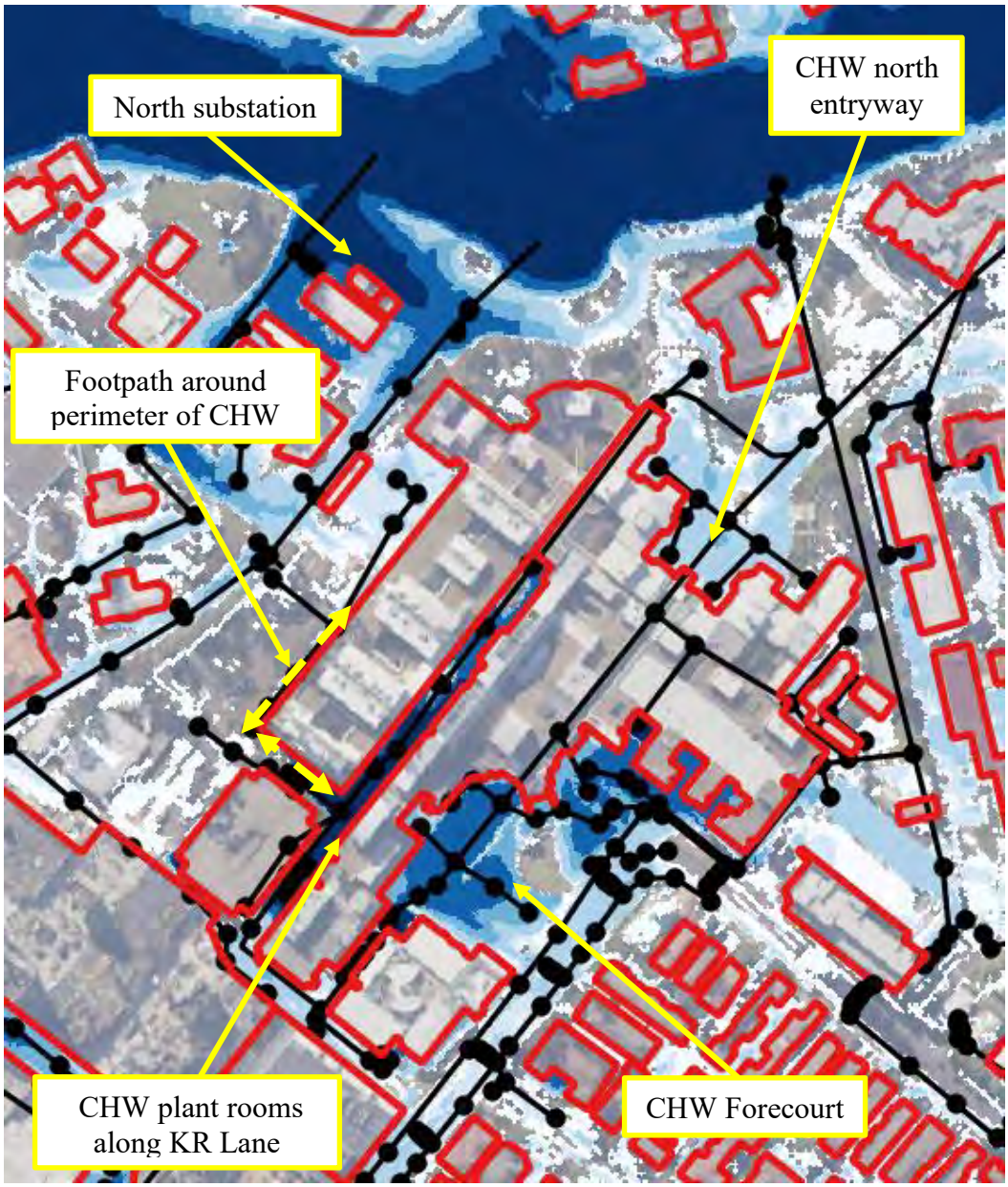


Figure 10 - Notable areas subject to existing flooding (PMF overland event in background)

7 Post-Development Flooding Conditions

7.1 Proposed PSB Development Strategy

The stormwater drainage scheme and preliminary grading scheme (as designed by Arup at the schematic design stage) have been incorporated in the TUFLOW model under the post-development scenario.

The PSB civil design includes the new building footprint extent, external areas of the proposed building and the western portion of the existing car park within the extents of the site between Redbank Road and KR Lane. The entryway into the PSB development is an overhead walkway from L02 of the PSB building, extending through the existing CHW building and into the CHW forecourt area. The proposed CHW forecourt area has not been included as part of the modelling as it is still under design development. Therefore, the existing forecourt area has been used for the purposes of the modelling at this stage.

An overview of this proposed stormwater network and preliminary grading that was used for the flood impact assessment is described below and is presented in Appendix B.

7.1.1 Proposed Stormwater System

The stormwater strategy is a direct connection from the development site into the local existing stormwater network (i.e. no inclusion of on-site detention). Refer to Appendix B for the proposed PSB stormwater management plan.

The proposed stormwater system has been designed to capture and manage the 1% AEP for the proposed development, and where possible, maintain the existing natural catchment areas for discharges.

The proposed stormwater system for the site has effectively been designed to manage two (2) main catchment areas, namely:

1. The northern area of the PSB building and the on-grade car park which connects to the existing ∅750 trunk main (owned by HAC) along Redbank Road (Line B) and discharges directly into Toongabbie Creek upstream of the Redbank Road Bridge; and
2. The southern area of the PSB building and KR Lane (including the pedestrian access area between PSB and CHW) which connects to the existing ∅1050 trunk main (owned by HAC) leading to the existing detention basin (near RMH) before discharging to Parramatta River downstream of Redbank Road Bridge.

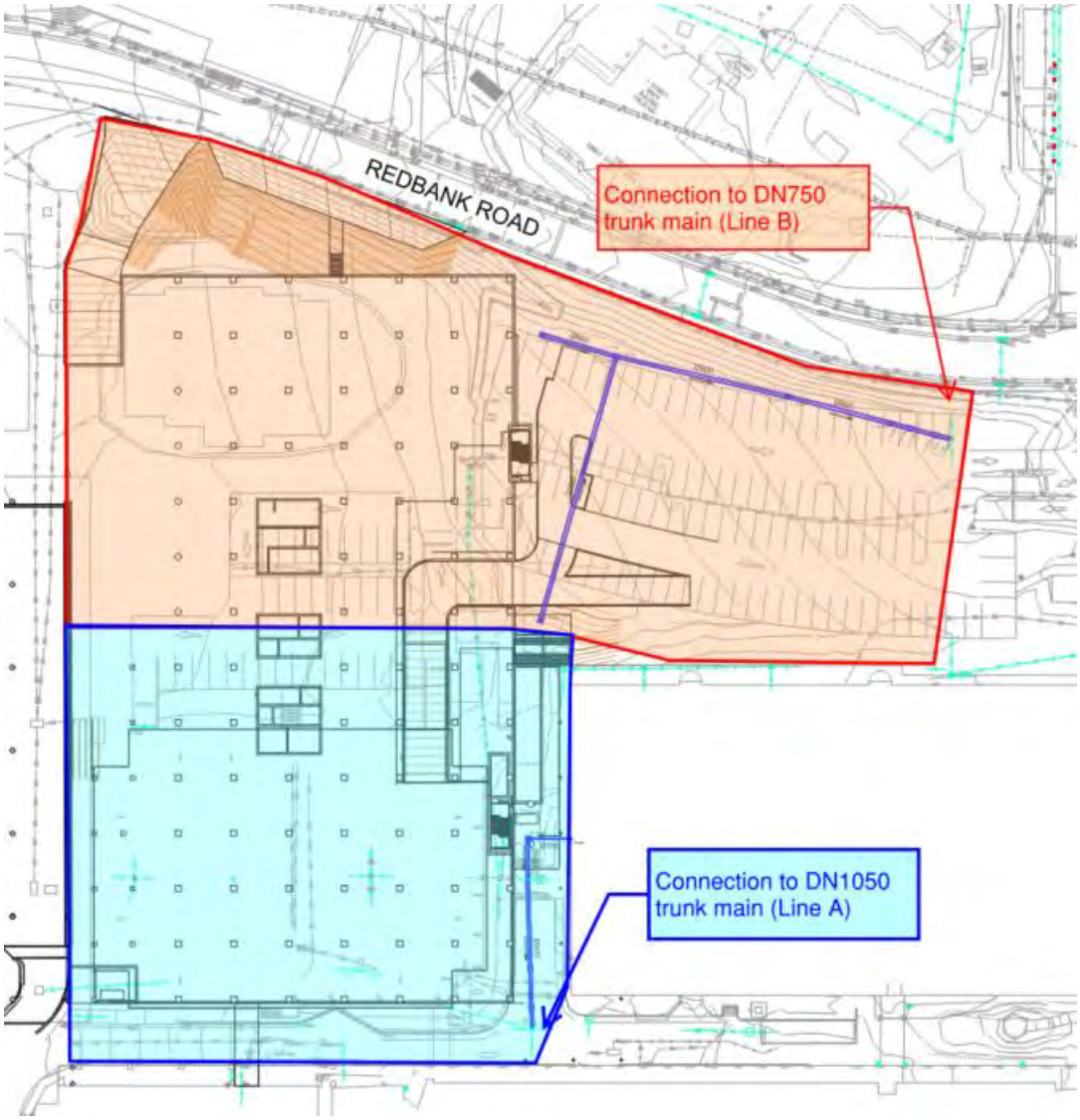


Figure 11- PSB Stormwater strategy catchment areas

Based on hydraulic and flooding analysis, the proposed stormwater strategy is assessed to be suitable for the site because it:

- Does not have significant impacts to the existing stormwater network or flooding conditions; and
- Intends to discharge site flows into Toongabbie Creek prior to the creek peak flow event (6 to 7 hours).

Refer to the Figure 12 for the river flow hydrograph and Figure 13 illustrating the site flow discharge difference between pre and post development at the RMH outlet to Toongabbie Creek.

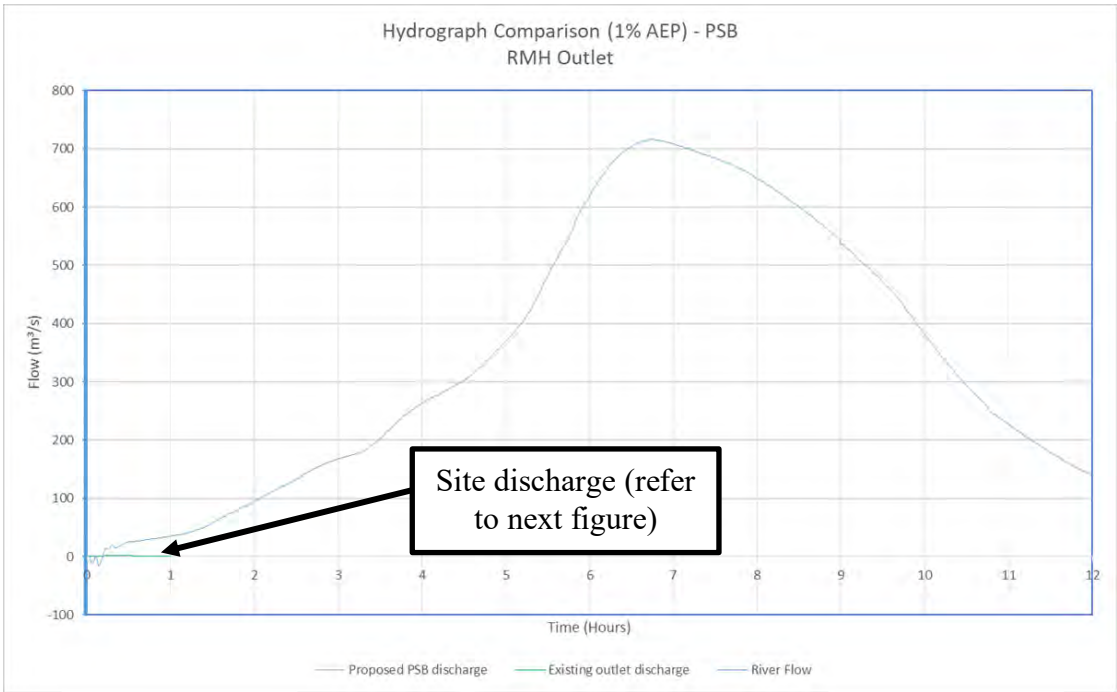


Figure 12 - River flow hydrograph

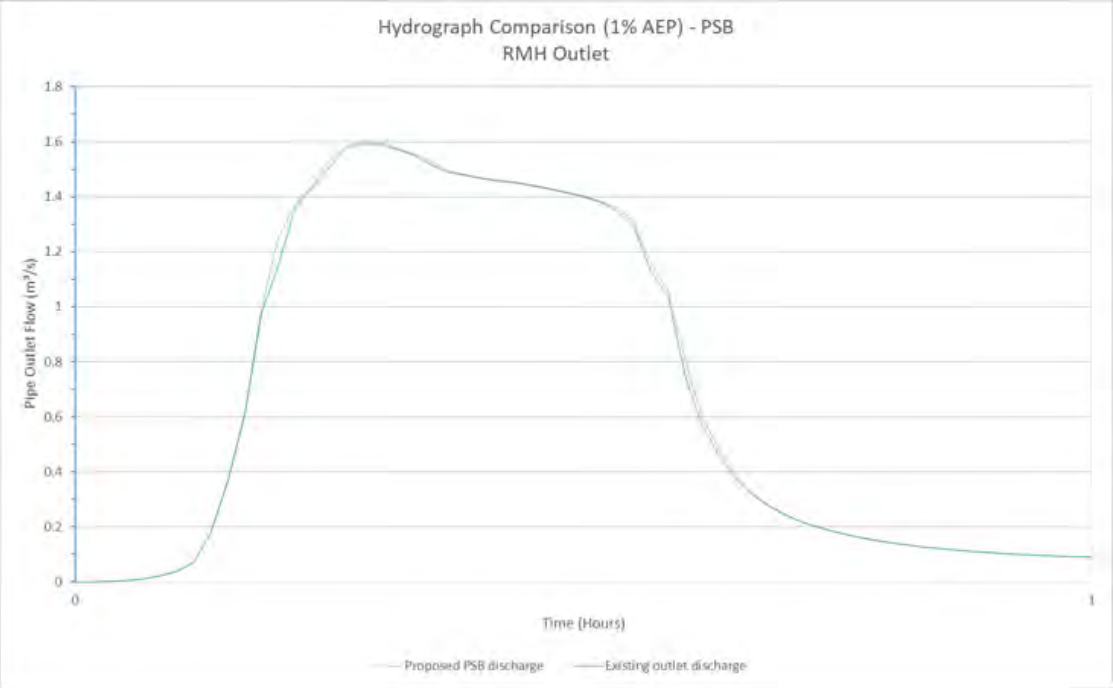


Figure 13 - Site Discharge flow hydrograph

7.1.2 Proposed External Grading / Levels

Preliminary grading was undertaken to create a digital terrain model (DTM) for the proposed site. The extent of grading was limited to areas as indicated below in Figure 14.

An overview of the proposed grading is as follows:

- Redbank Road interface – The existing levels have been cut down to allow for a loading dock driveway entryway and a fire booster slip lane;
- On-grade car park and northeast face of PSB building interface – Matching into existing levels and cutting down existing levels at the vehicle ramp into the PSB car park;
- Pedestrian laneway between the east face of the PSB building and the existing CHW building – top flight of stairs to be removed and levels cut down to match into the existing pedestrian footpath access on the perimeter of the CHW building; and
- KR Lane – maintain and reinstate to existing levels.

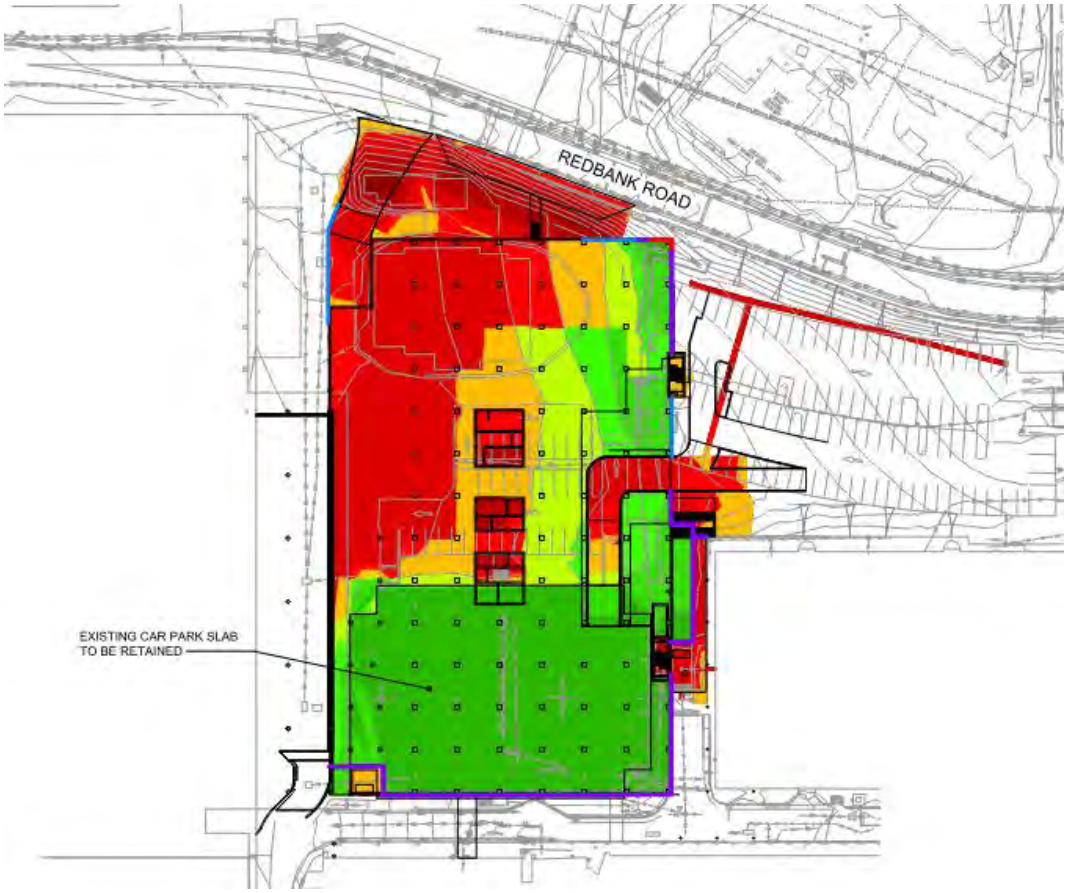


Figure 14 - Proposed PSB earthworks plan (red/orange indicate cut; green indicate fill)

7.2 Proposed Model Development and Limitations

A list of the key assumptions and limitations of the model developed for the proposed case scenario is as follows:

- The proposed PSB building is represented as blockage, meaning that stormwater cannot flow through the building. This provides a more conservative representation of the building and its obstructive effects on flow velocities and depths which may occur across the site;

- The entryway into the PSB building is via a L02 bridge and access through CHW building from the CHW forecourt. The existing CHW forecourt was modelled, rather than the proposed CHW forecourt design as the proposed forecourt design is still under development. This is considered suitable for the purposes of flood modelling at this stage of the project, as the proposed forecourt design shall be designed in a similar manner to existing conditions in order to mitigate flood impacts;
- The lowest PSB building finished floor level is 20.6 m. Any building entryway requirement for ramping up to a suitable threshold determined by this impact assessment, is assumed to be provided within the building footprint; and
- Proposed design scenario assumes the same pit blockage factor as the existing case for a like-for-like assessment.

7.3 Post-Development Flood Modelling Results

The following sections describe the post-development flooding conditions. Refer to Appendix A for the proposed case flood results maps.

As discussed in Section 6, since the PSB site is mainly impacted by overland flow flood events, assessment of the post-development flows has been undertaken mainly for this flood mechanism since the riverine flooding would be similar to pre-development conditions with the exception of the PMF.

The following sections describe the overland flow flood affectation for the site under post-development conditions unless noted otherwise.

7.3.1 10% AEP Event

The 10% event results indicate localised flooding within the site to be primarily from overland flows as follows:

Redbank Road

- Sheet flow in the order of 0.1 m depth or less (unchanged) along the road carriageway and deepest in the proximity of the car park access.

Existing Car Parks

- Minor localised flood in the order of 0.1 m depth (unchanged) within the on-grade car park to the north, which is drained by the car park local drainage.

KR Lane

- Ponding along KR Lane up to 0.15 m (slight decrease) at the localised low point located east of the PSB site. It is noted there are grated inlet pits at this low point to discharge into the ∅1050 trunk main.

7.3.2 1% AEP Event

The 1% AEP event results indicate localised flooding within the site as follows:

Redbank Road

- Sheet flow in the order of 0.1 m depth or less (unchanged) along the road carriageway and deepest in the proximity of the car park access.

Existing Car Parks

- Minor localised flood in the order of 0.1 m depth (unchanged) within the on-grade car park to the north, which is drained by the car park local drainage.

KR Lane

- Ponding along KR Lane up to 0.19 m (slight decrease) at the localised low point located east of the PSB site. It is noted there are grated inlet pits at this low point to discharge into the ∅1050 trunk main.

7.3.3 PMF Event

Similar to pre-development conditions, the PMF event results indicate flooding from both overland and river that impacts the site as follows:

Redbank Road

- (Overland) Up to 0.5 m flood depth (unchanged) at the north end of the road near the car park access driveway; and
- (River) In excess of 4.0 m flood depth (unchanged) at the north end of the road near the car park access driveway.

Existing Car Parks

- (Overland) Up to 0.22 m flood depth (slight increase) in localised areas within the existing on-grade car park; and
- (River) In excess of 1.5 m flood depth (unchanged) within the northern end of the existing on-grade car park.

KR Lane

- (Overland and river) Ponding along KR Lane up to 2.0 m flood depth (unchanged) at the localised low point at the corner of KR lane and the east corner of the PSB site. Flood extent above 1.0 m flood depth covers approximately half of KR Lane;
- (Overland) Flows from this low point on KR Lane travel northward along the west and north perimeter of the CHW building to the car park access driveway with flood depth in the order of 0.85 m (increase); and
- (River) Flows from Redbank Road car park access driveway travel southward along the west and north perimeter of the CHW building into the KR Lane, with flood depth in the order of 1 m (unchanged).

7.3.4 Post-Development Flood Hazard

Post development flood hazards have also been determined for the 1% AEP and PMF events, based on the hazard category recommended by the AR&R2019 guidelines.

Notable areas of flood hazard are as follows:

- 1% AEP event:
  - Generally H1 hazard (unchanged) for the overland flow flooding for the PSB site and its surrounds, which is safe flow conditions for people and vehicles.
- PMF event:
  - Up to H5 hazard (unchanged) can be found on Redbank Road and the car park access, and localised spots with H6 hazard (unchanged) for KR lane under overland flow flooding conditions. These flow conditions are unsafe for people and vehicles, and buildings are vulnerable to structural damage and possible failure;
  - Up to H6 hazard (unchanged) can be found on Redbank Road and the car park access, and localised spots with H5 hazard (unchanged) for KR lane under riverine flooding conditions. These flow conditions are unsafe for people and vehicles, and buildings are vulnerable to structural damage and possible failure; and
  - Pedestrian access along the northwest and southwest perimeter of the existing CHW building would experience flow conditions considered unsafe for people under post-development conditions (unchanged). It is recommended that a shelter-in-place approach be adopted as part of the flood emergency management strategy (refer to section 7.7).

7.4 Flood Impacts

The following sections describe flood impacts the proposed development will have compared to the pre-development conditions. Refer to Appendix A for the afflux flood results maps.

7.4.1 Changes to Flooding Behaviour

<u>10% AEP Flood Event</u>

- Redbank Road (Overland): No adverse impacts and slight improvements to peak flood levels for the areas north of Redbank Road;
- KR Lane (Overland): No adverse impacts were found. The localised changes to peak flood levels adjacent to the new PSB building is due to the finished level grade changes introduced as part of the development, which does not materially cause flood impact on adjacent buildings;
- Existing on-grade car park and building extents (Overland): No significant flood impacts;

- Downstream outfalls/RMH basin (Overland): Highly localised afflux of up to +0.013 m at the ∅750 Redbank Road trunk main and +0.016 m at the RMH basin due to the PSB site flows being discharged from upsized pipes. These are not considered as significant impacts since no properties are affected; and
- No significant impacts were found for the riverine flood event.

1% AEP Flood Event

- Redbank Road (Overland): No significant adverse impacts and slight improvements to peak flood levels for the areas north of Redbank Road;
- KR Lane (Overland): No adverse impacts were found. The localised changes to peak flood levels adjacent to the new PSB building is due to the finished level grade changes introduced as part of the development, which does not materially cause flood impact on adjacent buildings;
- Existing on-grade car park and building extents (Overland): No significant flood impacts;
- Downstream outfalls/RMH basin (Overland): Localised afflux of up to +0.011 m at the RMH basin due to the PSB site flows being discharged from upsized pipes. This is not considered a significant impact since no properties are affected; and
- No significant impacts were found for the riverine flood event.

PMF Event

- Redbank Road (Overland): Localised areas of +0.03 m and +0.08 m affluxes were found north Redbank Road, which is due to finished level grade changes along the pedestrian access adjacent to CHW which allowed for more floodwaters to flow downstream in the PMF;
- KR Lane (Overland): Generally a reduction in peak flood levels by up to 0.14 m for the laneway, resulting in improved flood risk for the CHW loading dock at the KR Lane area for the PMF extreme event;
- Existing on-grade car park and building extents (Overland): Afflux in the order of +0.02 m for the northern end of the on-grade car park;
- North and west perimeter of existing CHW building (Overland): Afflux in the order of +0.1 m for the north facing side of CHW and up to +0.35 m for the pedestrian access footpath (south-west of CHW). This is due to the widening of the footpath to allow more overland flow from KR lane, through this corridor and into the car park entryway and Redbank Road. It should be noted there are building entryways along this footpath which were already flooded in excess of 0.5 m under pre-development conditions;
- Research Lane: Afflux in the order of +0.05 m within the roadway;
- Existing trunk main outfalls (Overland): No significant impacts found for the PMF overland flood event; and
- No significant impacts were found for the PMF riverine event.

Flood Hazards

- Generally minimal changes to flood hazards as discussed in Section 7.3.4

7.5 Flood Immunity / Thresholds

Proposed building entryway thresholds and floor levels have been assessed against the flood levels as summarized in Figure 15 and Table 3.

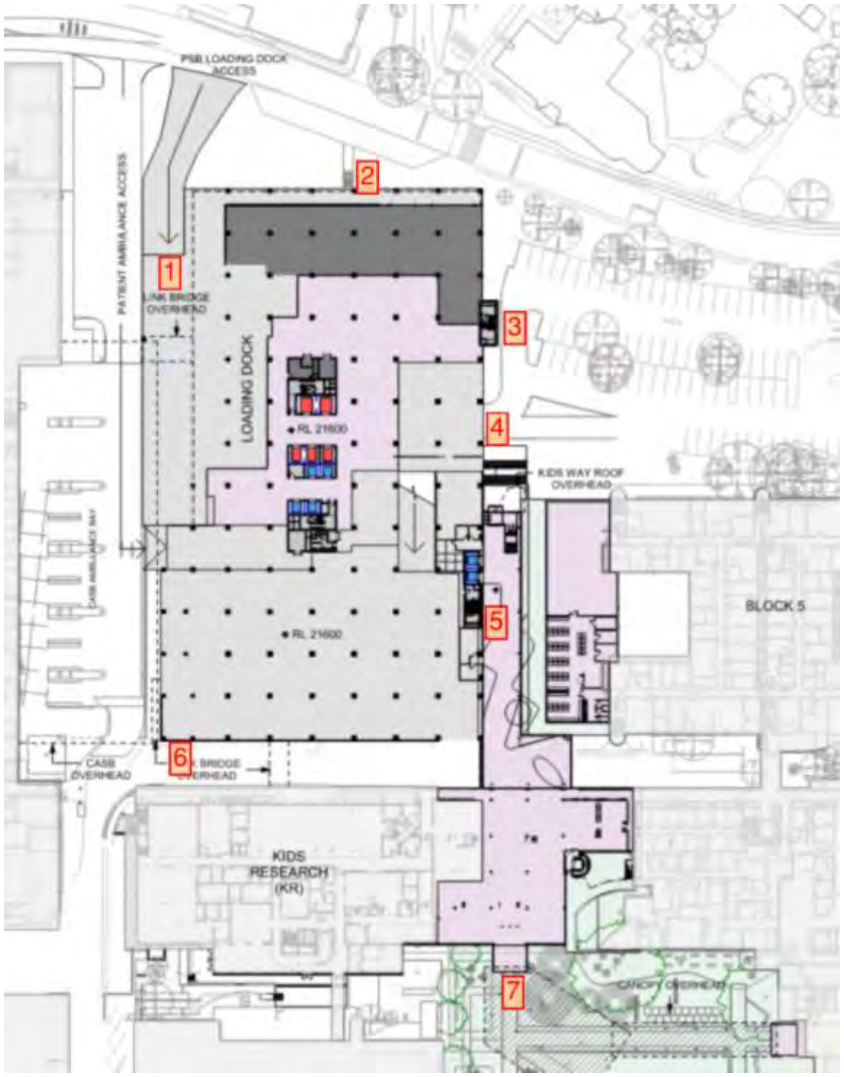


Figure 15 - PSB floor level and entryway plan (source: BLP L02 plan dated 22/12/2020)

Table 3 - Proposed floor/entryway threshold levels

Location	FFL/Threshold (m AHD)	1% (m AHD)	PMF (m AHD)	Comments
1 - PSB loading dock ramp	20.60 (top of ramp)	19.55 (overland)	19.63 (overland)	Above 1% AEP + 500mm freeboard and PMF
2 – Egress stairs	20.60 (top of stairs)	-	17.99 (river)	Above 1% AEP + 500mm freeboard and PMF
3 – Fire stairs	19.40 (entryway RL)	19.15 (overland)	19.16 (overland)	Above PMF and 1% AEP, and building stairs internally ascend to RL 20.6 m i.e. above 1% AEP + 500mm freeboard
4 – Vehicle ramp to internal car park	19.10 (entryway RL) 21.40 (top of ramp)	19.26 (overland)	19.27 (overland)	Ramp internally ascends to RL 21.4 m i.e. above 1% AEP + 500mm freeboard and PMF
5 – Fire stairs	17.13 (entryway RL)	17.17 (overland)	17.89 (overland) 18.00 (river)	Building stairs internally ascend to RL 21.4 m i.e. above 1% AEP + 500mm freeboard and PMF
6 – HYD plant room	19.10	18.83 (overland)	19.38 (overland) 18.00 (river)	Plant room access to be reassessed
7 – L02 entryway into PSB from forecourt Entryway RL 21.60 m	21.60 (entryway RL)	21.16 (overland)	21.92 (overland)	Entryway subject to further assessment to mitigate flood risk from forecourt

The results show that the lowest habitable floor level (RL 20.6 m AHD) is above the 1% AEP plus 0.5 m freeboard and PMF event surrounding the building. Some entryways into the building are below these flood levels, however they internally ramp/rise to the habitable floor level within the building.

The PSB main entryway is an overhead walkway from L02 of the building, extending through the existing CHW building and connecting to the CHW forecourt area at RL 21.6 m. This entryway is exposed to flooding in the forecourt area with the PMF flood level being above the entryway level. Because the PSB is considered as “sensitive uses and facilities”, this main entryway shall be reassessed to mitigate flood risks from the forecourt impacting the PSB entryway or the sensitive facilities within the PSB building.

As the design progresses for the PSB building, proposed portals and vents should be raised to the level above the 1% AEP plus 0.5 m freeboard or PMF level (whichever is higher) at that location.

7.6 Sensitivity Analysis

The following modelling scenarios were also undertaken as a sensitivity analysis to assess the effects of climate change and pipe blockage on the flood model results as well as flooding impacts.

7.6.1 Climate Change

Climate change assessment was undertaken utilising the 0.5% and 0.2% AEP events as proxy, assessing the effects of increased rainfall intensity and elevated tailwater conditions (due to the increase rainfall) on the flood risks for the PSB site. Sea level rise has not been modelled herein as it primarily affects the tidal areas downstream of the Parramatta CBD (draft Parramatta River Flood Study by Cardno, 2019). Refer to Appendix A for the 0.2% AEP climate change flood results maps.

The sensitivity of the peak flood levels to climate change is presented in Table 4, with the comparison locations shown in Figure 16. The results show that the peak flood levels around the PSB site, which are primarily driven by overland flow flooding, do not significantly increase from the 1% AEP to the 0.5% AEP and 0.2% AEP events. The difference in the 0.5% AEP and 0.2% AEP levels compared to the 1% AEP is less than 0.1 m for both events assessed. In terms of the afflux, there is negligible difference in the change of peak flood levels for the post-development flood conditions, which is generally within the tolerance of the limits of the model accuracy, i.e. ± 0.01 m.

Table 4 – Sensitivity of Flood Levels to Climate Change

Location (Refer Figure 16)	Pre-Development Peak Flood Levels (m AHD)			Post-Development Peak Flood Levels (m AHD)			Post-Development Afflux (m)		
	1% AEP	0.5% AEP	0.2% AEP	1% AEP	0.5% AEP	0.2% AEP	1% AEP	0.5% AEP	0.2% AEP
1 – KR Lane Low Point	16.25	16.26	16.29	16.25	16.26	16.31	-0.01	-0.01	+0.01
2 – KR Lane/CASB Ramp	19.08	19.08	19.09	19.07	19.08	19.08	-	-	-
3 – KR Lane East	17.36	17.36	17.36	17.36	17.36	17.36	-	-	-
4 – CHW Pedestrian Access	17.09	17.10	17.12	17.09	17.10	17.10	-	-	-0.02
5 – PSB Car Park Access	13.63	13.64	13.64	13.63	13.63	13.63	-0.01	-0.01	-0.01
6 – Redbank Rd	15.36	15.36	15.37	15.35	15.35	15.36	-0.01	-0.01	-0.01
7 – CMRI Threshold	22.91	22.92	22.92	22.91	22.92	22.92	-	-	-
8 – CHW Forecourt	21.09	21.10	21.11	21.09	21.10	21.11	-	-	-

Figure 16 – Flood Level Comparison Locations

7.6.2 Pipe Blockage

Modelling of the 1% AEP event was undertaken for a fully blocked stormwater system as considered from the CoPC engineering design guidelines. Comparison of the flood levels between the no pipe blockage and full pipe blockage scenarios is presented in Table 5, with the comparison locations shown in Figure 16.

The results show that for trapped low points such as KR Lane (#1, #3 and #4) and CHW Forecourt (#8) which are drained primarily by the stormwater system, the peak flood levels increase significantly (i.e. > 0.1 m) under the full pipe blockage scenario. For areas driven mainly by flood conveyance such as Redbank Road (#5 and #6), the blockage of the stormwater system has less influence on the local flood levels.

In terms of afflux, the post-development impacts on peak flood levels are generally negligible under the full pipe blockage scenario, with the exception of KR lane where there is significant reduction in levels (#1 and #3) but increased

afflux downstream at the CHW pedestrian access corridor (#4). This is due to the widening of the footpath to allow more overland flow from KR lane, through this corridor and into the car park entryway and Redbank Road. The pedestrian access becomes the primary discharge point for flows once the local drainage system is fully blocked.

Table 5 – Sensitivity of 1% AEP Flood Levels to Pipe Blockage Assumption

Location (Refer Figure 16)	Pre-Development Peak Flood Levels (m AHD)		Post-Development Peak Flood Levels (m AHD)		Post-Development Afflux (m)	
	No Pipe Blockage	100% Pipe Blockage	No Pipe Blockage	100% Pipe Blockage	No Pipe Blockage	100% Pipe Blockage
1 – KR Lane Low Point	16.25	17.58	16.25	17.47	-0.01	-0.10
2 – KR Lane/CASB Ramp	19.08	19.15	19.07	19.15	-	-
3 – KR Lane East	17.36	17.58	17.36	17.48	-	-0.10
4 – CHW Pedestrian Access	17.09	17.38	17.09	17.43	-	+0.05
5 – PSB Car Park Access	13.63	13.68	13.63	13.68	-0.01	-
6 – Redbank Rd	15.36	15.39	15.35	15.38	-0.01	-0.01
7 – CMRI Threshold	22.91	23.00	22.91	22.99	-	-0.01
8 – CHW Forecourt	21.09	21.57	21.09	21.57	-	-

This analysis also shows that the proposed PSB level of 20.6 m AHD is still above the 1% AEP level plus 0.5 m freeboard under the full pipe blockage scenario (based on peak flood levels estimated for #1, #2 and #4).

Although it has been demonstrated that the proposed PSB finished floor levels still have flood immunity in this event, it should be noted that a blocked stormwater system will result in an increase in flood depths in and around the proposed PSB site and forecourt area.

It is recommended that an Operation & Maintenance (O&M) Plan for the proposed PSB site drainage system is implemented and existing downstream stormwater assets are maintained to ensure adequate performance of the stormwater network.

7.7 Emergency Management Strategy

There is a flood emergency management strategy in place for the Westmead Health Precinct by the SCHN which is coordinated with other relevant authorities

including (and not limited to) NSW Health, NSW Police, Transport NSW, State Emergency Service (SES) and the Bureau of Meteorology (BoM).

SCHN shall be consulted for the proposed PSB development to not only develop the flood emergency management strategy specific for the site, but to also coordinate the management plan with the overall Westmead Health Precinct plans. The intent is to not make any significant changes to the existing management plans, but to maintain/coordinate with the plans already in place and outline any specific elements that require to be changed.

Subject to consultations with SCHN, a summary of flood emergency management strategies for the PSB site are recommended as follows:

- Since the lowest habitable floor level is above the riverine flood levels and overland flooding is expected to be short duration/high hazard events, a shelter-in-place approach in the event of a flood would be feasible for users in the building and around the site;
- Evacuation routes (locations of stairs/ramps and muster points), signage, warning systems (alarms and PA systems) and CCTV surveillance are to be considered as part of the building management plans;
- Details of how the Building Management System (BMS) is linked with FloodSmart Parramatta;
- Further design and management of critical infrastructure to not disrupt the operation of medical equipment (such as electrical substations, switchboards, back-up power generators or any other critical plant equipment) in the event of a flood. This can include design of the servicing elements to be above the flood levels or consideration for back-up equipment to provide service for a given duration until the main element may resume; and
- Post-flood event actions including inspections and maintenance activities.

8 Recommendations and Further Work

This flood impact assessment has been undertaken at schematic design stage, and as such, Arup have assessed the flooding and stormwater management requirements for the development design. Key outcomes are as follows:

- The proposed lowest finished habitable floor level of 20.6 m AHD for the proposed PSB building provides flood immunity for the 1% AEP plus 0.5 m freeboard and PMF events, with the exception of the main entryway which is to be further developed and assessed;
- The impacts of the development have been assessed for the events specified in the SEARs. The proposed building design, stormwater scheme and grading strategy for the development do not significantly impact the existing conditions flood behaviour and surrounding areas.
- Flood hazard for the 1% AEP event is low. However, the PMF event hazard is high for Redbank Road, car park access, pedestrian accessway around the CHW building and KR lane and it is recommended to have a shelter-in-place approach as part of the flood emergency management strategy;
- There are no significant impacts from the climate change sensitivity analysis;
- There are impacts from the pipe blockage sensitivity analysis, especially along KR lane which primarily drains to stormwater trunk main and the forecourt area. Therefore it is recommended to maintain and clean stormwater assets to ensure adequate performance of the stormwater network; and

Arup proposes several further key design recommendations and next steps as follows:

- Further design development of the PSB in consultation with the Architect as the design progresses. This includes assessment of the CHW forecourt area and PSB entryway to mitigate flood risk into the building;
- Updated flood modelling to demonstrate flood risk and impact of PSB and CHW forecourt as the development design progresses; and
- Consultation with SCHN on developing the flood emergency management plan and coordination with the wider Westmead Health Precinct management plan.

Appendix A

Flood Maps

Legend

- Model Extent
- Site Boundary
- Proposed Building
- Information received from Parramatta Light Rail
- Information from CASB Flood Model
- Information provided by LTS Lockley Survey
- Pits
- OSD Tanks
- Nodes for Input Hydrograph
- Existing DRAINS Subcatchments

Issue	Date	By	Chkd	Appd
1	12-02-2021	JC	NC	TT

ARUP

Level 5, Barrack Place
151 Clarence Street
Sydney NSW 2000
Tel +61 (2) 9320 9320
www.arup.com

Client
Health Infrastructure

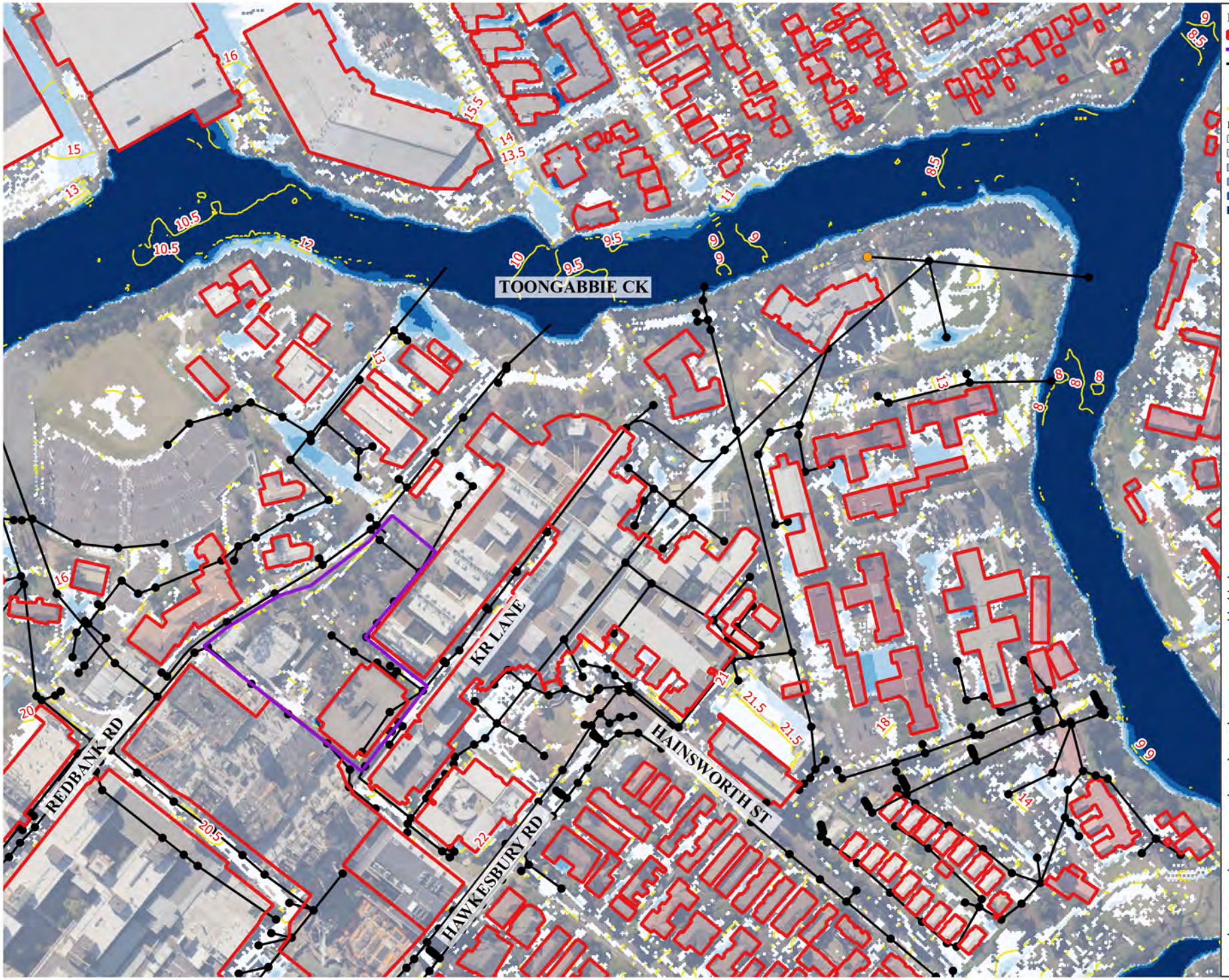
Job Title
Children's Hospital Westmead Stage 2

25 0 25 50 m

Scale at A3 1:5,000

Figure No. M.S.1
Flood Model Setup Plan

Job No.	Figure Status
271985	**For SSDA**



Legend

- Buildings
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Flood Level Contours (mAHD)

Peak Flood Depths (m)

- <= 0.05
- 0.05 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- > 1

Issue	Date	By	Chkd	Appd
1	12-02-2021	JC	NC	TT

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Sydney NSW 2000
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Job Title
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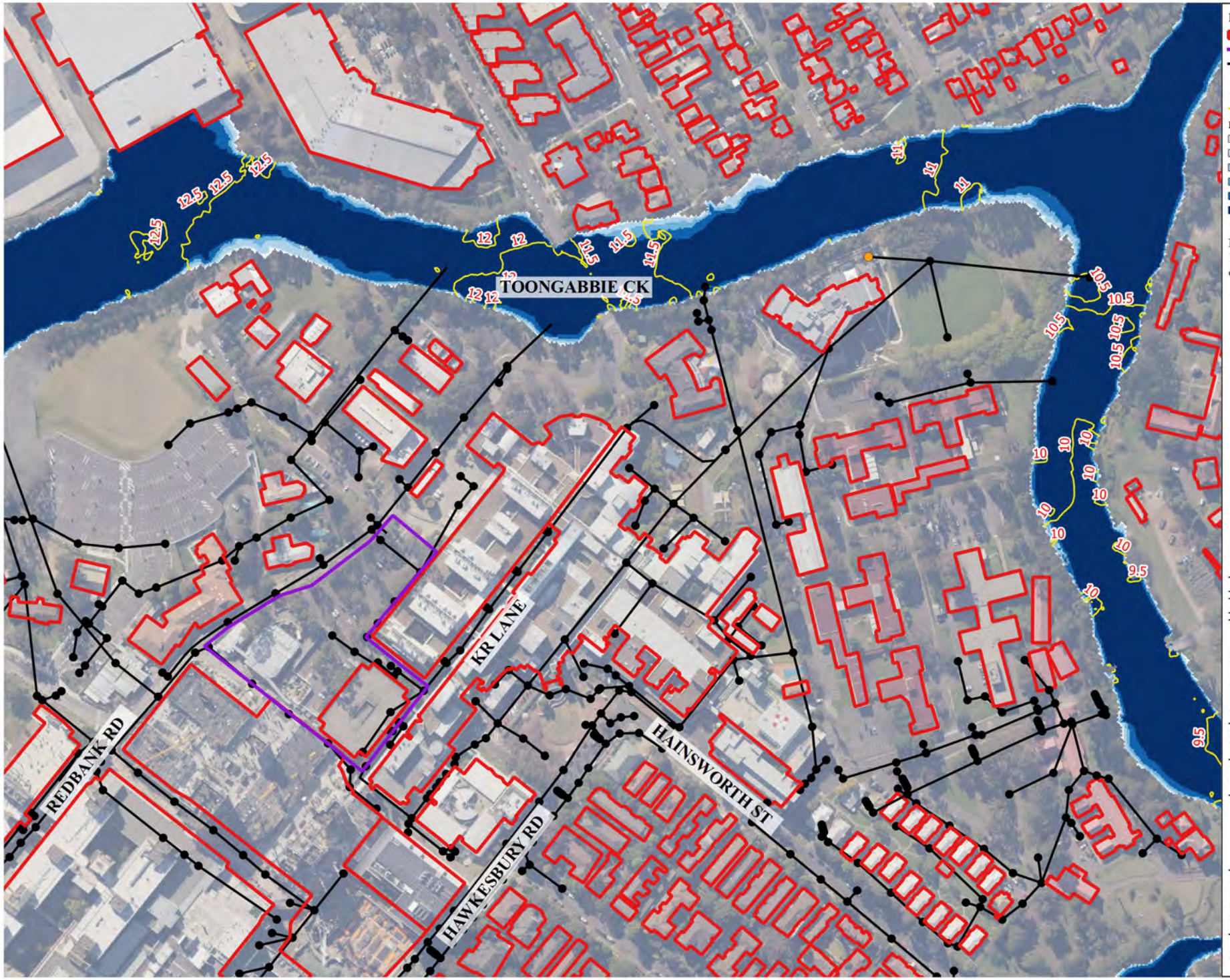
25 0 25 50 m

Scale at A3 1:2,500

Figure No. E.D.1
Existing Case 10% AEP Overland Flooding Peak Flood Depths and Levels

Job No.
271985

Figure Status
For SSDA



Legend

- Buildings
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Flood Level Contours (mAHD)

Peak Flood Depths (m)

- <= 0.05
- 0.05 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- > 1

Notes:

1. The riverine flooding shown excludes local catchment runoff

Issue	Date	By	Chkd	Appd
1	12-02-2021	JC	NC	TT

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151 Clarence Street
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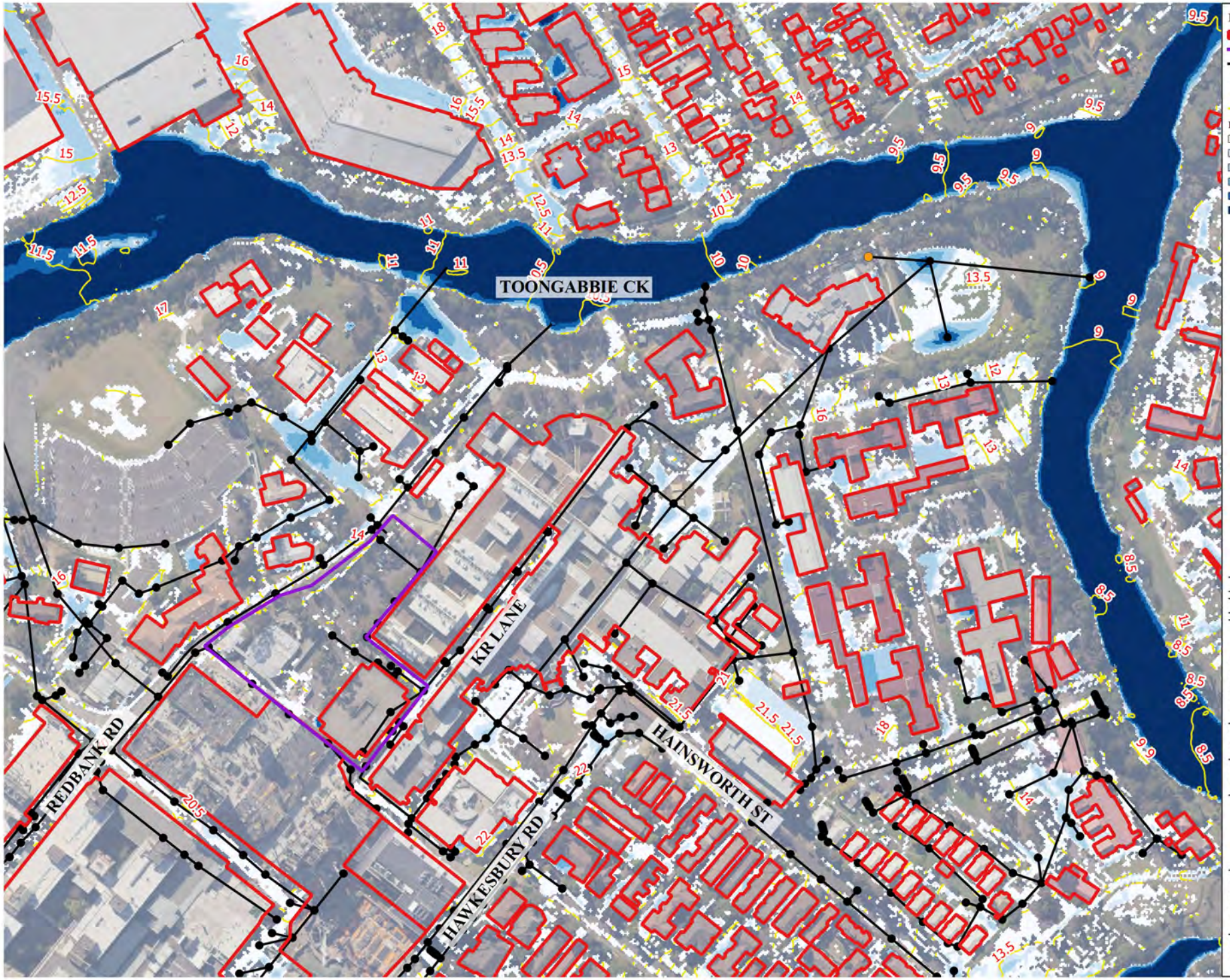
25 0 25 50 m

Scale at A3 1:2,500

Figure No. E.D.2
Existing Case 10% AEP Riverine Flooding Peak Flood Depths and Levels

Job No.	Figure Status
271985	**For SSDA**



Legend

- Buildings
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Flood Level Contours (mAHD)

Peak Flood Depths (m)

- <= 0.05
- 0.05 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- > 1

Issue	Date	By	Chkd	Appd
1	12-02-2021	JC	NC	TT

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151 Clarence Street
Sydney NSW 2000
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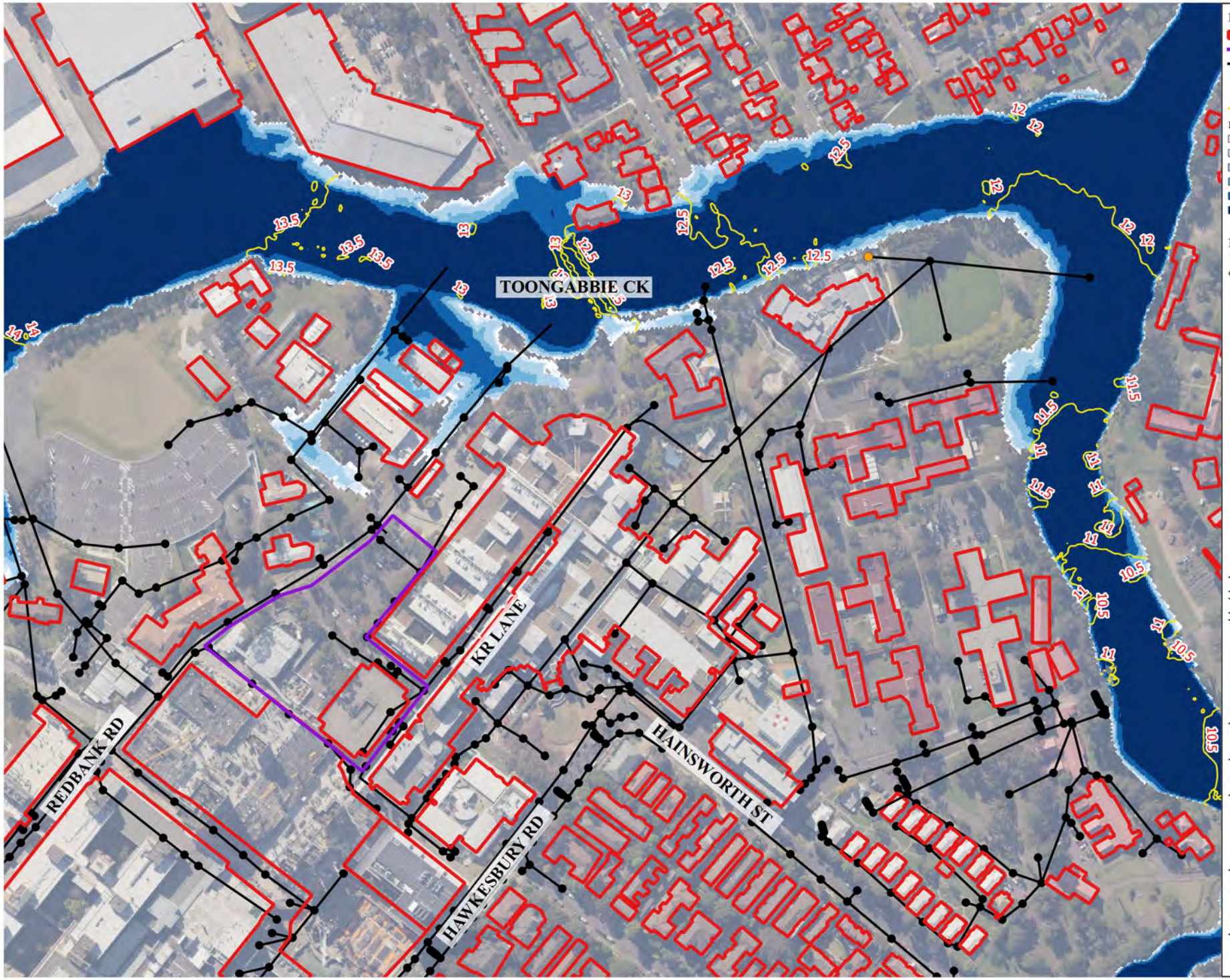
25 0 25 50 m

Scale at A3 1:2,500

Figure No. E.D.3
Existing Case 1% AEP Overland Flooding Peak Flood Depths and Levels

Job No.	Figure Status
271985	**For SSDA**



Legend

- Buildings
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Flood Level Contours (mAHD)

Peak Flood Depths (m)

- <= 0.05
- 0.05 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- > 1

Notes:

1. The riverine flooding shown excludes local catchment runoff

Issue	Date	By	Chkd	Appd
1	12-02-2021	JC	NC	TT

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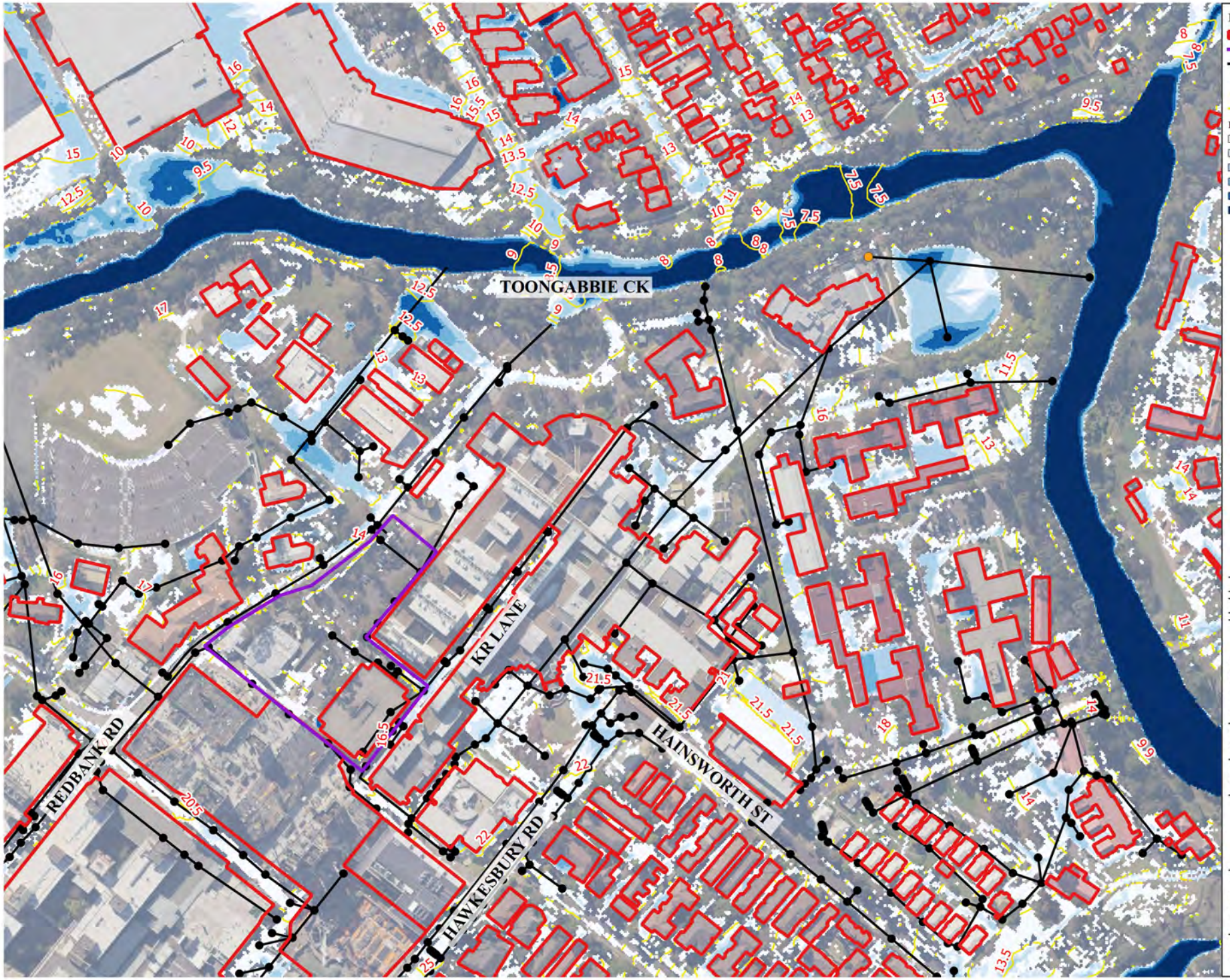
25 0 25 50 m

Scale at A3 1:2,500

Figure No. E.D.4

Existing Case 1% AEP Riverine Flooding
Peak Flood Depths and Levels

Job No.	Figure Status
271985	**For SSDA**



Legend

- Buildings
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Flood Level Contours (mAHD)

Peak Flood Depths (m)

- <= 0.05
- 0.05 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- > 1

Issue	Date	By	Chkd	Appd
1	12-02-2021	JC	NC	TT

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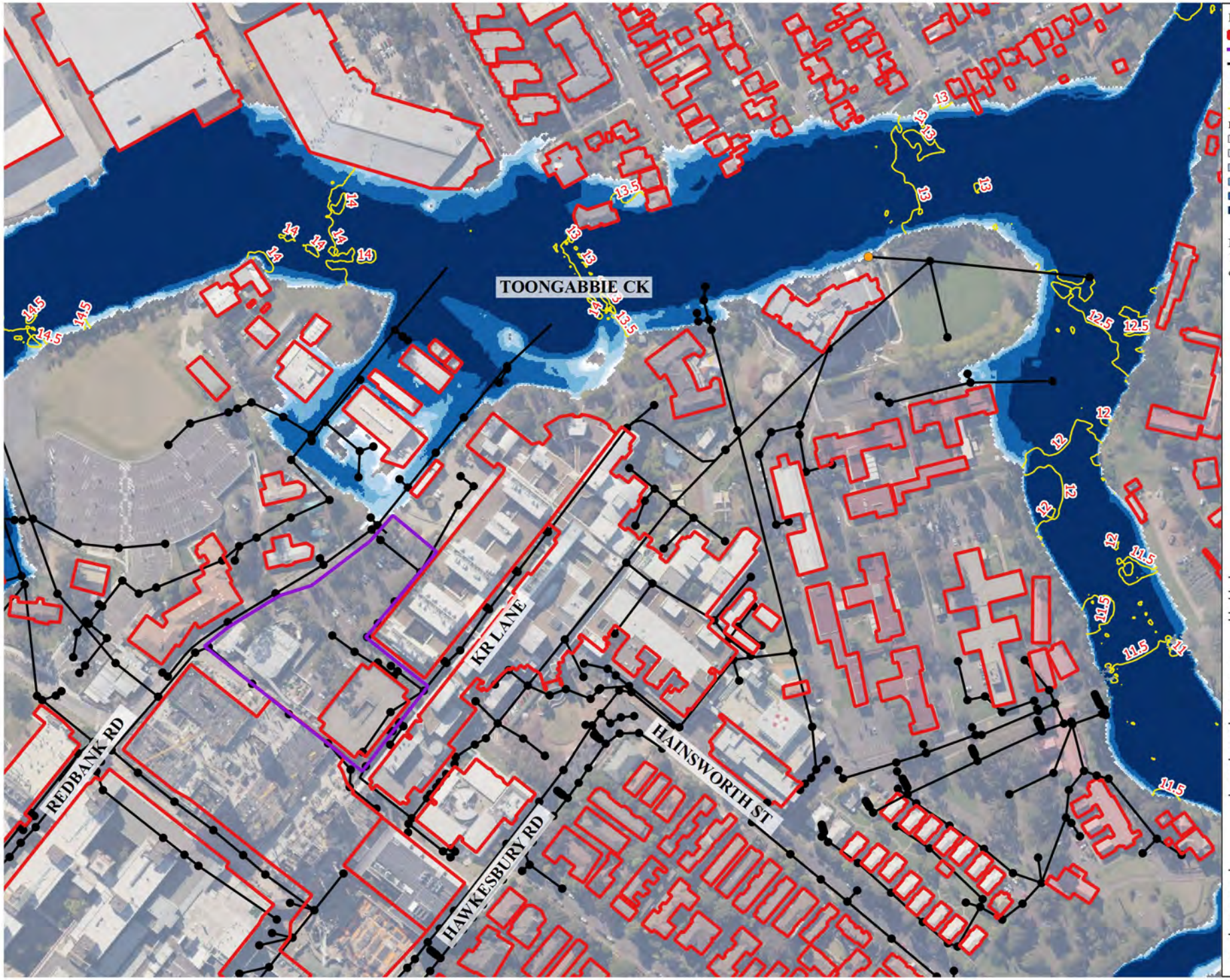
25 0 25 50 m

Scale at A3 1:2,500

Figure No. E.D.5
Existing Case 0.2% AEP Overland Flooding Peak Flood Depths and Levels

Job No.	Figure Status
271985	**For SSDA**



Legend

- Buildings
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Flood Level Contours (mAHD)

Peak Flood Depths (m)

- <= 0.05
- 0.05 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- > 1

Notes:

1. The riverine flooding shown excludes local catchment runoff

Issue	Date	By	Chkd	Appd
1	12-02-2021	JC	NC	TT

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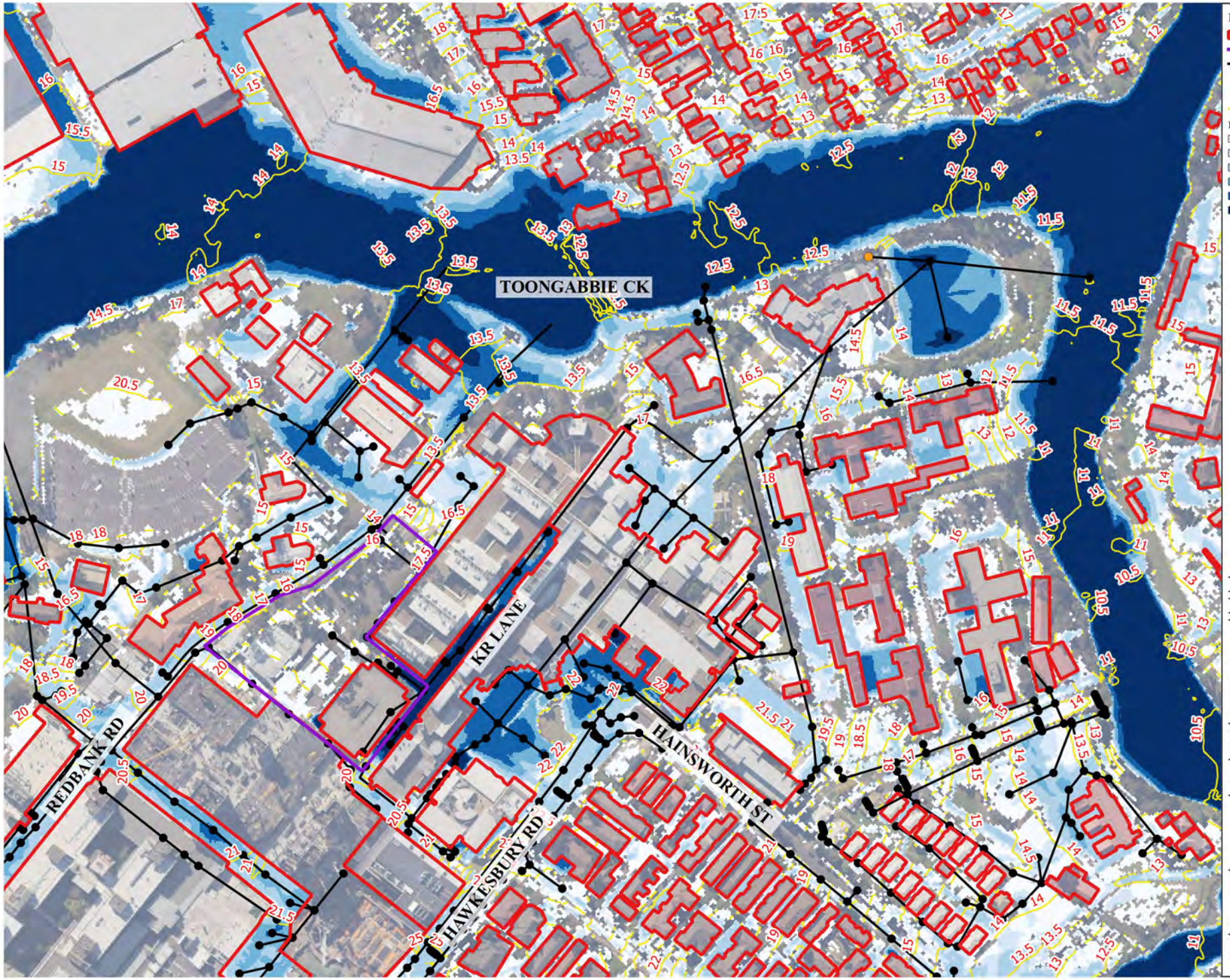
25 0 25 50 m

Scale at A3 1:2,500

Figure No. E.D.6
Existing Case 0.2% AEP Riverine Flooding Peak Flood Depths and Levels

Job No.	Figure Status
271985	**For SSDA**



Legend

- Buildings
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Flood Level Contours (mAHD)

Peak Flood Depths (m)

- <= 0.05
- 0.05 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- > 1

Issue	Date	By	Chkd	Appd
1	12-02-2021	JC	NC	TT

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Job Title
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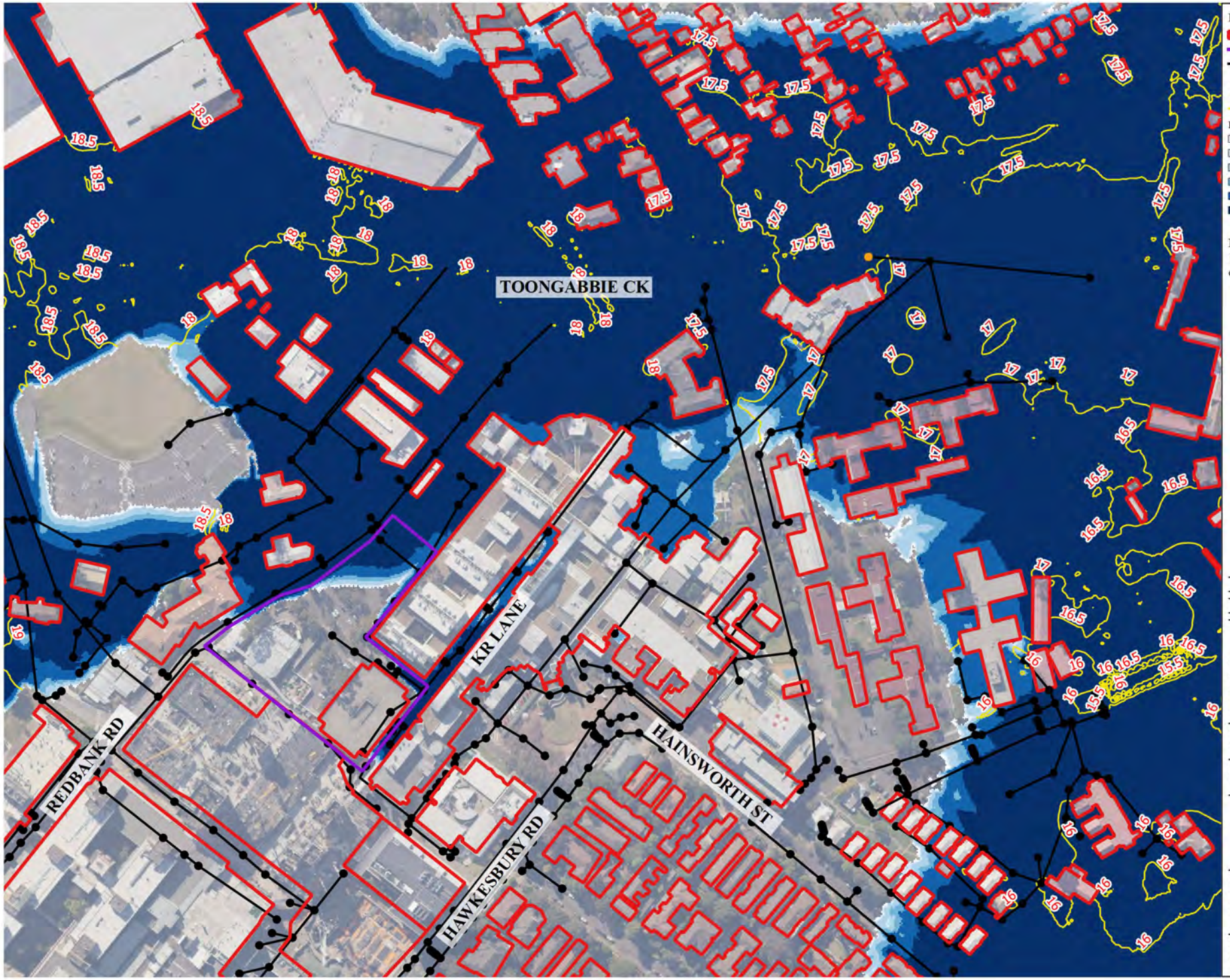
25 0 25 50 m

Scale at A3 1:2,500

Figure No. E.D.7

Existing Case PMF Overland Flooding
Peak Flood Depths and Levels

Job No.	Figure Status
271985	**For SSDA**



Legend

- Buildings
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Flood Level Contours (mAHD)

Peak Flood Depths (m)

- <= 0.05
- 0.05 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- > 1

Notes:

1. The riverine flooding shown excludes local catchment runoff

Issue	Date	By	Chkd	Appd
1	12-02-2021	JC	NC	TT

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Job Title
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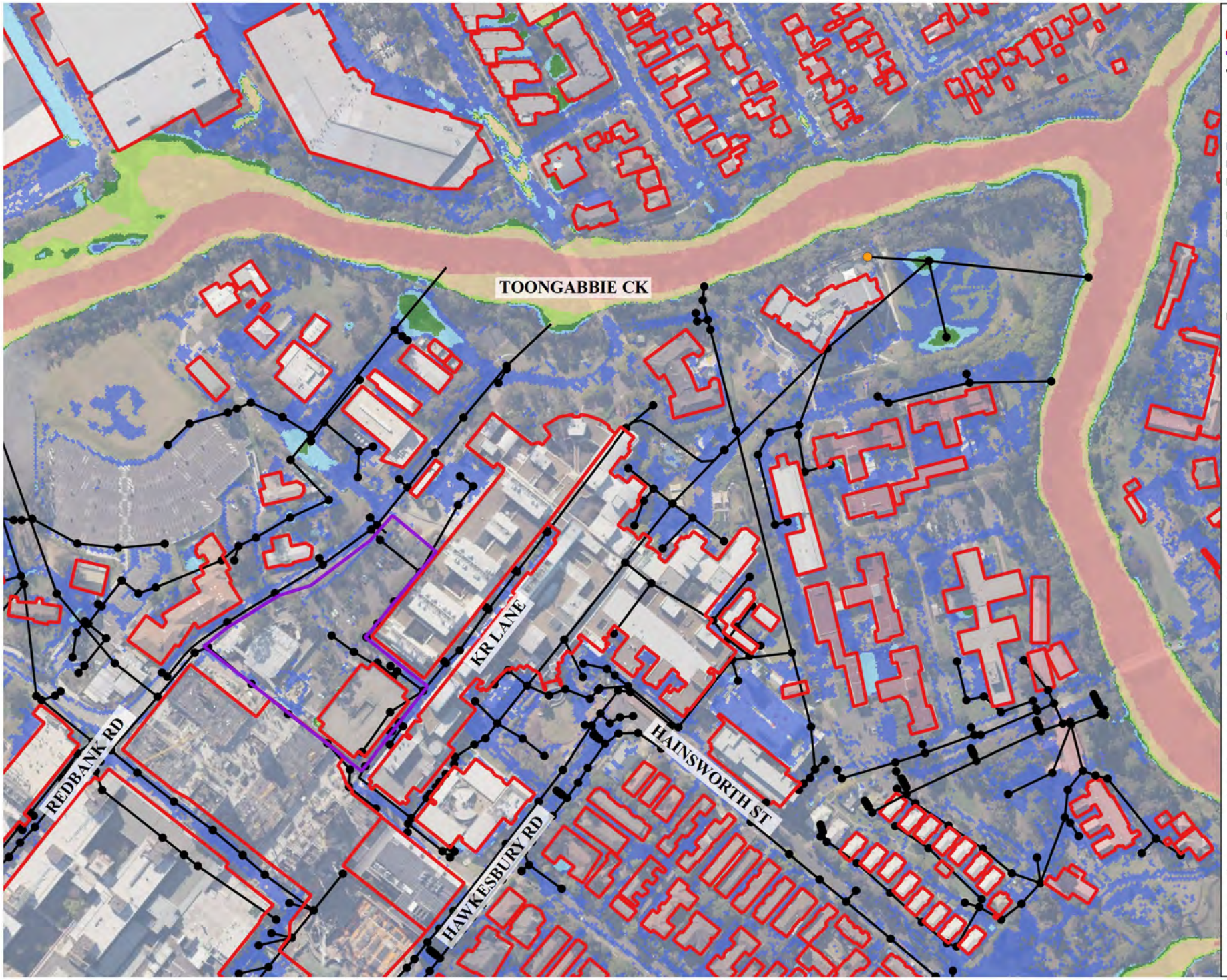
25 0 25 50 m

Scale at A3 1:2,500

Figure No. E.D.8
Existing Case PMF Riverine Flooding
Peak Flood Depths and Levels

Job No.	Figure Status
271985	**For SSDA**



Legend

- Buildings
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD

Flood Hazard Category

- H1 - Relatively benign flow conditions.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for all vehicles, children and the elderly.
- H4 - Unsafe for all people and vehicles.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Issue	Date	By	Chkd	Appd
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Job Title
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25 0 25 50 m

Scale at A3 1:2,500

Figure No. E.H.1
Existing Case 1% AEP Overland Flooding Hazard

Job No.	Figure Status
271985	**For SSDA**

Legend

- Buildings
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD

Flood Hazard Category

- H1 - Relatively benign flow conditions.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for all vehicles, children and the elderly.
- H4 - Unsafe for all people and vehicles.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. The riverine flooding shown excludes local catchment runoff

Issue	Date	By	Chkd	Appd
I	12-02-2021	JC	NC	TT

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151 Clarence Street
Sydney NSW 2000
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25 0 25 50 m

Scale at A3 1:2,500

Figure No. E.H.2
Existing Case 1% AEP Riverine Flooding Hazard

Job No.	Figure Status
271985	**For SSDA**

Legend

- Buildings
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD

Flood Hazard Category

- H1 - Relatively benign flow conditions.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for all vehicles, children and the elderly.
- H4 - Unsafe for all people and vehicles.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Issue	Date	By	Chkd	Appd
I	12-02-2021	JC	NC	TT

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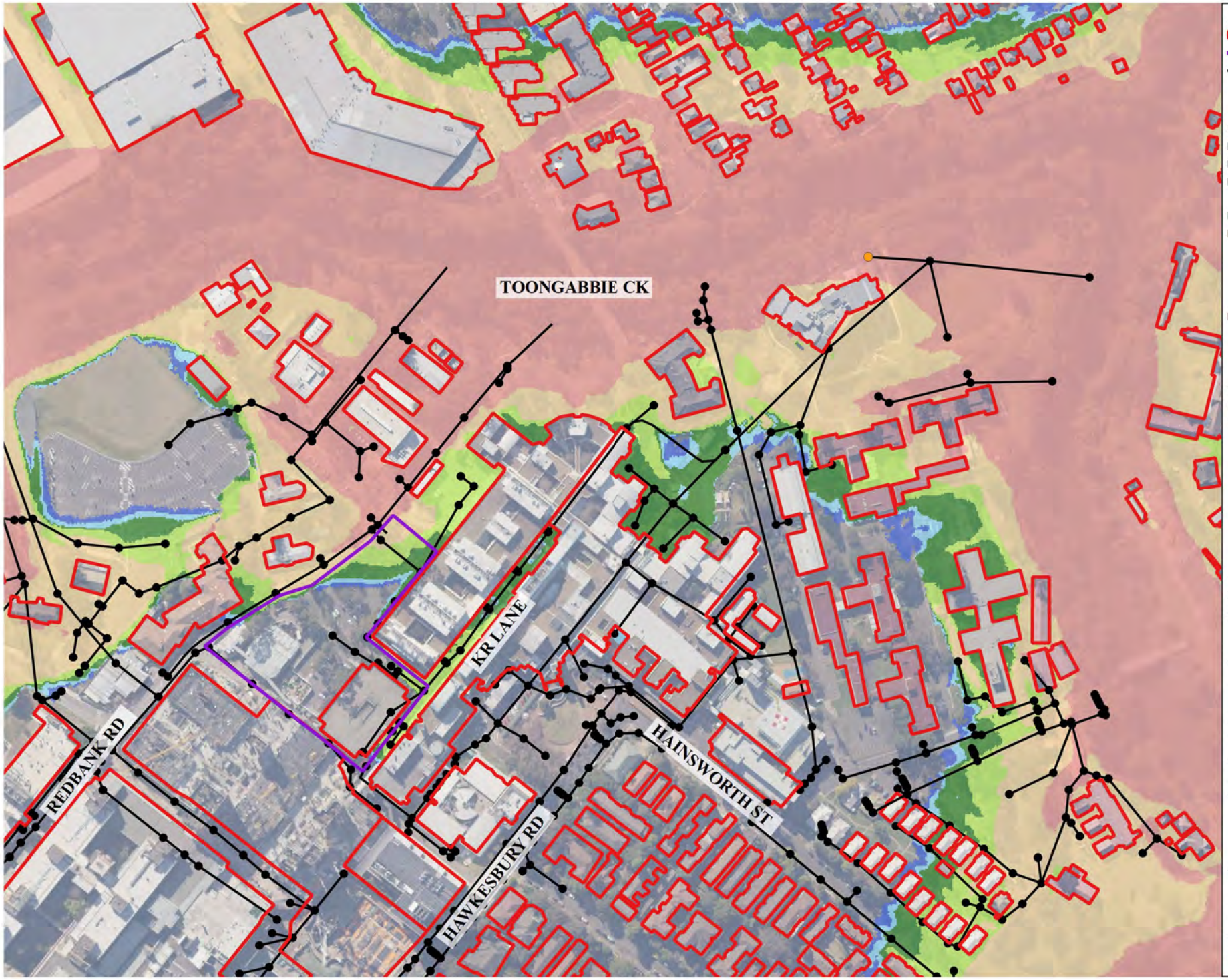
25 0 25 50 m

Scale at A3 1:2,500

Figure No. E.H.3
Existing Case PMF Overland Flooding Hazard

Job No.	Figure Status
271985	**For SSDA**



Legend

- Buildings
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD

Flood Hazard Category

- H1 - Relatively benign flow conditions.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for all vehicles, children and the elderly.
- H4 - Unsafe for all people and vehicles.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. The riverine flooding shown excludes local catchment runoff

Issue	Date	By	Chkd	Appd
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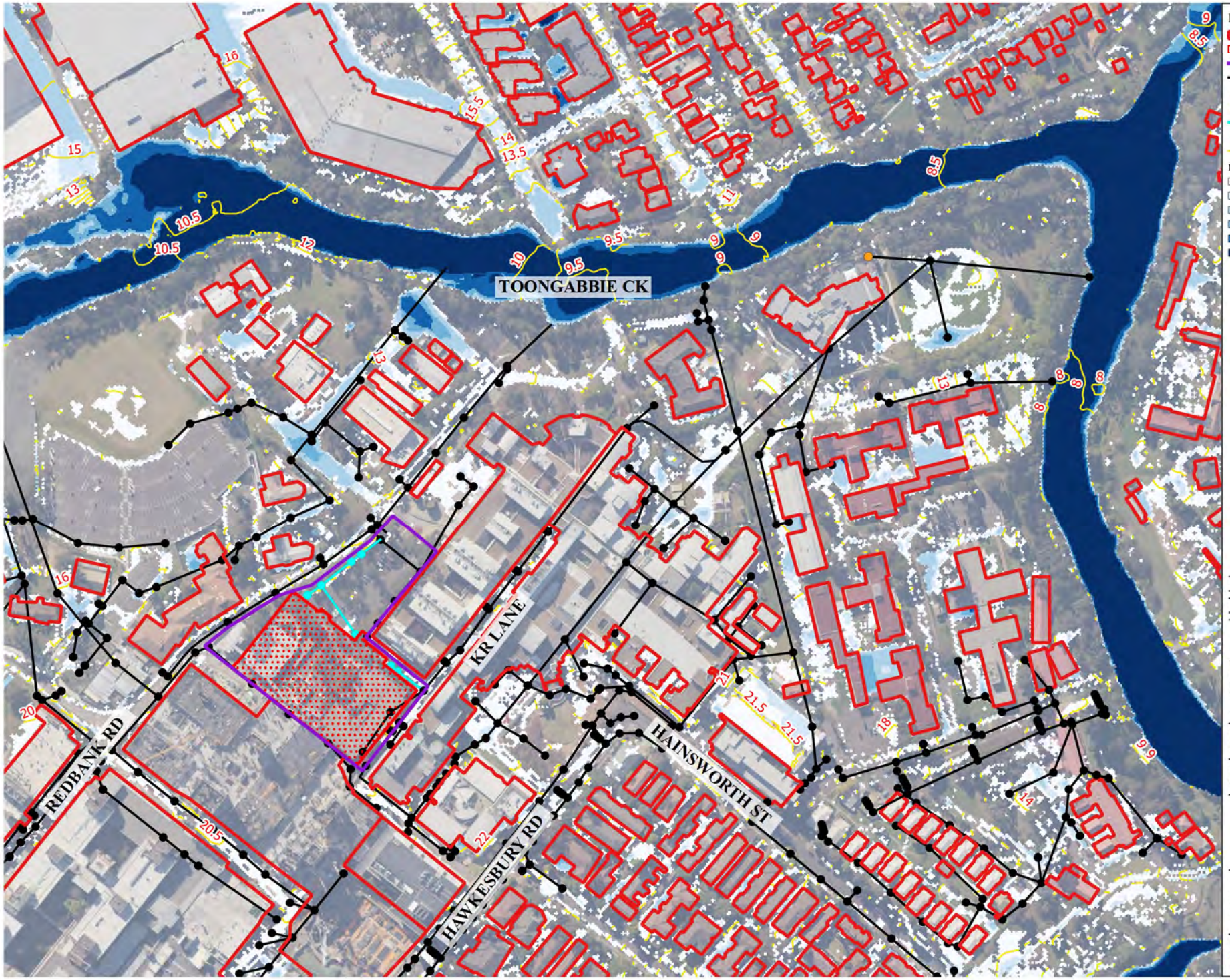
25 0 25 50 m

Scale at A3 1:2,500

Figure No. E.H.4
Existing Case PMF Riverine Flooding Hazard

Job No.
271985

Figure Status
For SSDA



Legend

- Buildings
- Proposed Building
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Proposed Pipes
- Proposed Pits
- Flood Level Contours (mAHD)

Peak Flood Depths (m)

- <= 0.05
- 0.05 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- > 1

Issue	Date	By	Chkd	Appd
1	12-02-2021	JC	NC	TT

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Job Title
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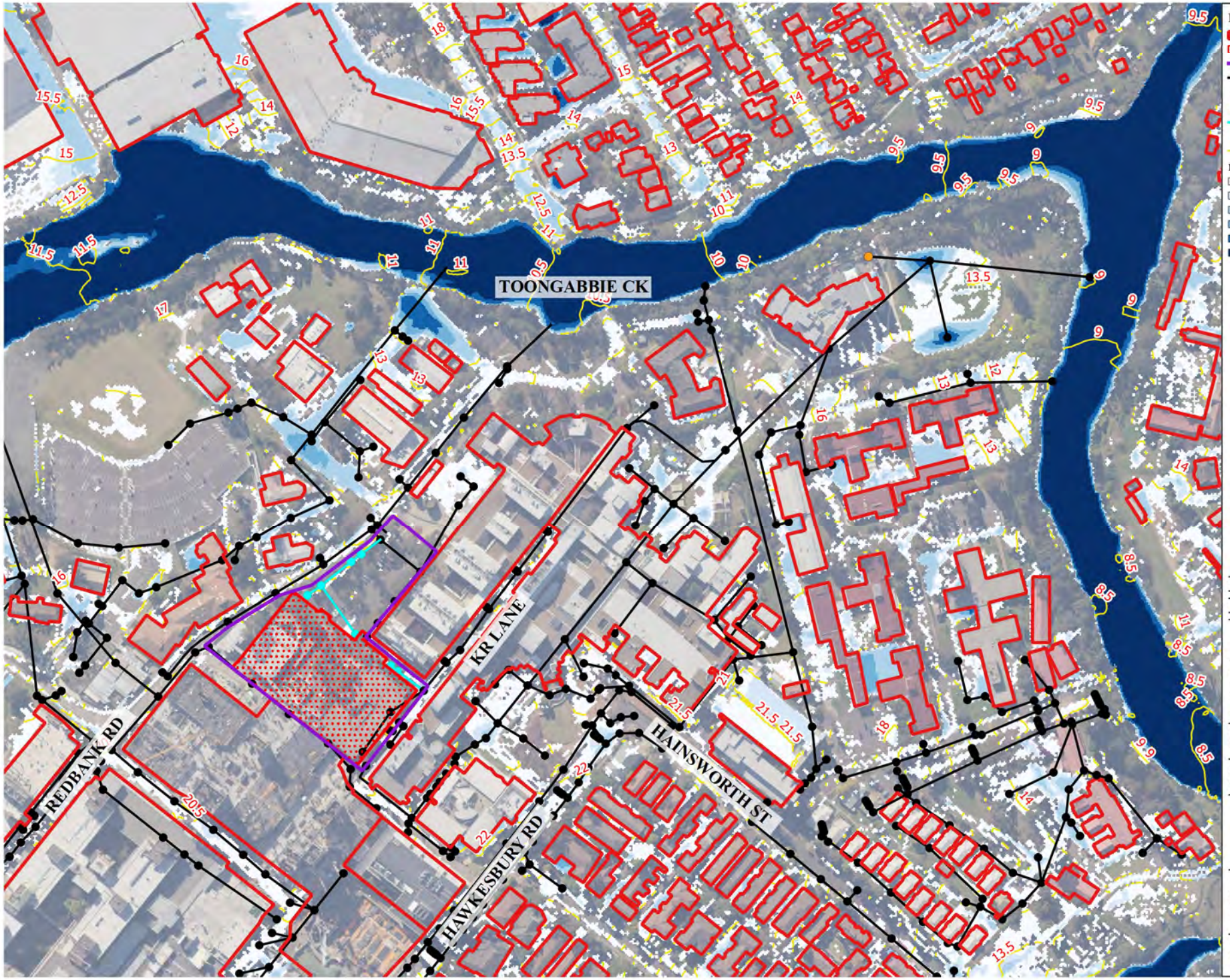
25 0 25 50 m

Scale at A3 1:2,500

Figure No. P.D.1

PSB Proposed Case 10% AEP Overland Flooding Peak Flood Depths and Levels

Job No.	Figure Status
271985	**For SSDA**



Legend

- Buildings
- Proposed Building
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Proposed Pipes
- Proposed Pits
- Flood Level Contours (mAHD)

Peak Flood Depths (m)

- <= 0.05
- 0.05 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- > 1

Issue	Date	By	Chkd	Appd
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Job Title
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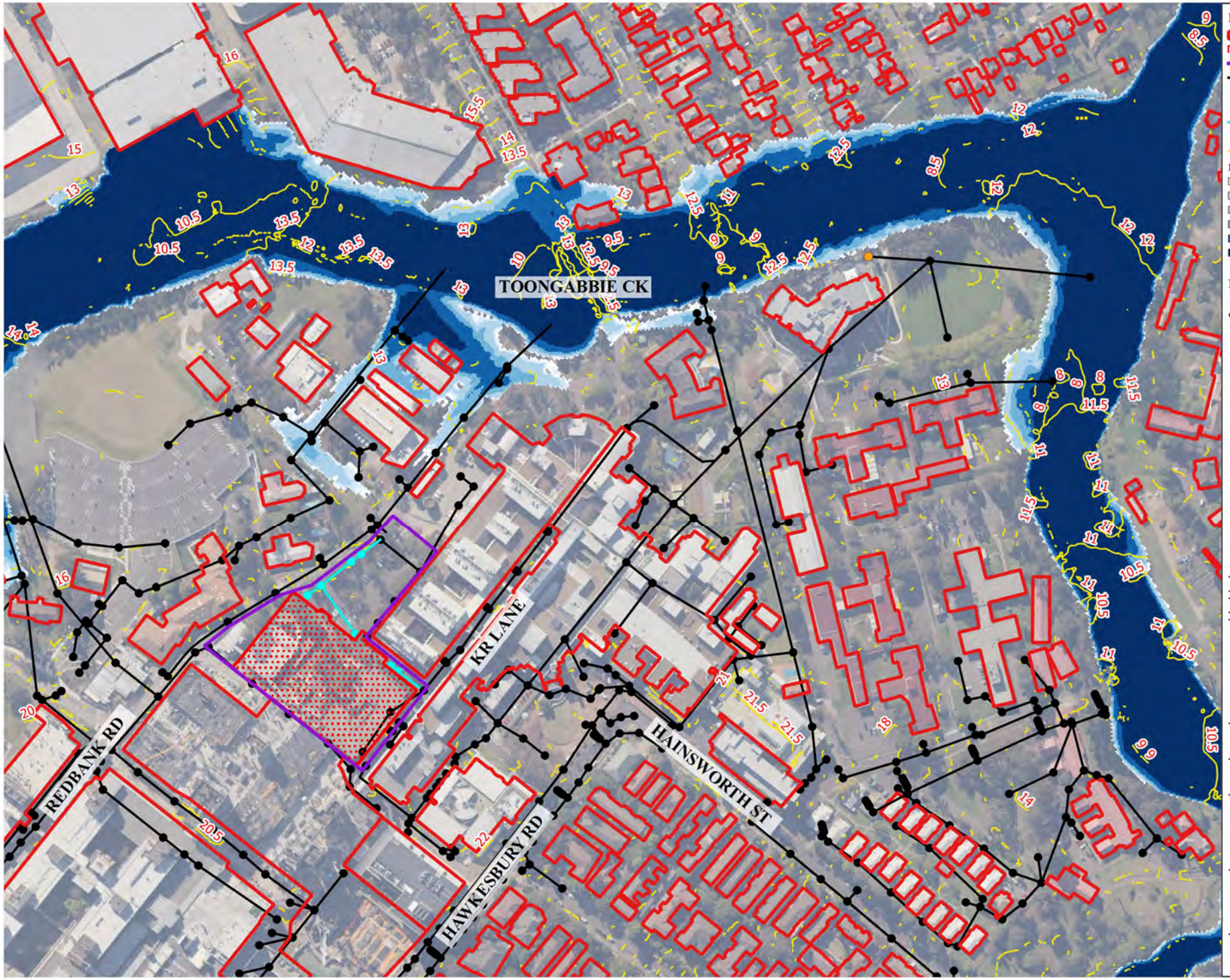
25 0 25 50 m

Scale at A3 1:2,500

Figure No. P.D.2

PSB Proposed Case 1% AEP Overland Flooding Peak Flood Depths and Levels

Job No.	Figure Status
271985	**For SSDA**



Legend

- Buildings
- Proposed Building
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Proposed Pipes
- Proposed Pits
- Flood Level Contours (mAHD)

Peak Flood Depths (m)

- <= 0.05
- 0.05 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- > 1

Notes:

1. The riverine flooding shown excludes local catchment runoff

Issue	Date	By	Chkd	Appd
1	12-02-2021	JC	NC	TT

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Job Title
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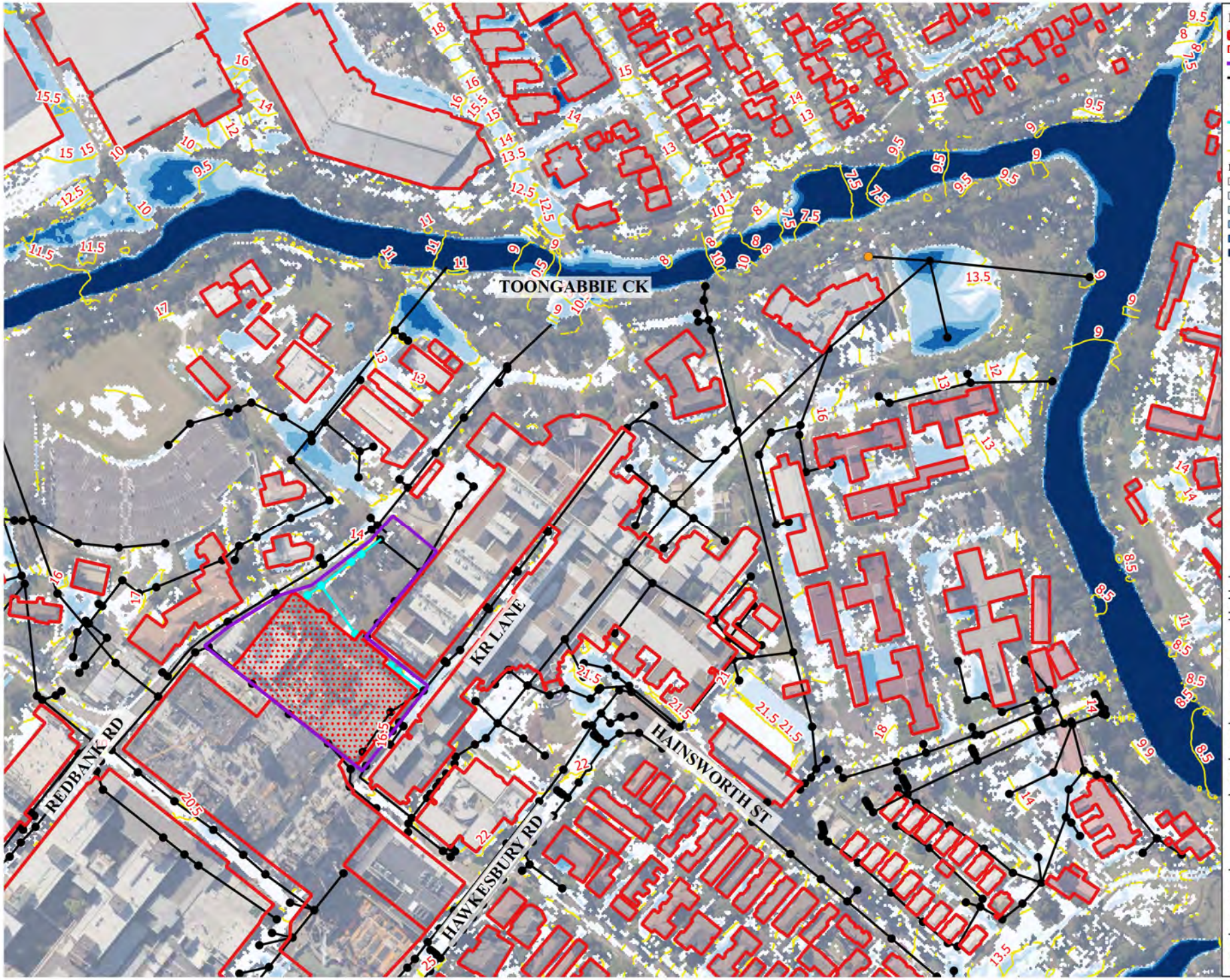
25 0 25 50 m

Scale at A3 1:2,500

Figure No. P.D.3

PSB Proposed Case 1% AEP Riverine Flooding Peak Flood Depths and Levels

Job No.	Figure Status
271985	**For SSDA**



Legend

- Buildings
- Proposed Building
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Proposed Pipes
- Proposed Pits
- Flood Level Contours (mAHD)

Peak Flood Depths (m)

- <= 0.05
- 0.05 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- > 1

Issue	Date	By	Chkd	Appd
1	12-02-2021	JC	NC	TT

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Job Title
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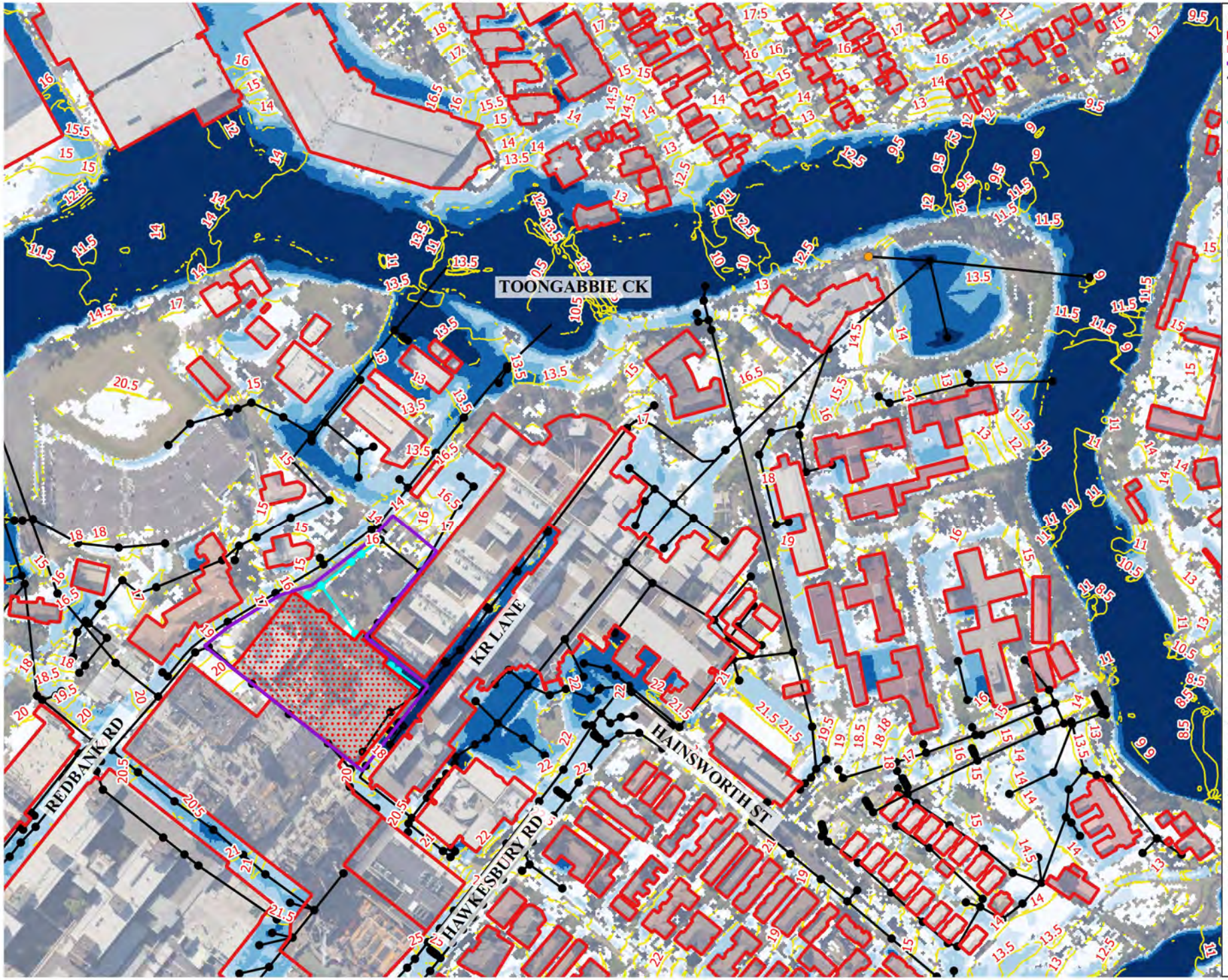
25 0 25 50 m

Scale at A3 1:2,500

Figure No. P.D.4

PSB Proposed Case 0.2% AEP Overland Flooding Peak Flood Depths and Levels

Job No.	Figure Status
271985	**For SSDA**



Legend

- Buildings
- Proposed Building
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Proposed Pipes
- Proposed Pits
- Flood Level Contours (mAHD)

Peak Flood Depths (m)

- <= 0.05
- 0.05 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- > 1

Issue	Date	By	Chkd	Appd
1	12-02-2021	JC	NC	TT

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Job Title
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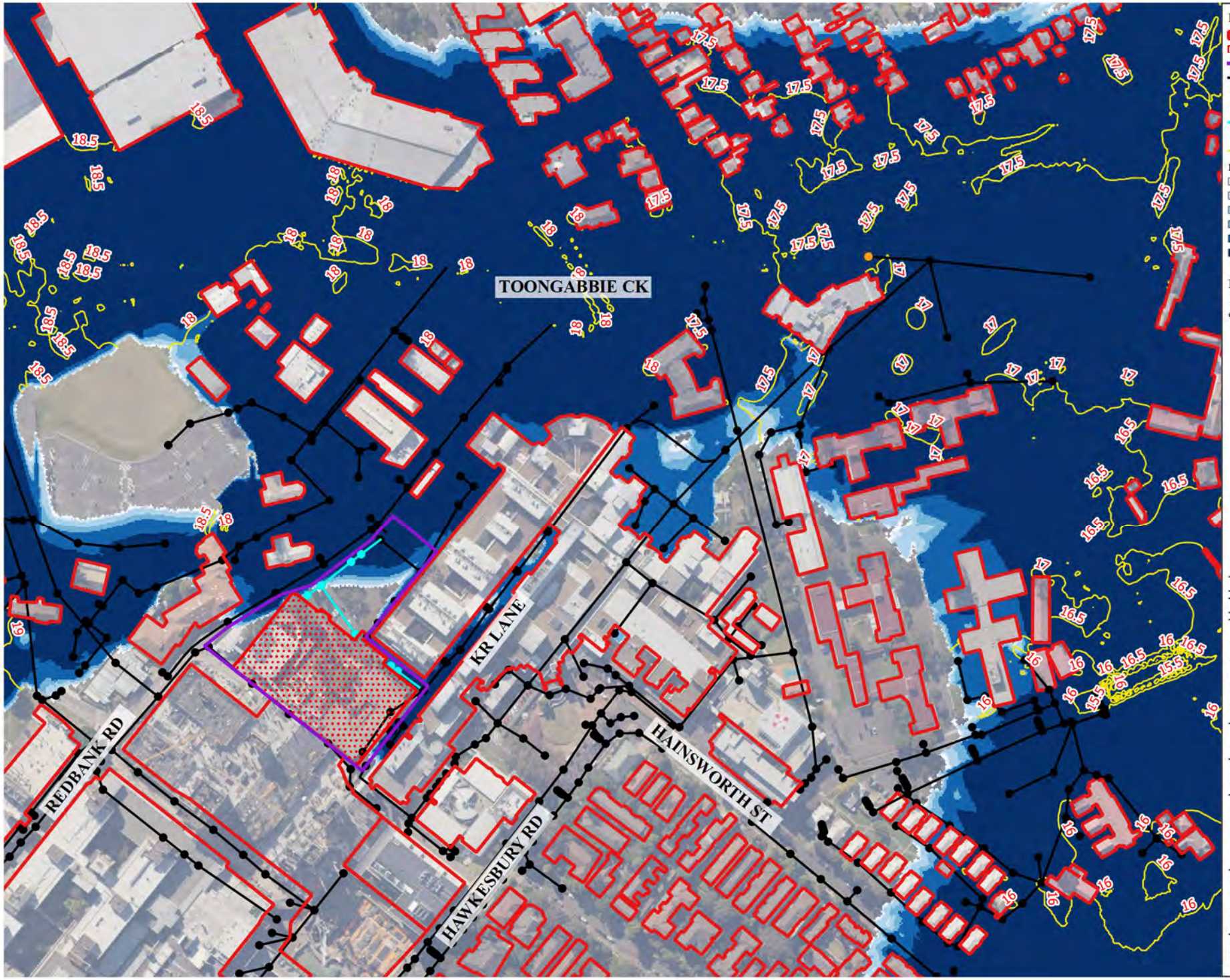
25 0 25 50 m

Scale at A3 1:2,500

Figure No. P.D.5

PSB Proposed Case PMF
Overland Flooding
Peak Flood Depths and Levels

Job No.	Figure Status
271985	**For SSDA**



Legend

- Buildings
- Proposed Building
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Proposed Pipes
- Proposed Pits
- Flood Level Contours (mAHD)

Peak Flood Depths (m)

- <= 0.05
- 0.05 - 0.1
- 0.1 - 0.3
- 0.3 - 0.5
- 0.5 - 1
- > 1

Notes:

1. The riverine flooding shown excludes local catchment runoff

Issue	Date	By	Chkd	Appd
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Job Title
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25 0 25 50 m

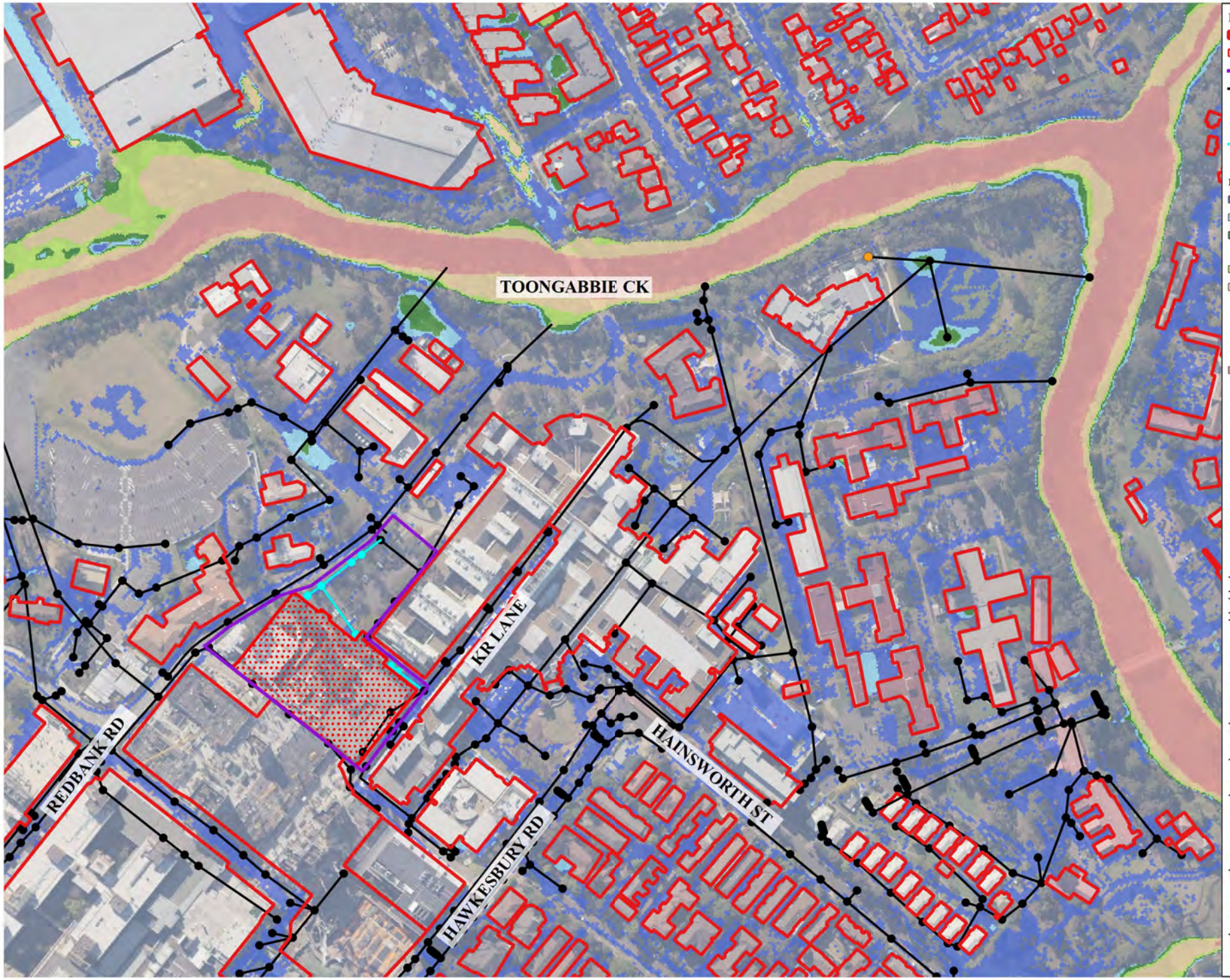
Scale at A3 1:2,500

Figure No. P.D.6

PSB Proposed Case PMF
Riverine Flooding
Peak Flood Depths and Levels

Job No.
271985

Figure Status
For SSDA



Legend

- Buildings
- Proposed Building
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Proposed Pipes
- Proposed Pits

Flood Hazard Category

- H1 - Relatively benign flow conditions.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for all vehicles, children and the elderly.
- H4 - Unsafe for all people and vehicles.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

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151 Clarence Street
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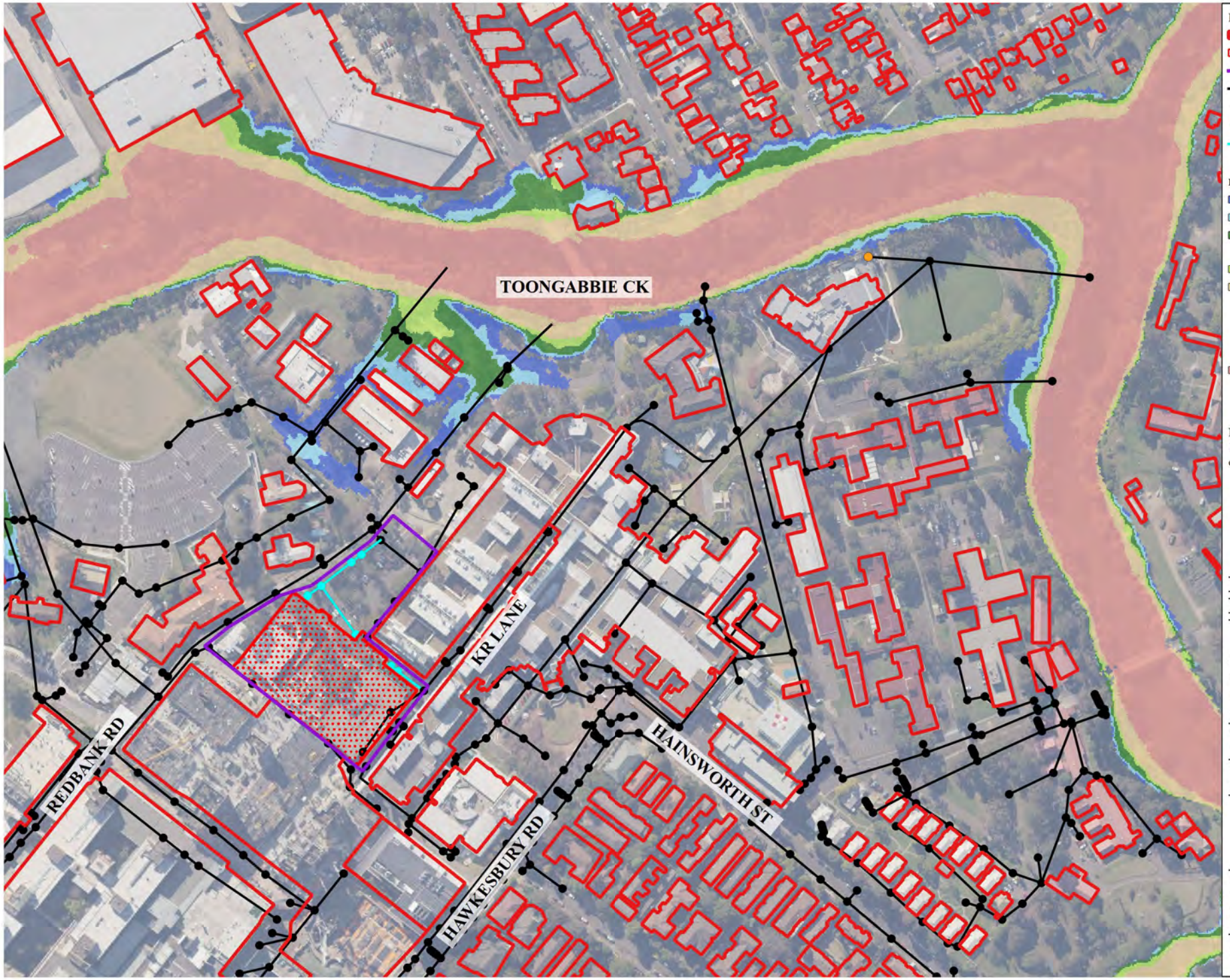
Scale at A3 1:2,500

Figure No. P.H.1

PSB Proposed Case 1% AEP Overland Flooding Hazard

Job No.	Figure Status
271985	**For SSDA**



Legend

- Buildings
- Proposed Building
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Proposed Pipes
- Proposed Pits

Flood Hazard Category

- H1 - Relatively benign flow conditions.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for all vehicles, children and the elderly.
- H4 - Unsafe for all people and vehicles.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. The riverine flooding shown excludes local catchment runoff

Issue	Date	By	Chkd	Appd
1	12-02-2021	JC	NC	TT

ARUP
Level 5, Barrack Place
151 Clarence Street
Sydney NSW 2000
Tel +61 (2) 9320 9320
www.arup.com

Client
Health Infrastructure

Job Title
Children's Hospital Westmead Stage 2

25 0 25 50 m

Scale at A3 1:2,500

Figure No. P.H.2
PSB Proposed Case 1% AEP Riverine Flooding Hazard

Job No.	Figure Status
271985	**For SSDA**

Legend

- Buildings
- Proposed Building
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Proposed Pipes
- Proposed Pits

Flood Hazard Category

- H1 - Relatively benign flow conditions.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for all vehicles, children and the elderly.
- H4 - Unsafe for all people and vehicles.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Issue	Date	By	Chkd	Appd
I	12-02-2021	JC	NC	TT

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www.arup.com

Client
Health Infrastructure

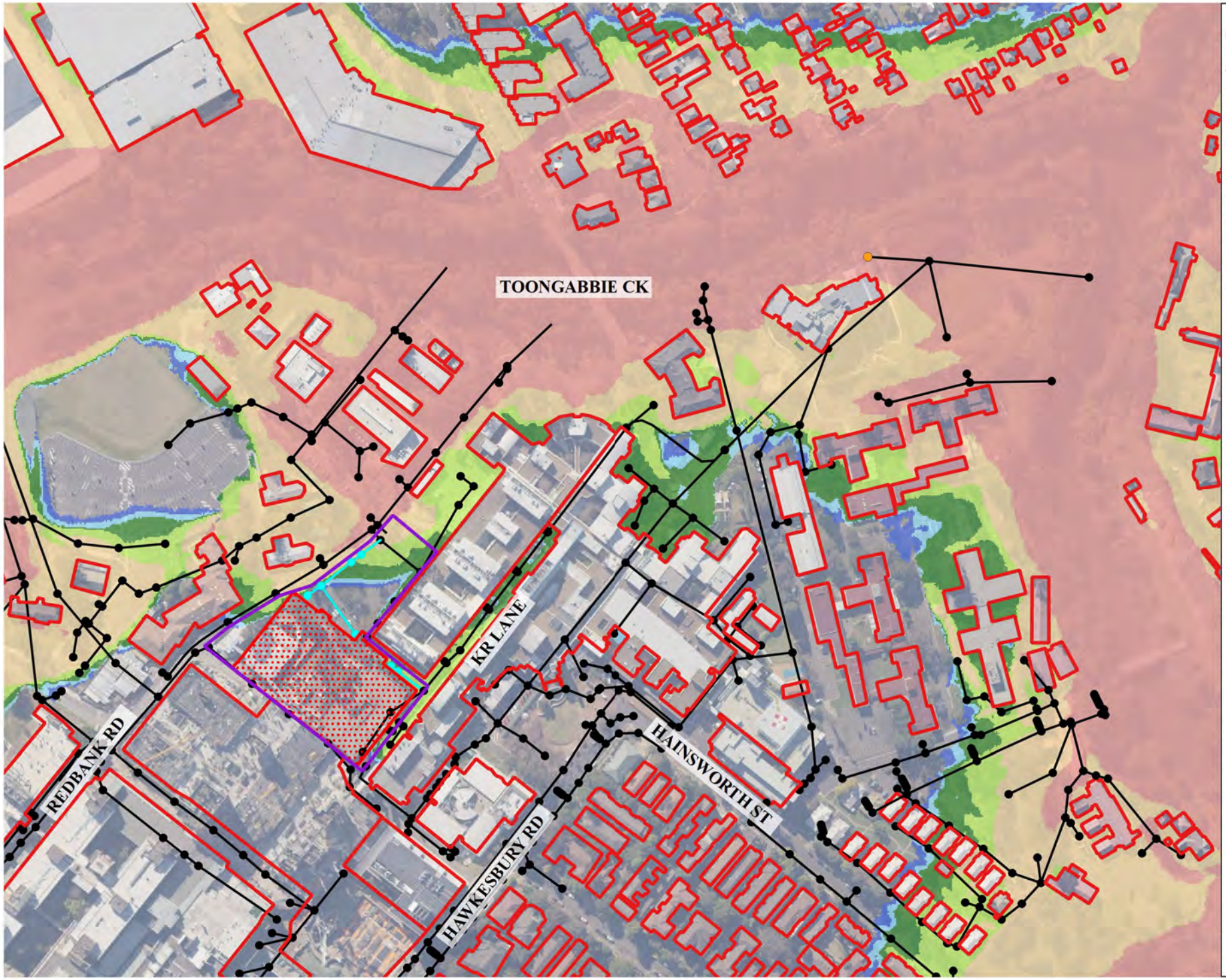
Job Title
Children's Hospital Westmead Stage 2

25 0 25 50 m

Scale at A3 1:2,500

Figure No. P.H.3
PSB Proposed Case PMF Overland Flooding Hazard

Job No.	Figure Status
271985	**For SSDA**



Legend

- Buildings
- Proposed Building
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Proposed Pipes
- Proposed Pits

Flood Hazard Category

- H1 - Relatively benign flow conditions.
- H2 - Unsafe for small vehicles.
- H3 - Unsafe for all vehicles, children and the elderly.
- H4 - Unsafe for all people and vehicles.
- H5 - Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust building types vulnerable to failure.
- H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Notes:
1. The riverine flooding shown excludes local catchment runoff

Issue	Date	By	Chkd	Appd
I	12-02-2021	JC	NC	TT

ARUP
Level 5, Barrack Place
151 Clarence Street
Sydney NSW 2000
Tel +61 (2) 9320 9320
www.arup.com

Client
Health Infrastructure

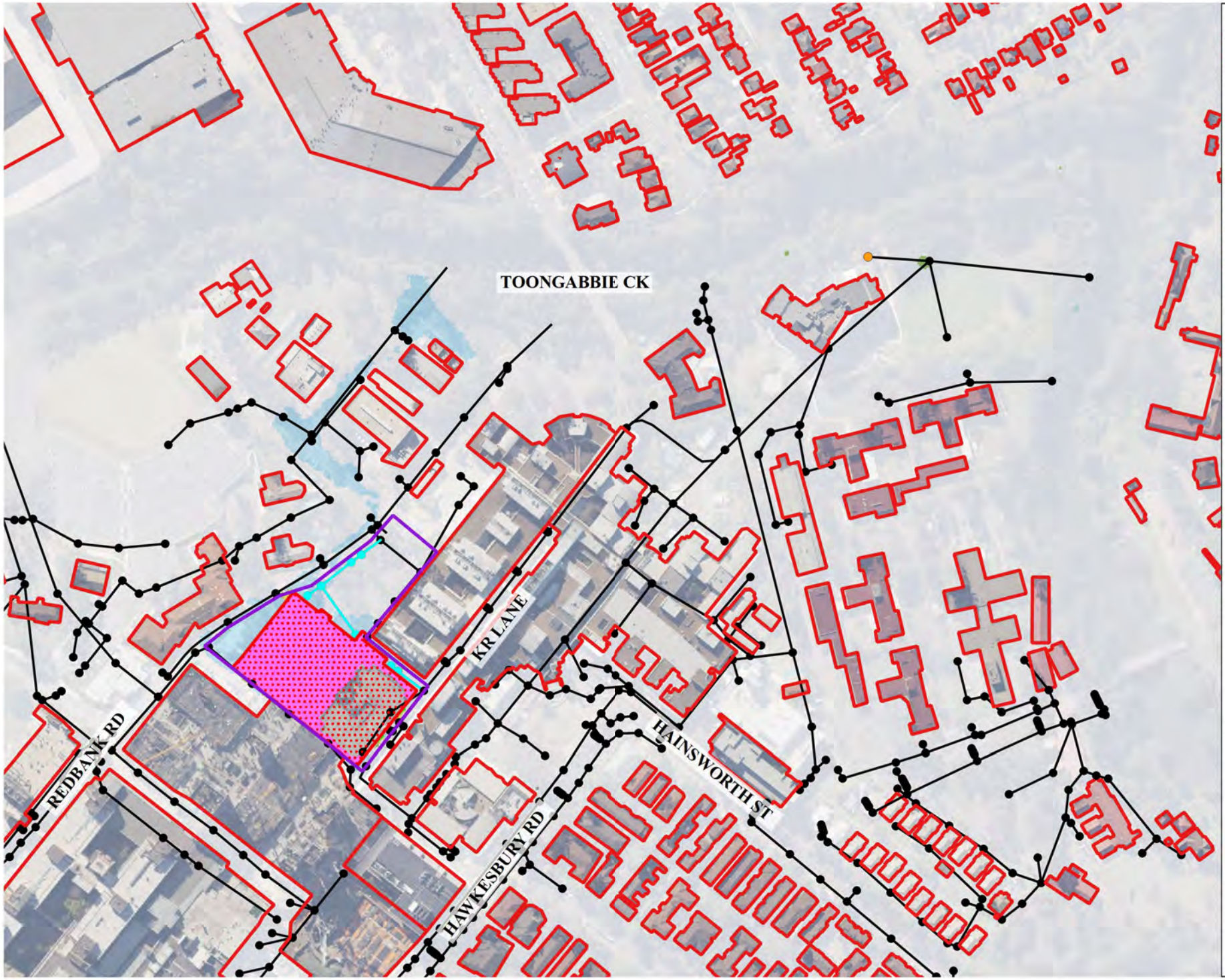
Job Title
Children's Hospital Westmead Stage 2

25 0 25 50 m

Scale at A3 1:2,500

Figure No. P.H.4
PSB Proposed Case PMF Riverine Flooding Hazard

Job No.	Figure Status
271985	**For SSDA**



Legend

- Buildings
- Proposed Building
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Proposed Pipes
- Proposed Pits

Change in Flood Level (m)

- <= -0.01
- -0.01 - 0.01
- 0.01 - 0.05
- 0.05 - 0.1
- 0.1 - 0.5
- > 0.5
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

1. This figure has been produced by comparing the proposed development flooding levels presented in Figure P.D.1 with the levels as presented in Figure E.D.1. Flooding impacts report changes in peak flood levels (mAHD). Note this is not the same as peak water depth.

Issue	Date	By	Chkd	Appd
I	12-02-2021	JC	NC	TT

ARUP

Level 5, Barrack Place
151 Clarence Street
Sydney NSW 2000
Tel +61 (2) 9320 9320
www.arup.com

Client
Health Infrastructure

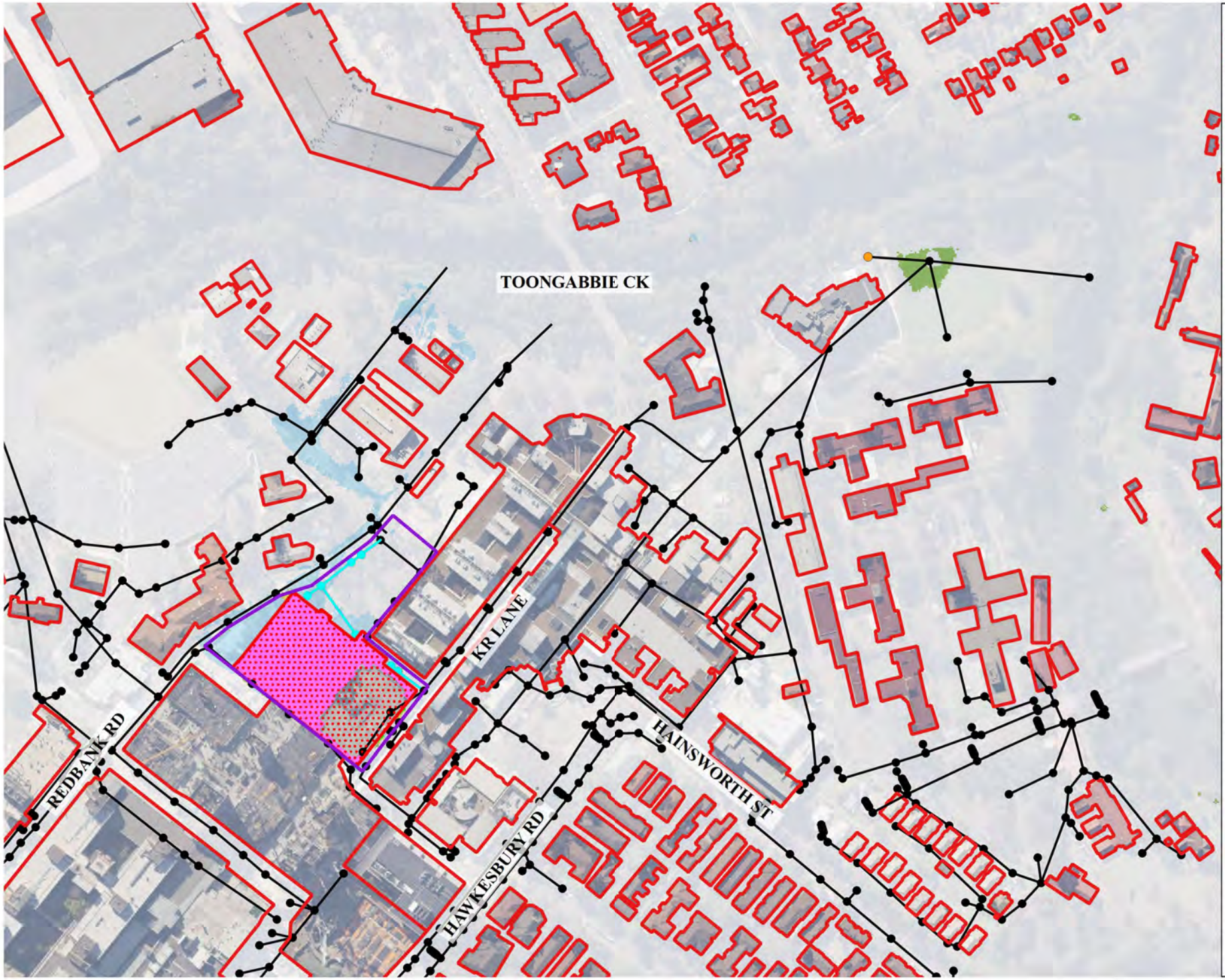
Job Title
Children's Hospital Westmead Stage 2

25 0 25 50 m

Scale at A3 1:2,500

Figure No. P.A.1
PSB Proposed Case 10% AEP Overland Flooding Afflux

Job No.	Figure Status
271985	**For SSDA**



Legend

- Buildings
- Proposed Building
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Proposed Pipes
- Proposed Pits

Change in Flood Level (m)

- <= -0.01
- -0.01 - 0.01
- 0.01 - 0.05
- 0.05 - 0.1
- 0.1 - 0.5
- > 0.5
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

1. This figure has been produced by comparing the proposed development flooding levels presented in Figure P.D.2 with the levels as presented in Figure E.D.3. Flooding impacts report changes in peak flood levels (mAHD). Note this is not the same as peak water depth.

Issue	Date	By	Chkd	Appd
I	12-02-2021	JC	NC	TT

ARUP

Level 5, Barrack Place
151 Clarence Street
Sydney NSW 2000
Tel +61 (2) 9320 9320
www.arup.com

Client
Health Infrastructure

Job Title
Children's Hospital Westmead Stage 2

25 0 25 50 m

Scale at A3 1:2,500

Figure No. P.A.2
PSB Proposed Case 1% AEP Overland Flooding Afflux

Job No.
271985

Figure Status
For SSDA

Legend

- Buildings
- Proposed Building
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Proposed Pipes
- Proposed Pits

Change in Flood Level (m)

- <= -0.01
- -0.01 - 0.01
- 0.01 - 0.05
- 0.05 - 0.1
- 0.1 - 0.5
- > 0.5
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

1. This figure has been produced by comparing the proposed development flooding levels presented in Figure P.D.3 with the levels as presented in Figure E.D.4. Flooding impacts report changes in peak flood levels (mAHD). Note this is not the same as peak water depth.

2. The riverine flooding shown excludes local catchment runoff

Issue	Date	By	Chkd	Appd
1	12-02-2021	JC	NC	TT

ARUP

Level 5, Barrack Place
151 Clarence Street
Sydney NSW 2000
Tel +61 (2) 9320 9320
www.arup.com

Client
Health Infrastructure

Job Title
Children's Hospital Westmead Stage 2

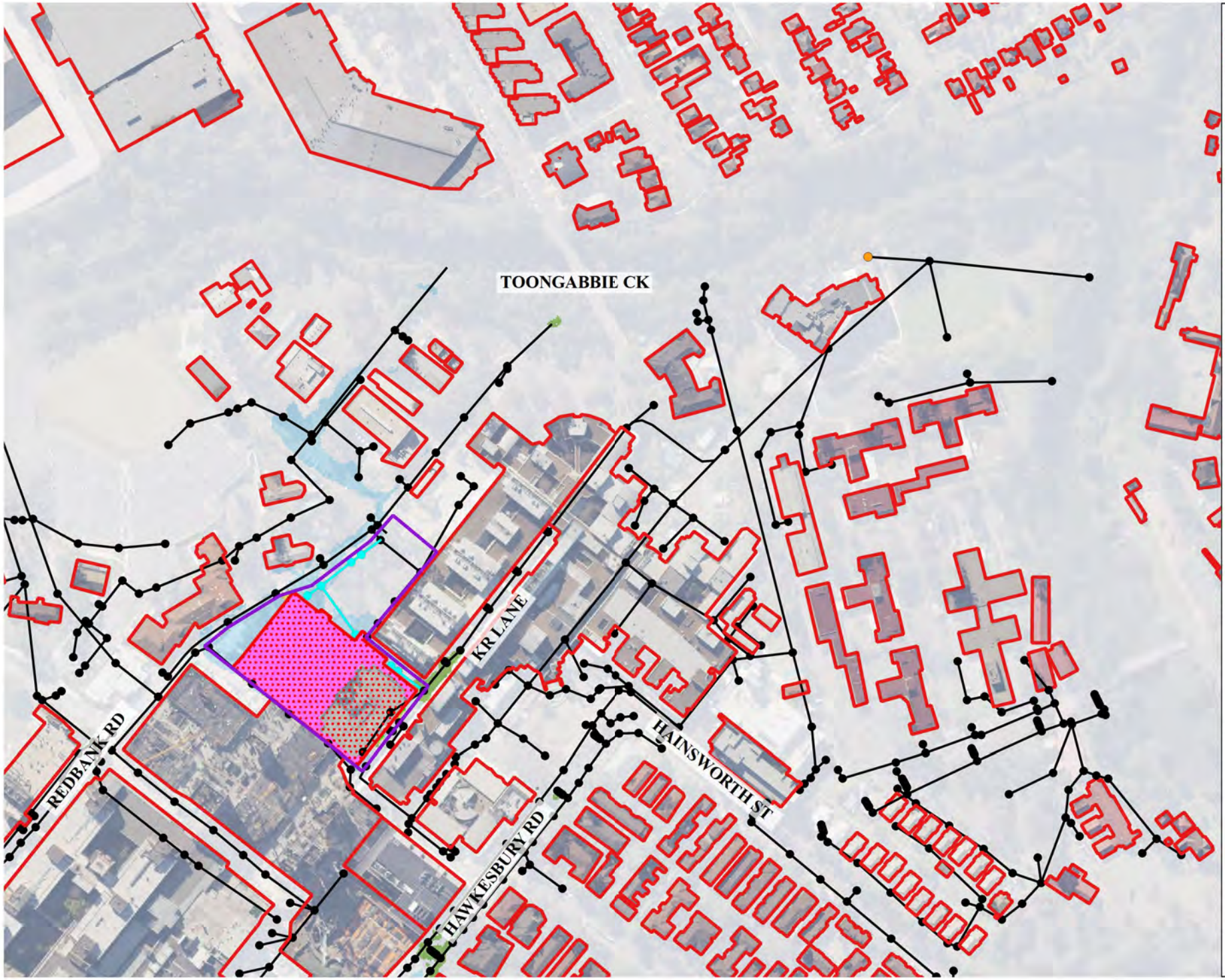
25 0 25 50 m

Scale at A3 1:2,500

Figure No. P.A.3
PSB Proposed Case 1% AEP Riverine Flooding Afflux

Job No.
271985

Figure Status
For SSDA



Legend

- Buildings
- Proposed Building
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Proposed Pipes
- Proposed Pits

Change in Flood Level (m)

- <= -0.01
- -0.01 - 0.01
- 0.01 - 0.05
- 0.05 - 0.1
- 0.1 - 0.5
- > 0.5
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

1. This figure has been produced by comparing the proposed development flooding levels presented in Figure P.D.4 with the levels as presented in Figure E.D.5. Flooding impacts report changes in peak flood levels (mAHD). Note this is not the same as peak water depth.

Issue	Date	By	Chkd	Appd
I	12-02-2021	JC	NC	TT

ARUP

Level 5, Barrack Place
151 Clarence Street
Sydney NSW 2000
Tel +61 (2) 9320 9320
www.arup.com

Client
Health Infrastructure

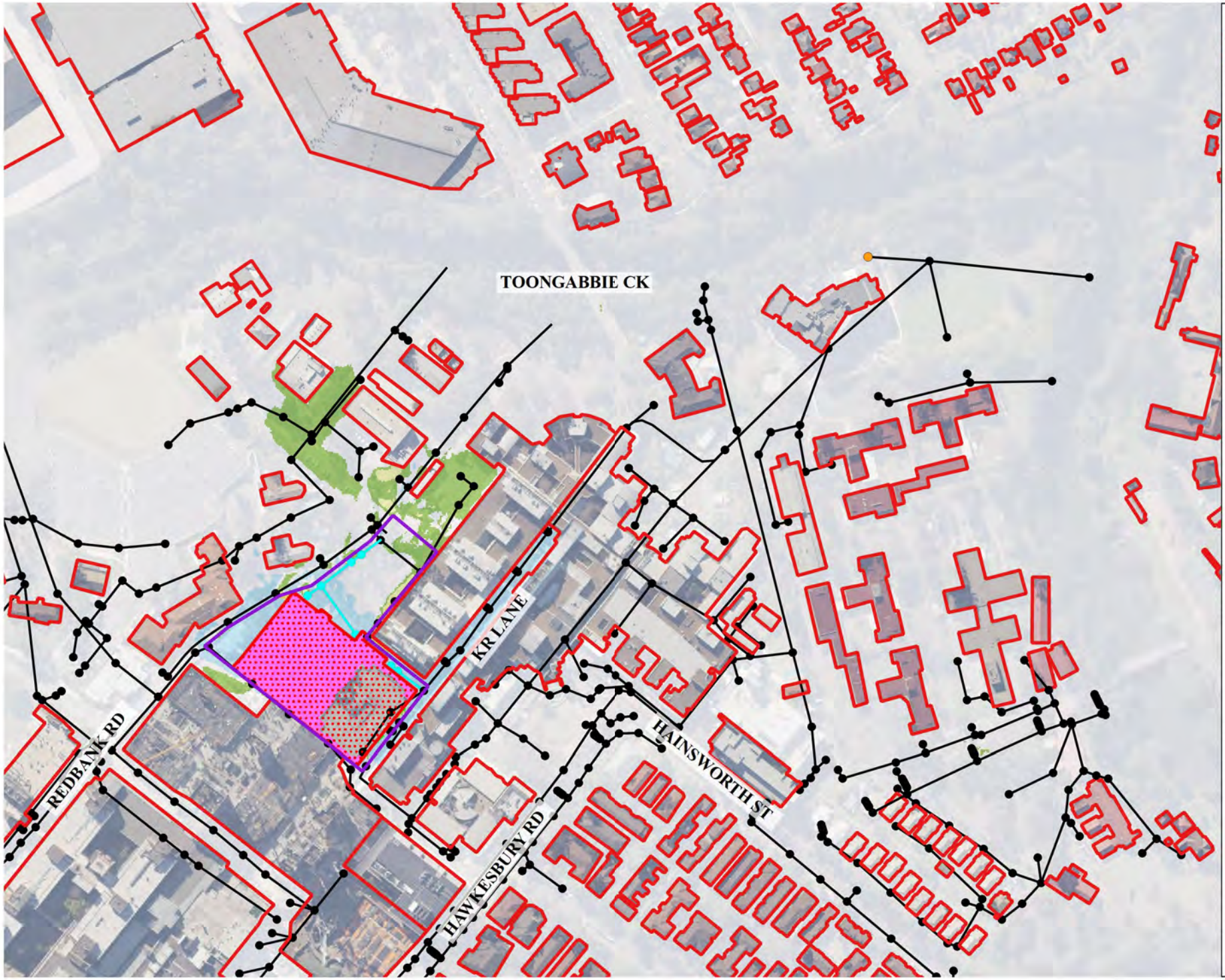
Job Title
Children's Hospital Westmead Stage 2

25 0 25 50 m

Scale at A3 1:2,500

Figure No. P.A.4
PSB Proposed Case 0.2% AEP Overland Flooding Afflux

Job No.	Figure Status
271985	**For SSDA**



Legend

- Buildings
- Proposed Building
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Proposed Pipes
- Proposed Pits

Change in Flood Level (m)

- <= -0.01
- -0.01 - 0.01
- 0.01 - 0.05
- 0.05 - 0.1
- 0.1 - 0.5
- > 0.5
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

1. This figure has been produced by comparing the proposed development flooding levels presented in Figure P.D.5 with the levels as presented in Figure E.D.7. Flooding impacts report changes in peak flood levels (mAHD). Note this is not the same as peak water depth.

Issue	Date	By	Chkd	Appd
I	12-02-2021	JC	NC	TT

ARUP

Level 5, Barrack Place
151 Clarence Street
Sydney NSW 2000
Tel +61 (2) 9320 9320
www.arup.com

Client
Health Infrastructure

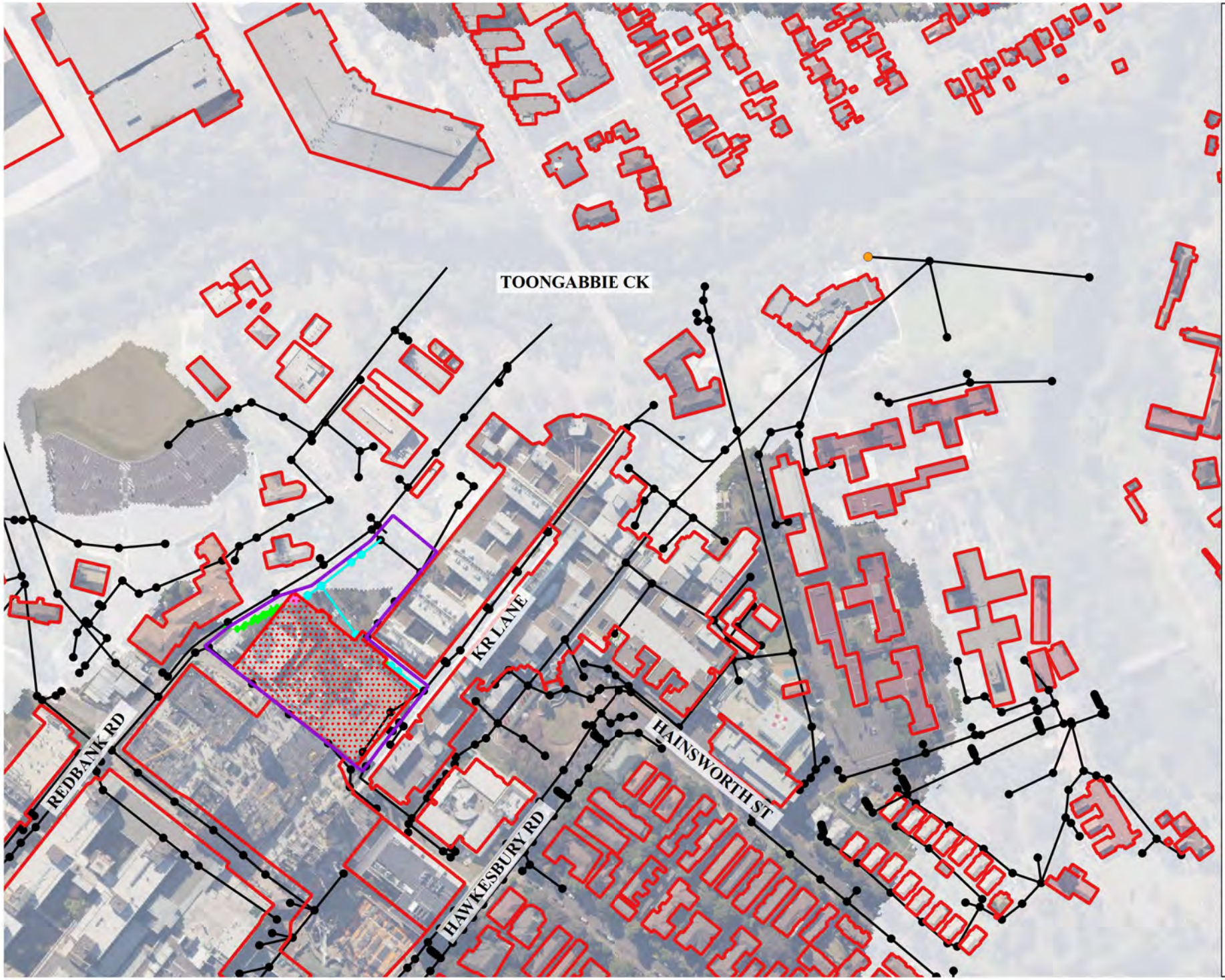
Job Title
Children's Hospital Westmead Stage 2

25 0 25 50 m

Scale at A3 1:2,500

Figure No. P.A.5
PSB Proposed Case PMF Overland Flooding Afflux

Job No.	Figure Status
271985	**For SSDA**



Legend

- Buildings
- Proposed Building
- Site Boundary
- Existing Pipes
- Existing Pits
- Existing OSD
- Proposed Pipes
- Proposed Pits

Change in Flood Level (m)

- <= -0.01
- -0.01 - 0.01
- 0.01 - 0.05
- 0.05 - 0.1
- 0.1 - 0.5
- > 0.5
- Was Wet Now Dry
- Was Dry Now Wet

Notes:

1. This figure has been produced by comparing the proposed development flooding levels presented in Figure P.D.6 with the levels as presented in Figure E.D.8. Flooding impacts report changes in peak flood levels (mAHD). Note this is not the same as peak water depth.

2. The riverine flooding shown excludes local catchment runoff

Issue	Date	By	Chkd	Appd
I	12-02-2021	JC	NC	TT

ARUP

Level 5, Barrack Place
151 Clarence Street
Sydney NSW 2000
Tel +61 (2) 9320 9320
www.arup.com

Client
Health Infrastructure

Job Title
Children's Hospital Westmead Stage 2

25 0 25 50 m

Scale at A3 1:2,500

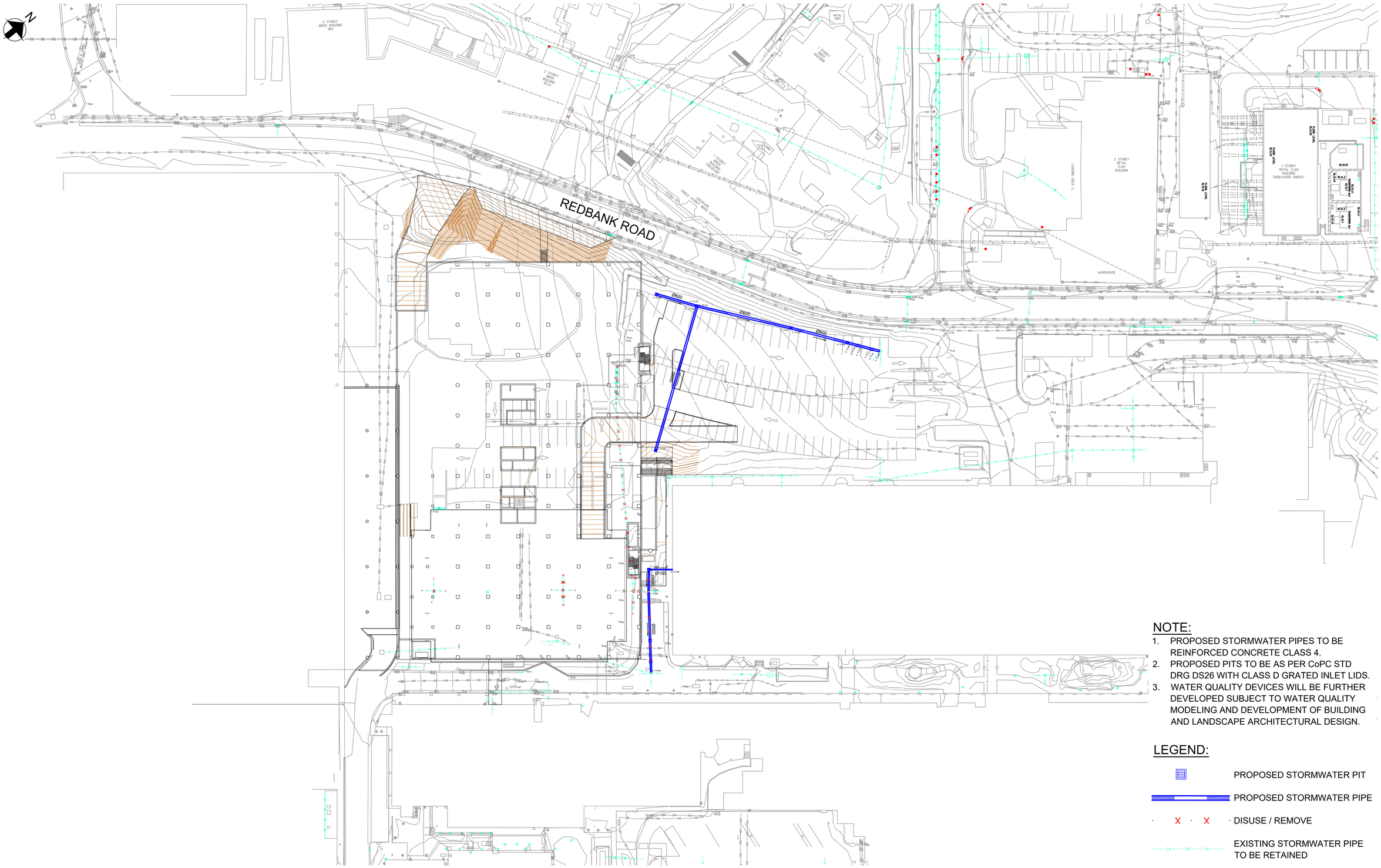
Figure No. P.A.6
PSB Proposed Case PMF Riverine Flooding Afflux

Job No.	Figure Status
271985	**For SSDA**

Appendix B

Stormwater Management Plan

A1



NOTE:

1. PROPOSED STORMWATER PIPES TO BE REINFORCED CONCRETE CLASS 4.
2. PROPOSED PITS TO BE AS PER CoPC STD DRG DS26 WITH CLASS D GRATED INLET LIDS.
3. WATER QUALITY DEVICES WILL BE FURTHER DEVELOPED SUBJECT TO WATER QUALITY MODELING AND DEVELOPMENT OF BUILDING AND LANDSCAPE ARCHITECTURAL DESIGN.

LEGEND:

- PROPOSED STORMWATER PIT
- PROPOSED STORMWATER PIPE
- DISUSE / REMOVE
- EXISTING STORMWATER PIPE TO BE RETAINED

NOT FOR CONSTRUCTION

Scales

0 10 20m

A1 / A3
1:500 / 1:1000

Design Model Version
Xref ..\d0515556\X-ARU-PGL-SU-CADASTRAL.dwg

Do not scale

Issue	Date	By	Chkd	Appd

Issue	Date	By	Chkd	Appd
4	11.02.21	DJ	TT	BH
SCHEMATIC DESIGN UPDATE				

Issue	Date	By	Chkd	Appd
3	21.01.21	CL	TT	LC
SCHEMATIC DESIGN UPDATE				
2	18.12.20	JC	TT	BH
100% SCHEMATIC DESIGN				
1	19.11.20	JC	TT	LC
DRAFT ISSUE FOR COST PLAN				

Client
NSW GOVERNMENT Health Infrastructure

Engineering Certification (CEng)
Name: .....
Signature: ..... Date: .....

Job Title
CHILDREN'S HOSPITAL WESTMEAD
STAGE 2
PAEDIATRIC SERVICES BUILDING
SCHEMATIC DESIGN

Scale at A1 1:500m

Discipline Civil

ARUP
Arup, Level 5, 151 Clarence St
Sydney, NSW, 2000
Tel +61 (02) 9320 9320 Fax +61 (02) 9320 9321
www.arup.com
CONSULT AUSTRALIA Member Firm
Arup Pty Ltd
ABN 18 000 966 165

Drawing Title
DRAINAGE
PSB
OVERALL PLAN

Drawing Status
SCHEMATIC DESIGN

Job No	Drawing No	Issue
271985-00	CHW-ARP-CV-DG-PS-00-XX600	**4**

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

A1

NOTE:

1. PROPOSED STORMWATER PIPES TO BE REINFORCED CONCRETE CLASS 4.
2. PROPOSED PITS TO BE AS PER CoPC STD DRG DS26 WITH CLASS D GRATED INLET LIDS.
3. WATER QUALITY DEVICES WILL BE FURTHER DEVELOPED SUBJECT TO WATER QUALITY MODELING AND DEVELOPMENT OF BUILDING AND LANDSCAPE ARCHITECTURAL DESIGN.

LEGEND:

- PROPOSED STORMWATER PIT
- PROPOSED STORMWATER PIPE
- DISUSE / REMOVE
- EXISTING STORMWATER PIPE TO BE RETAINED

REDBANK ROAD

1 STOREY BRICK BUILDING 'CHILDCARE'

CUBBY

CHILDCARE SINGLE STOREY BRICK COTTAGE

PROPOSED STORMWATER PIT. OPPORTUNITY FOR BUILDING STORMWATER CONNECTIONS

LITTER BASKETS TO BE INSTALLED IN PROPOSED PITS

IL 16.262

Ø600

IL 16.150

IL 16.140

IL 16.410

Ø600

IL 15.450

IL 15.440

Ø600

CONNECTION TO EXISTING NETWORK

IL 15.286

IL 15.280

IL 15.260

IL 15.22

IL 14.42

IL 14.280

Ø600

EXISTING STORMWATER LINE TO BE REMOVED

EXISTING STORMWATER PIT TO BE REMOVED

GROSS POLLUTANT TRAP

STORMWATER FILTRATION PIT. JELLYFISH OR APPROVED EQUIVALENT.

LITTER BASKETS TO BE INSTALLED IN EXISTING PIT

ADJOINS DRG No. CHW-ARP-CV-DG-PS-00-XX602

NOT FOR CONSTRUCTION

Scales

0 5 10m

A1 / A3
1:200 / 1:400

Design Model Version
Xref ..\d0515556\X-ARU-PGL-SU-CADASTRAL.dwg

Do not scale

Issue	Date	By	Chkd	Appd

Issue	Date	By	Chkd	Appd
4	11.02.21	DJ	TT	BH
SCHEMATIC DESIGN UPDATE				

Issue	Date	By	Chkd	Appd
3	21.01.21	CL	TT	LC
SCHEMATIC DESIGN UPDATE				
2	18.12.20	JC	TT	BH
100% SCHEMATIC DESIGN				
1	19.11.20	JC	TT	LC
DRAFT ISSUE FOR COST PLAN				

Client
NSW GOVERNMENT Health Infrastructure

Engineering Certification (CEng)
Name: .....
Signature: ..... Date: .....

Job Title
CHILDREN'S HOSPITAL WESTMEAD
STAGE 2
PAEDIATRIC SERVICES BUILDING
SCHEMATIC DESIGN

Scale at A1 1:200m

Discipline
Civil

ARUP
Arup, Level 5, 151 Clarence St
Sydney, NSW, 2000
Tel +61 (02) 9320 9320 Fax +61 (02) 9320 9321
www.arup.com

CONSULT AUSTRALIA
Member Firm
Arup Pty Ltd
ABN 18 000 966 165

Drawing Title
DRAINAGE
PSB
PLAN - SHEET 1 OF 2

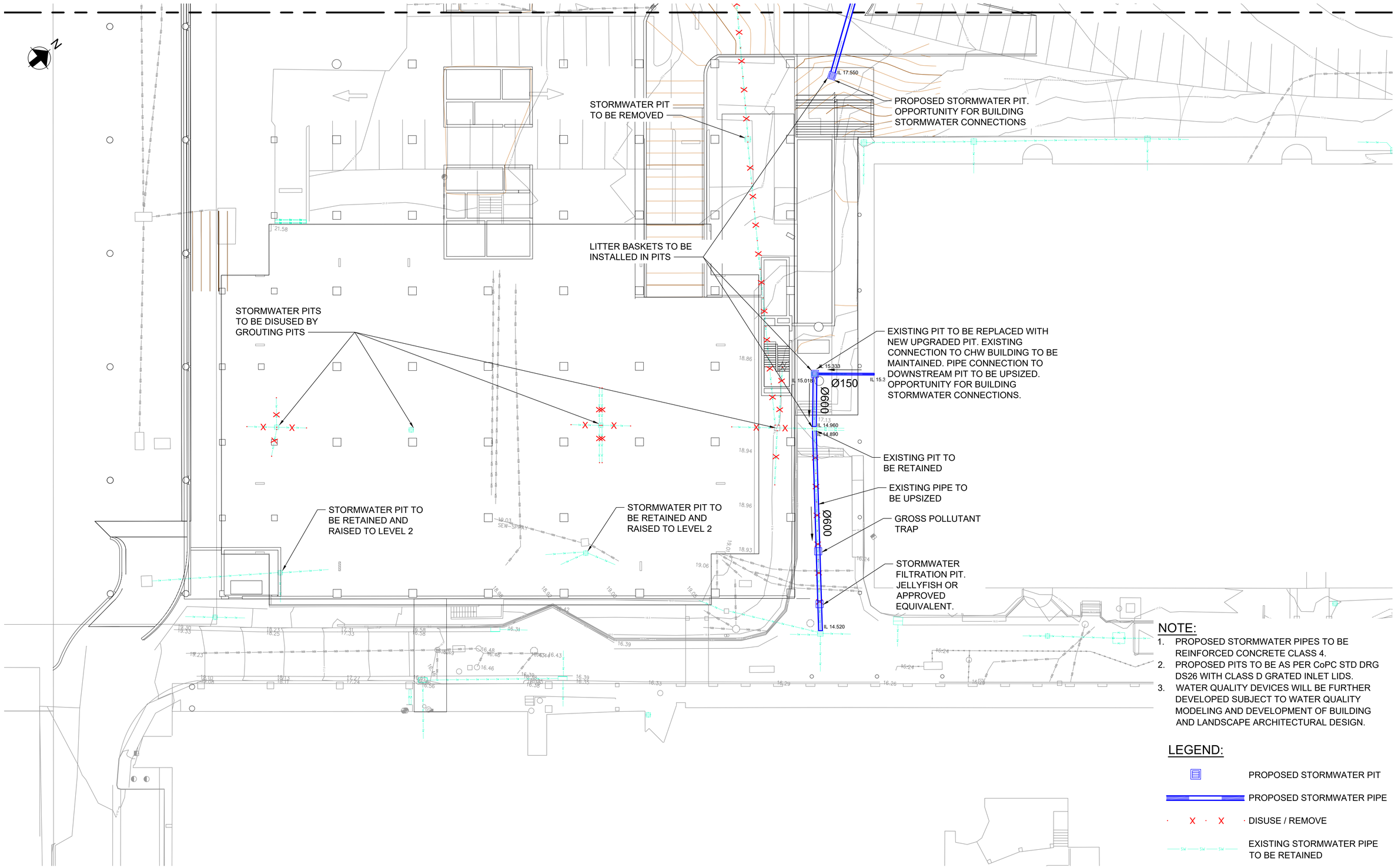
Drawing Status
SCHEMATIC DESIGN

Job No	Drawing No	Issue
271985-00	CHW-ARP-CV-DG-PS-00-XX601	4

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

A1

ADJOINS DRG No. CHW-ARP-CV-DG-PS-00-XX601



NOTE:

1. PROPOSED STORMWATER PIPES TO BE REINFORCED CONCRETE CLASS 4.
2. PROPOSED PITS TO BE AS PER CoPC STD DRG DS26 WITH CLASS D GRATED INLET LIDS.
3. WATER QUALITY DEVICES WILL BE FURTHER DEVELOPED SUBJECT TO WATER QUALITY MODELING AND DEVELOPMENT OF BUILDING AND LANDSCAPE ARCHITECTURAL DESIGN.

LEGEND:

- PROPOSED STORMWATER PIT
- PROPOSED STORMWATER PIPE
- DISUSE / REMOVE
- EXISTING STORMWATER PIPE TO BE RETAINED

NOT FOR CONSTRUCTION

Scales

0 5 10m

A1 / A3
1:200 / 1:400

Design Model Version
Xref ..\d0515556\X-ARU-PGL-SU-CADASTRAL.dwg

Do not scale

Issue	Date	By	Chkd	Appd

Issue	Date	By	Chkd	Appd
4	11.02.21	DJ	TT	BH
SCHEMATIC DESIGN UPDATE				

Issue	Date	By	Chkd	Appd
3	21.01.21	CL	TT	LC
SCHEMATIC DESIGN UPDATE				
2	18.12.20	JC	TT	BH
100% SCHEMATIC DESIGN				
1	19.11.20	JC	TT	LC
DRAFT ISSUE FOR COST PLAN				

Client
NSW GOVERNMENT Health Infrastructure

Engineering Certification (CEng)
Name: .....
Signature: ..... Date: .....

Job Title
CHILDREN'S HOSPITAL WESTMEAD
STAGE 2
PAEDIATRIC SERVICES BUILDING
SCHEMATIC DESIGN

Scale at A1 1:200m

Discipline Civil

ARUP
Arup, Level 5, 151 Clarence St
Sydney, NSW, 2000
Tel +61 (02) 9320 9320 Fax +61 (02) 9320 9321
www.arup.com
CONSULT AUSTRALIA Member Firm
Arup Pty Ltd
ABN 18 000 966 165

Drawing Title
DRAINAGE
PSB
PLAN - SHEET 2 OF 2

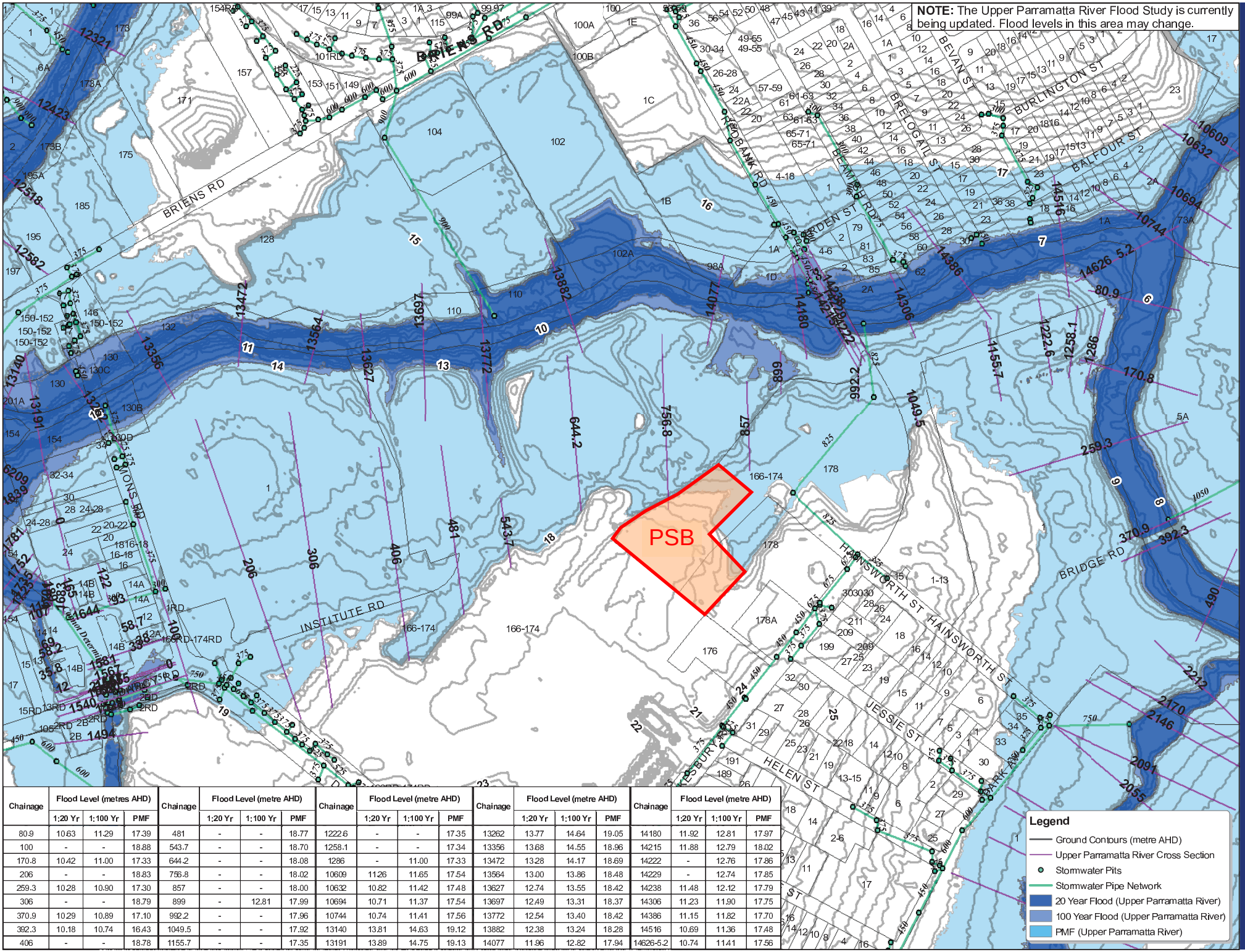
Drawing Status
SCHEMATIC DESIGN

Job No	Drawing No	Issue
271985-00	CHW-ARP-CV-DG-PS-00-XX602	4

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

Appendix C

CoPC Flood Map



Chainage	Flood Level (metres AHD)			Chainage	Flood Level (metre AHD)			Chainage	Flood Level (metre AHD)			Chainage	Flood Level (metre AHD)			Chainage	Flood Level (metre AHD)		
	1:20 Yr	1:100 Yr	PMF		1:20 Yr	1:100 Yr	PMF		1:20 Yr	1:100 Yr	PMF		1:20 Yr	1:100 Yr	PMF		1:20 Yr	1:100 Yr	PMF
80.9	10.63	11.29	17.39	481	-	-	18.77	1222.6	-	-	17.35	13262	13.77	14.64	19.05	14180	11.92	12.81	17.97
100	-	-	18.88	543.7	-	-	18.70	1258.1	-	-	17.34	13356	13.68	14.55	18.96	14215	11.88	12.79	18.02
170.8	10.42	11.00	17.33	644.2	-	-	18.08	1286	-	11.00	17.33	13472	13.28	14.17	18.69	14222	-	12.76	17.86
206	-	-	18.83	756.8	-	-	18.02	10609	11.26	11.65	17.54	13564	13.00	13.86	18.48	14229	-	12.74	17.85
259.3	10.28	10.90	17.30	857	-	-	18.00	10632	10.82	11.42	17.48	13627	12.74	13.55	18.42	14238	11.48	12.12	17.79
306	-	-	18.79	899	-	12.81	17.99	10694	10.71	11.37	17.54	13697	12.49	13.31	18.37	14306	11.23	11.90	17.75
370.9	10.29	10.89	17.10	992.2	-	-	17.96	10744	10.74	11.41	17.56	13772	12.54	13.40	18.42	14386	11.15	11.82	17.70
392.3	10.18	10.74	16.43	1049.5	-	-	17.92	13140	13.81	14.63	19.12	13882	12.38	13.24	18.28	14516	10.69	11.36	17.48
406	-	-	18.78	1155.7	-	-	17.35	13191	13.89	14.75	19.13	14077	11.96	12.82	17.94	14626-5.2	10.74	11.41	17.56

Parramatta City Council Flood Map

N

1:4,000

DISCLAIMER: Flood levels and flood extent lines are based on current information held by Council. Council does not accept responsibility for the accuracy of this Information. Any pipe sizes and location of pits and pipe lines should be confirmed by site investigation.
The flood levels provided are only an approximate guide and have been derived using the current computer simulated model.
The information provided on this document is presented in good faith. It is the responsibility of each individual using this information to undertake their own checks and confirm this information prior to its use.
Parramatta City Council, its agents and employees are not liable (whether by reason of negligence, lack of care or otherwise) to any person for any damage or loss whatsoever which has occurred or may occur in relation to that person taking or not taking (as the case may be) action in respect of any representation, statement, or advice referred to above.

Printed
11/05/2016

Appendix D

Flood Assessment and Stormwater Strategy Presentation and Meeting Minutes

Meeting Minutes

The Children's Hospital Westmead Stage 2 – Health Infrastructure / Parramatta Council Meeting

Meeting No.: 04

Date/Time: 1 February 2021 Start: 11:30am End: 12:30 pm

Venue: Video Conference

Attendance

Name		Organisation	Role
Caleb Teh	CT	Health Infrastructure	Project Director
Jim Tsom	JT	City of Parramatta Council	Catchment Development
Paul Clarke	PC	City of Parramatta Council	Catchment Development
Brian Hetherington	BH	Arup	Civil Engineer
Terrence Tang	TT	Arup	Civil Engineer
Nathan Cheah	NC	Arup	Civil Engineer
Hanan Hussaini	HH	PwC	Project Manager
Mary Sakr	MS	PwC	Project Manager

Item	Topic - Actions	Action	By
1.0	**Apologies and Introductions**		
1.1	Apologies and introductions noted.	Note	-
1.2	PwC noted the purpose of the session is to review the stormwater and flood mapping for the Westmead Health Precinct , prior to the EIS submission for the Paediatric Services Building (PSB) and Multi Storey Car Park (MSCP) as previously requested by CoPC.	Note	-
2.0	**Flood and Stormwater Strategy**		
2.1	Arup presented the stormwater and flood strategy for the PSB and MSCP (Attachment 1).	Note	-
2.2	Arup confirmed that the PSB and MSCP are proposed to be connected to private stormwater lines to eliminate the impact on the CoPC assets.	Note	-
2.3	CoPC noted that the overland flow-path will impact the existing CHW fire egress pedestrian pathway and recommended the review of the velocity and depth in that location.	Note	-
2.4	Arup noted the stormwater strategy includes direct connections into the existing stormwater network to discharge flow before river peak. Arup noted that the current site conditions are marginally impacted and therefore there is no requirement for an OSD tank. CoPC was generally in support, although queried the regulation of water quality. Arup to investigate as design progresses.	Note	-
3.0	**Other Items**		
3.1	Nil to report.	Note	-
4.0	**Next Meeting**		
4.1	To be confirmed.	Note	-

Attachments:

- **Attachment 1: Presentation**

Attachment 1: Presentation

CHW Stage 2 - Stormwater and Flood Risk Management

Agenda:

1. Children's Hospital Stage 2 Redevelopment overview and site appreciation
2. Outline the work that has been done since
3. Existing flood/stormwater conditions
4. Paediatric Services Building (PSB) Schematic Design
    - Proposed design
    - Development flood/stormwater assessment
    - Summary and next steps
5. Multistorey Car Park (MSCP) Schematic Design
    - Proposed design
    - Development flood/stormwater assessment
    - Summary and next steps

CHW Stage 2 – Stormwater and Flood Risk Management

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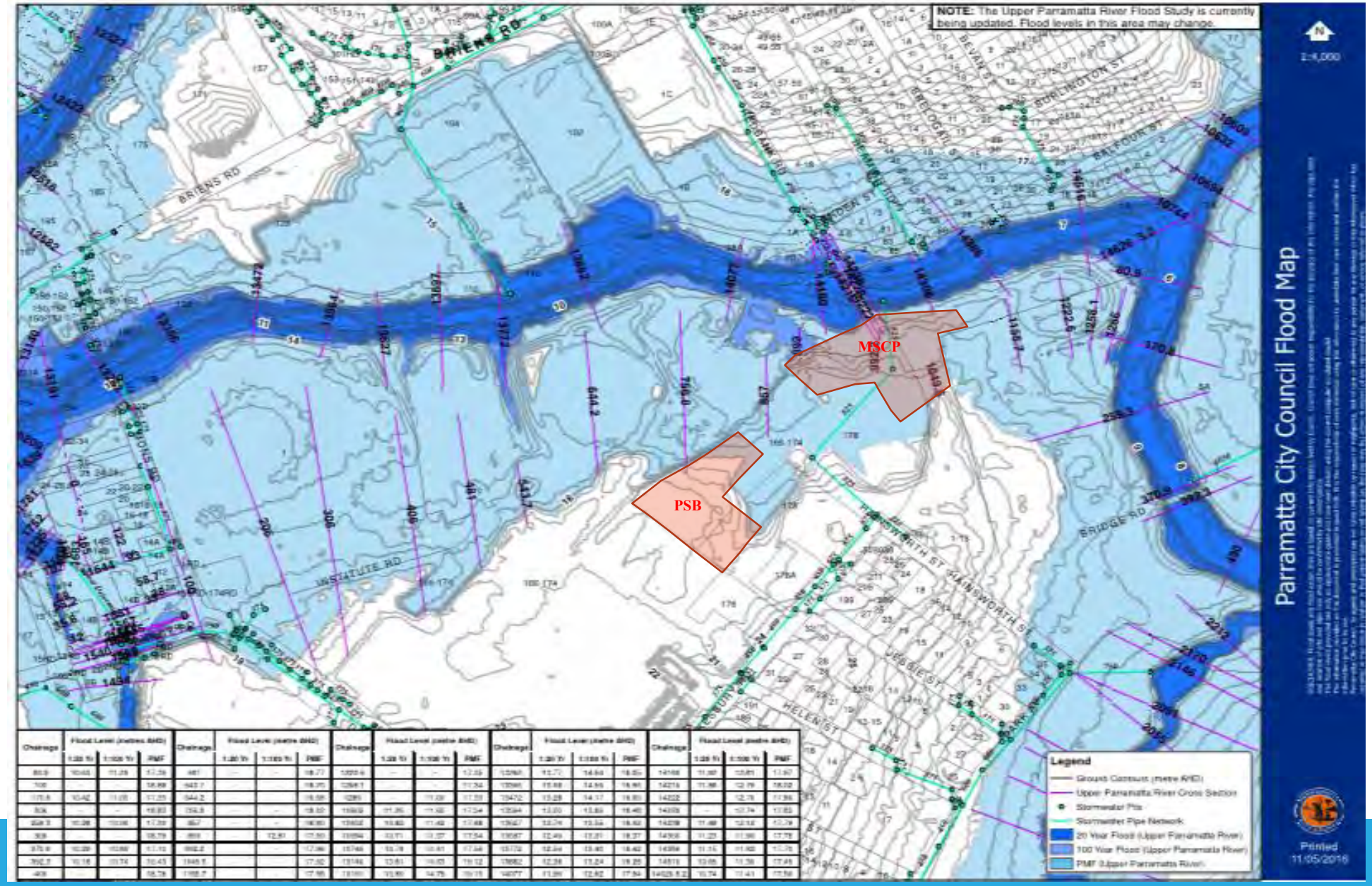
CHW Stage 2 – Stormwater and Flood Risk Management

Work Done:

- CASB Arup flood model (2017) (purple)
- PLR flood model (2019) (blue)
- PSB and MSCP site survey information (green)
- Arup combined the above information and created combined river and overland models

CHW Stage 2 – Stormwater and Flood Risk Management



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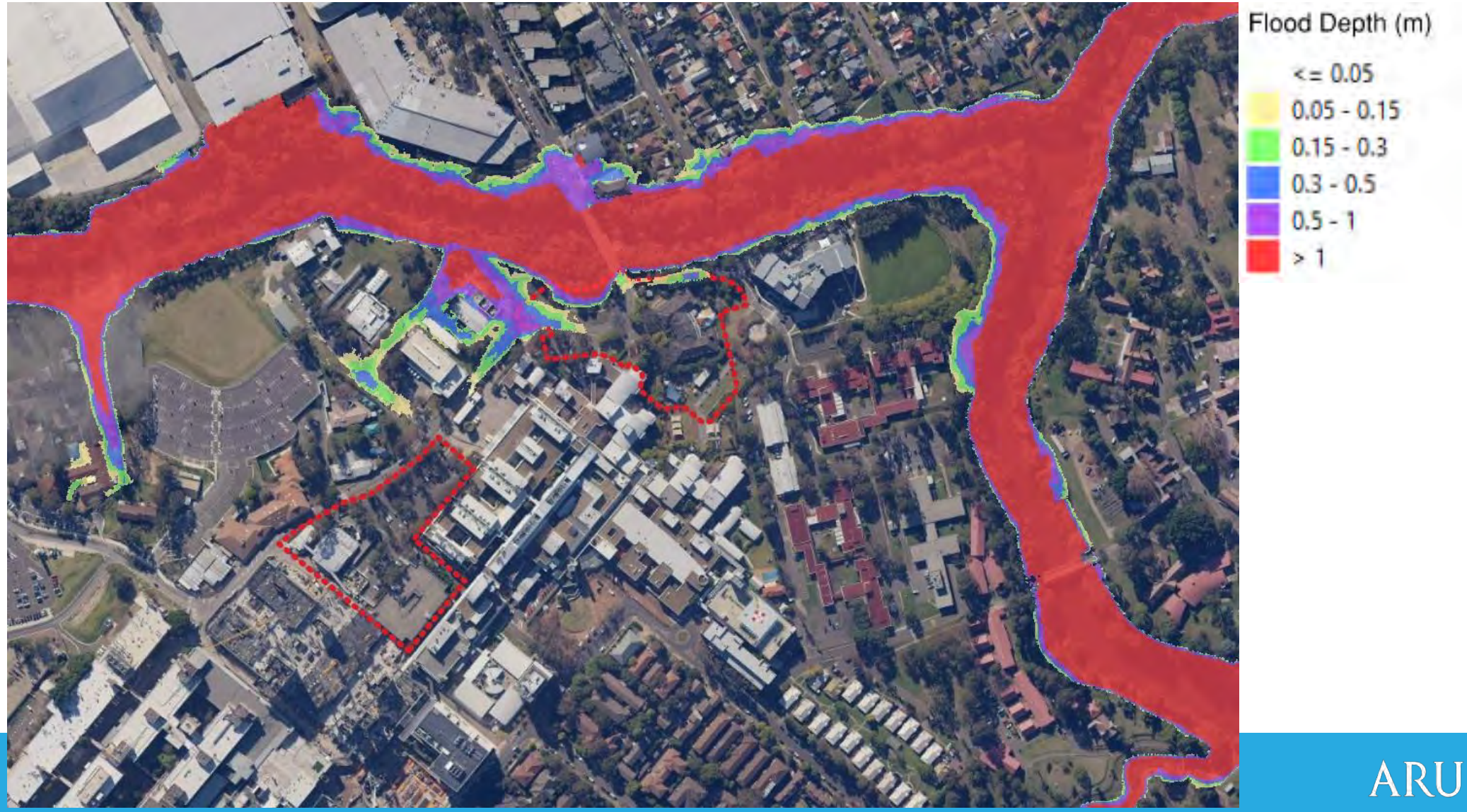
CHW Stage 2 – Stormwater and Flood Risk Management

Existing conditions - 1% AEP Overland

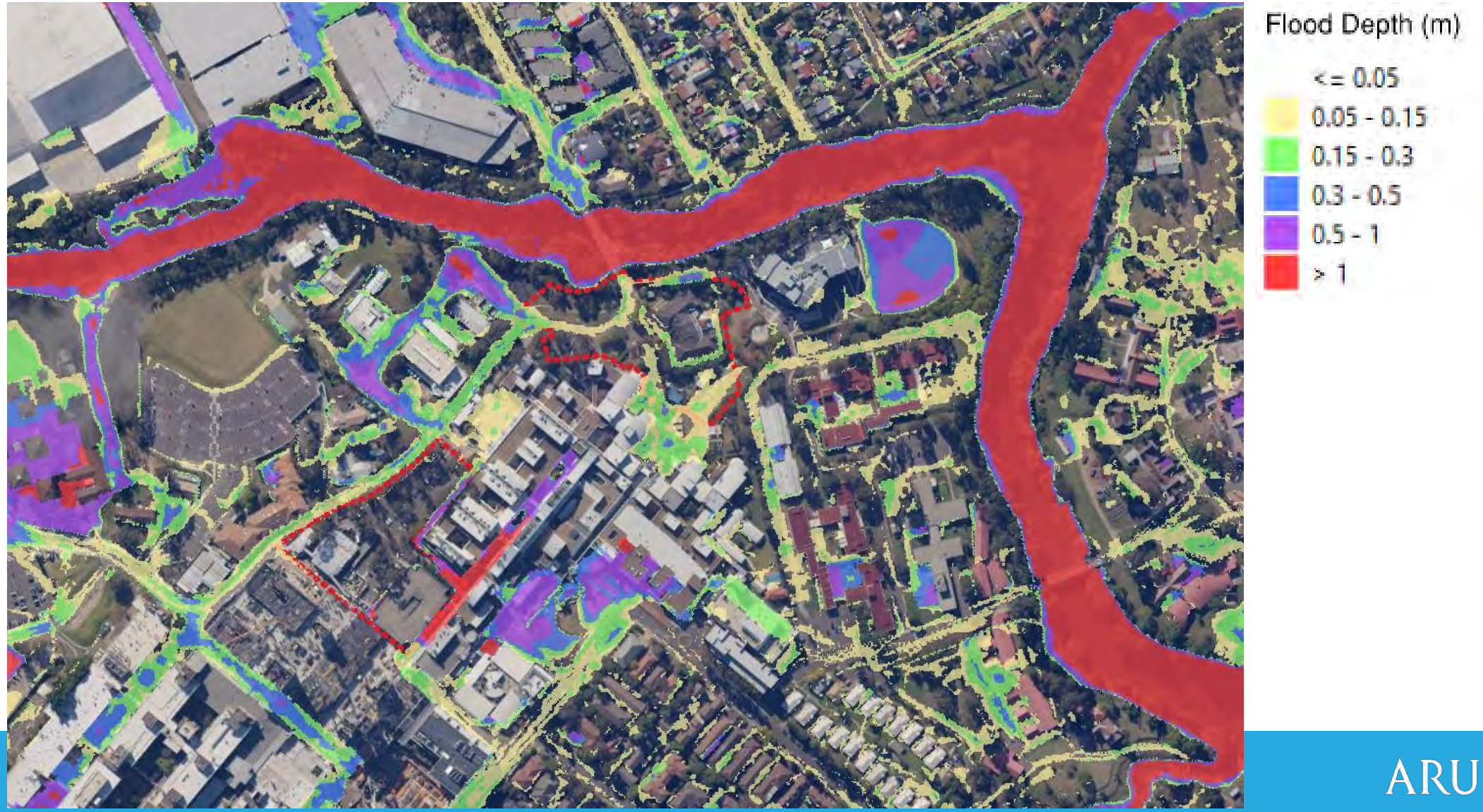
CHW Stage 2 – Stormwater and Flood Risk Management

Existing conditions - 1% AEP River



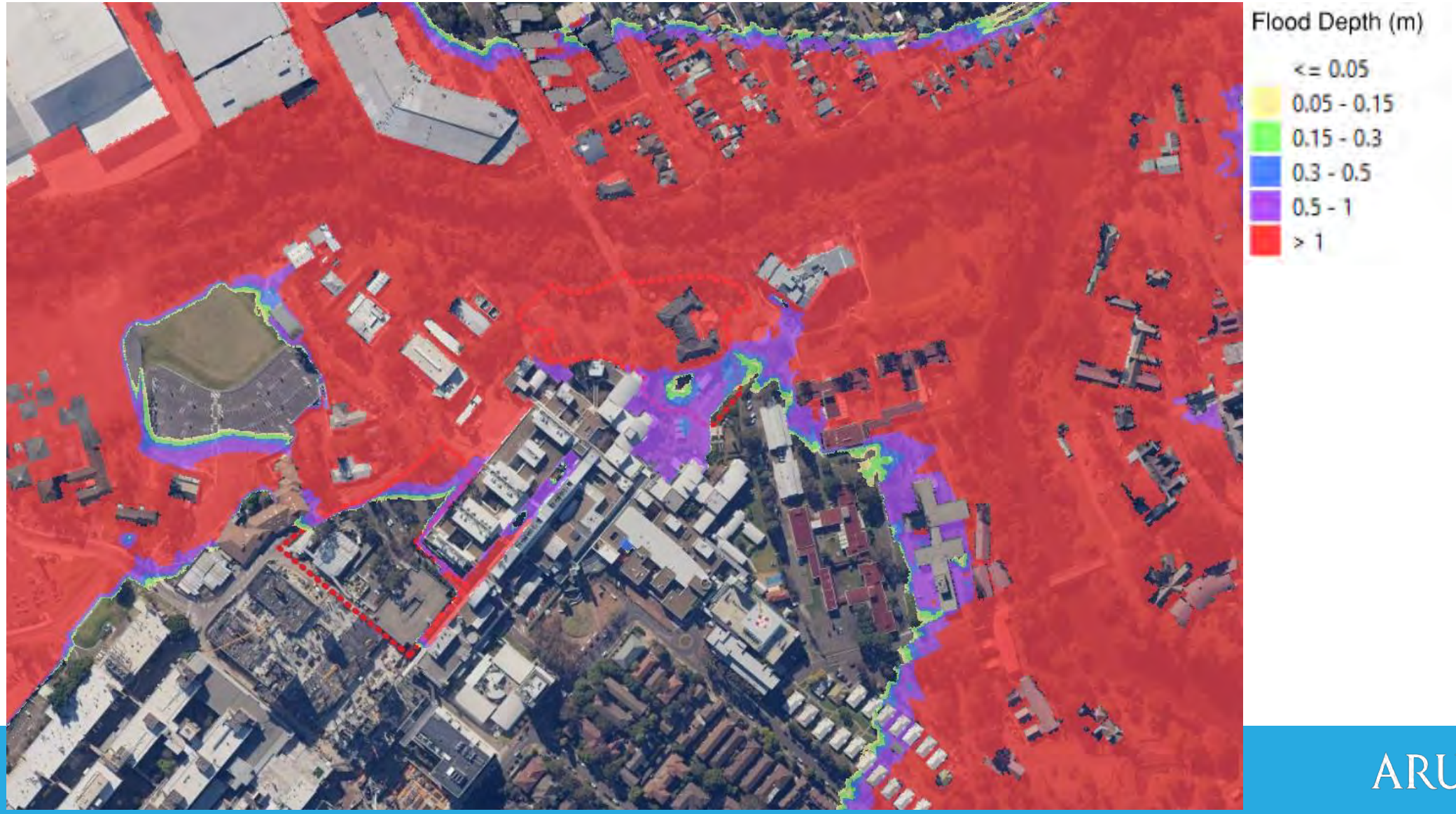
CHW Stage 2 – Stormwater and Flood Risk Management

Existing conditions – PMF Overland (30 mins)



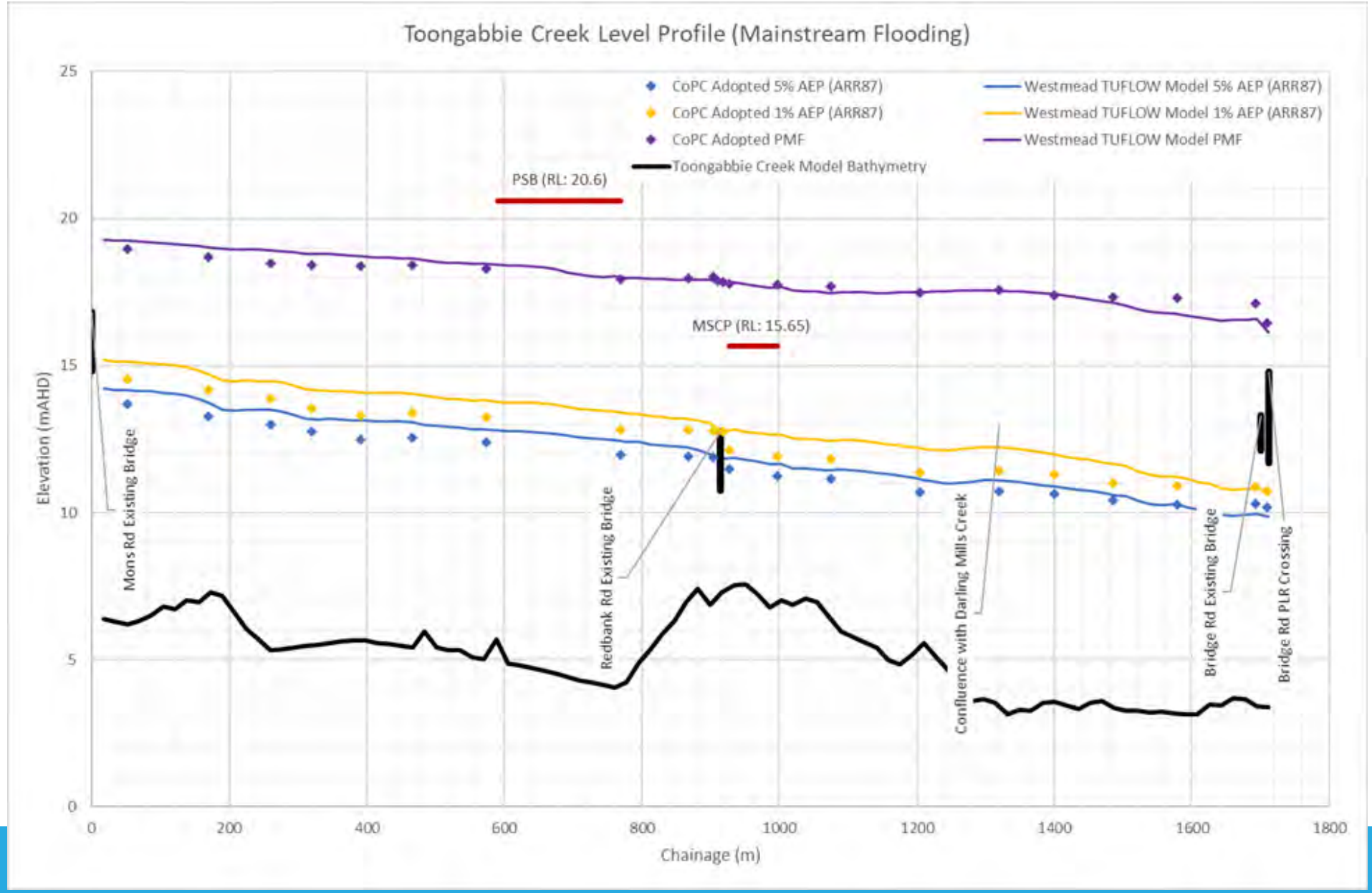
CHW Stage 2 – Stormwater and Flood Risk Management

Existing conditions – PMF River (3 hours)



CHW Stage 2 – Stormwater and Flood Risk Management

Calibration



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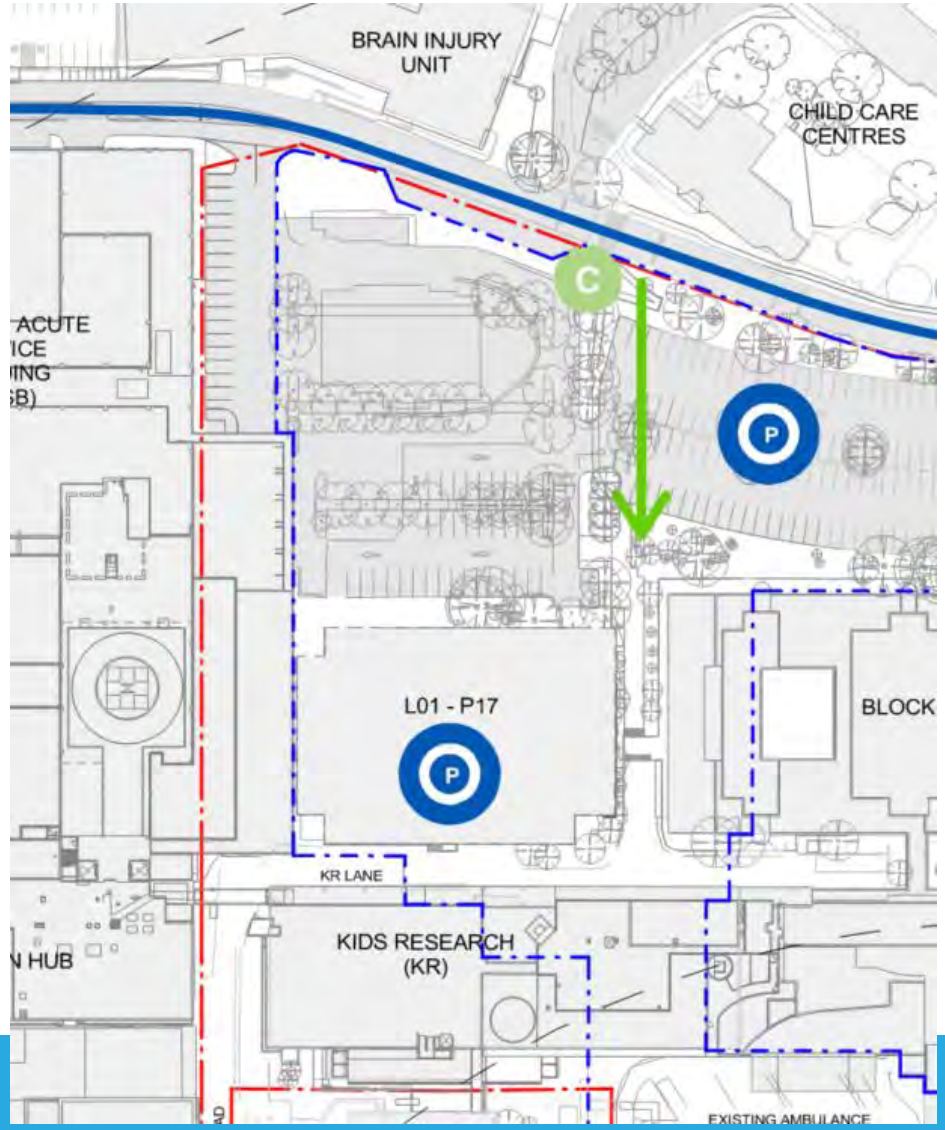
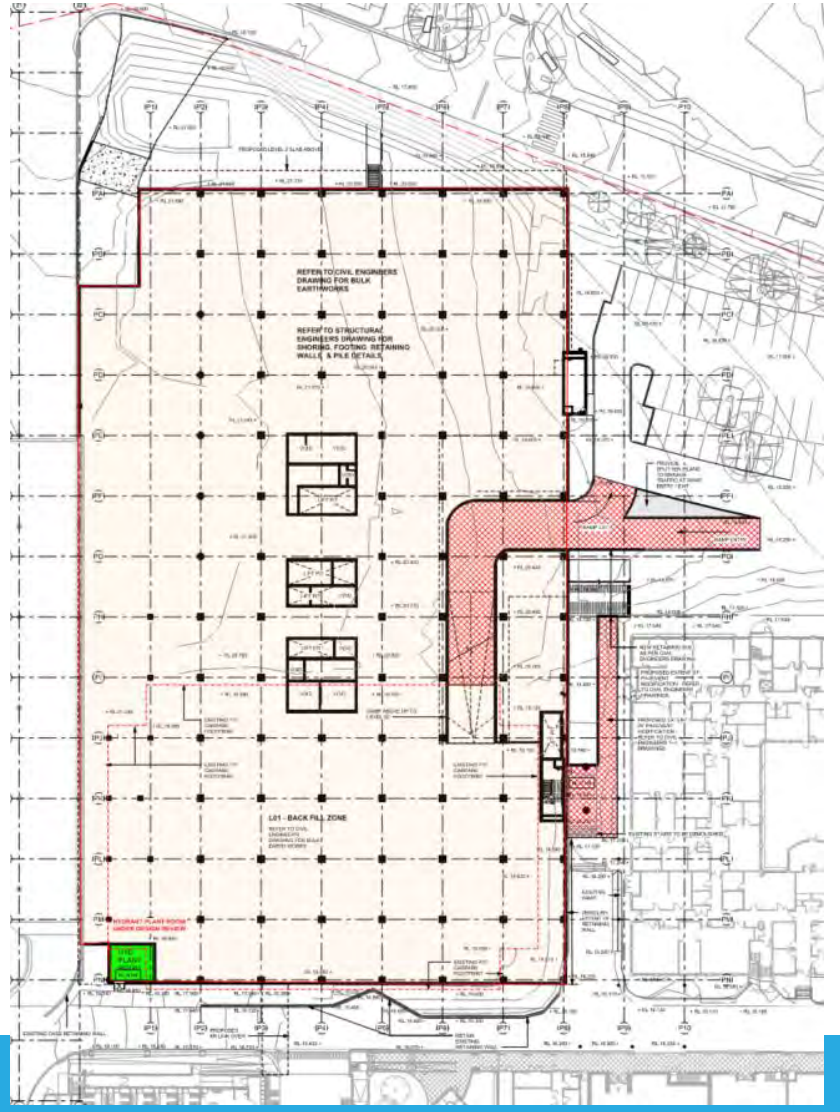
PSB – Stormwater and Flood Risk Management

Existing Site



Proposed Architectural Design



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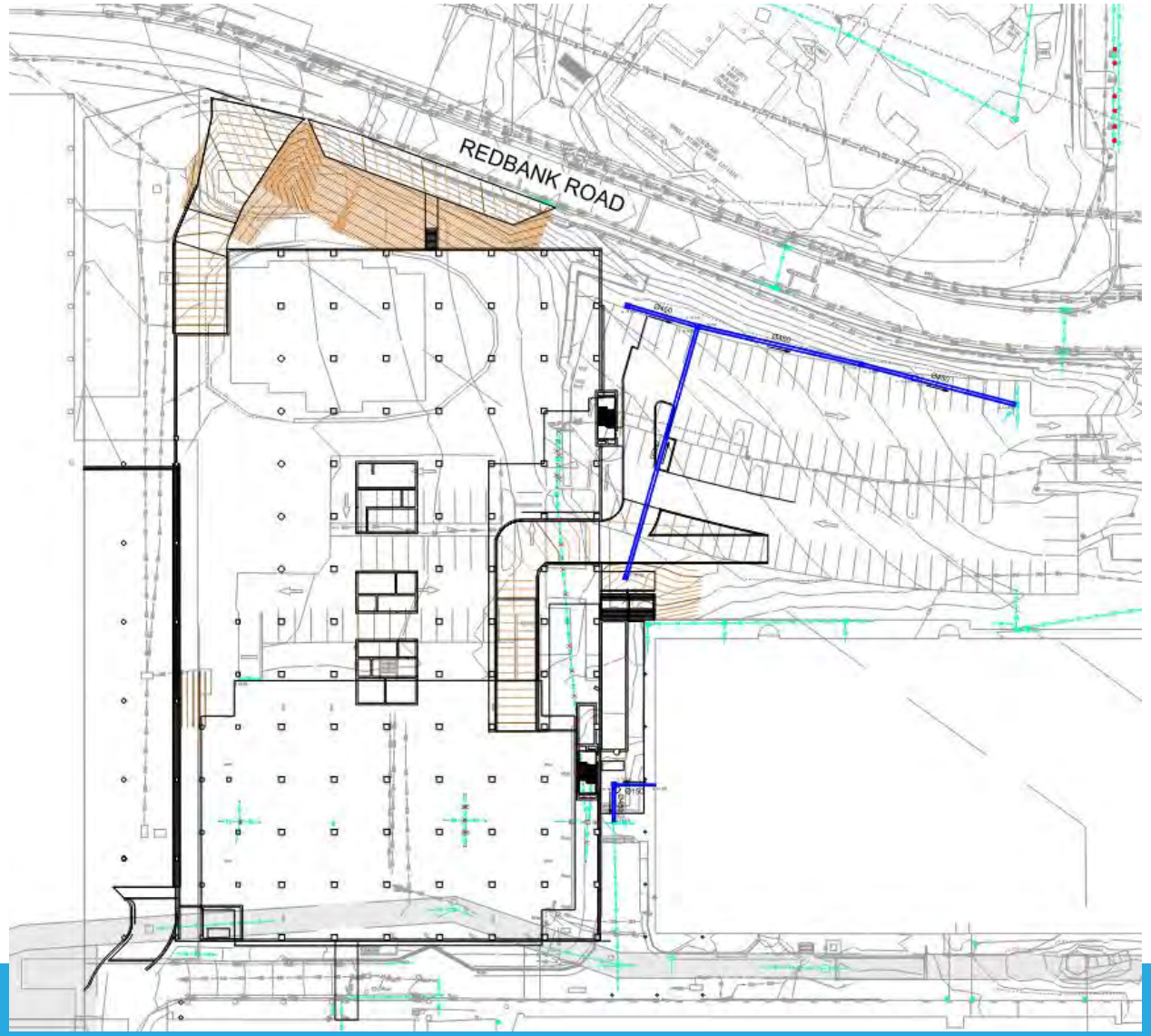
PSB – Stormwater and Flood Risk Management

Proposed Stormwater Strategy



PSB – Stormwater and Flood Risk Management

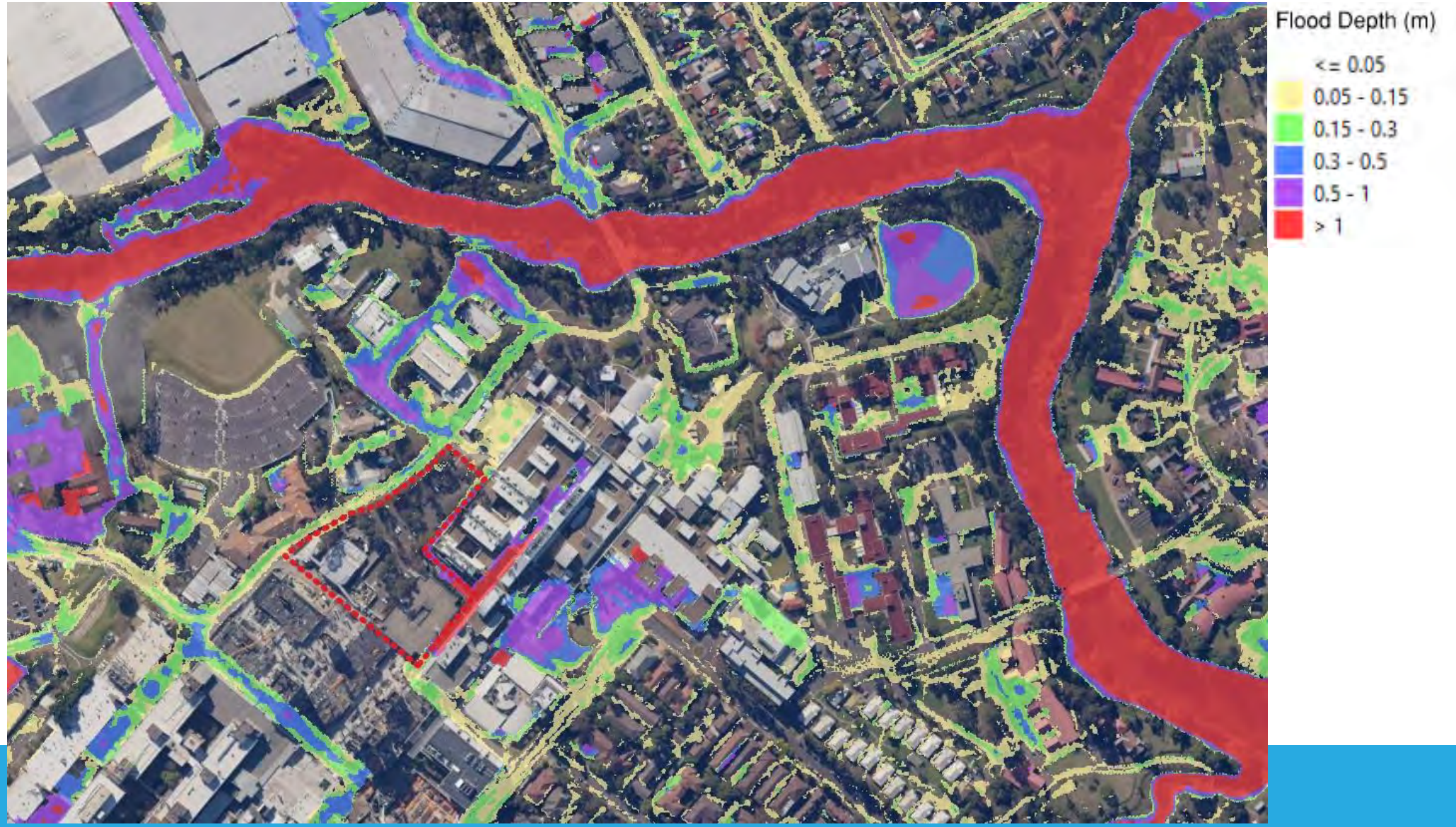
Proposed design flood results – 1% AEP Overland

PSB – Stormwater and Flood Risk Management

Proposed design flood results – 1% AEP River

PSB – Stormwater and Flood Risk Management

Proposed design flood results – PMF Overland

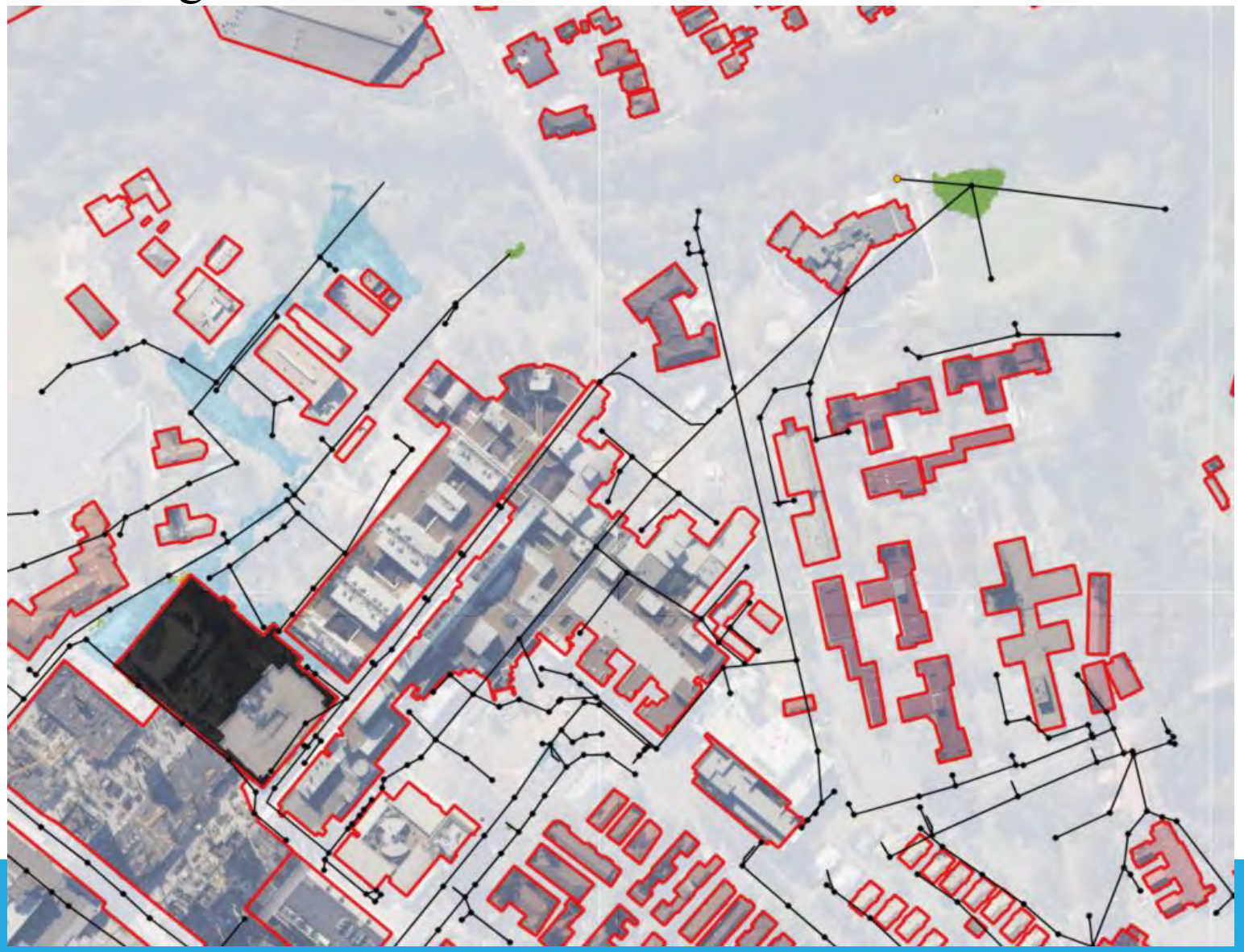


PSB – Stormwater and Flood Risk Management

Proposed design flood results – PMF River

PSB – Stormwater and Flood Risk Management

Proposed design flood results - 1% AEP Afflux Overland



Flood Level Increase (mAHD)

- <= -0.01
- -0.01 - 0.01
- 0.01 - 0.05
- 0.05 - 0.2
- > 0.2
- No longer flooded
- Newly flooded

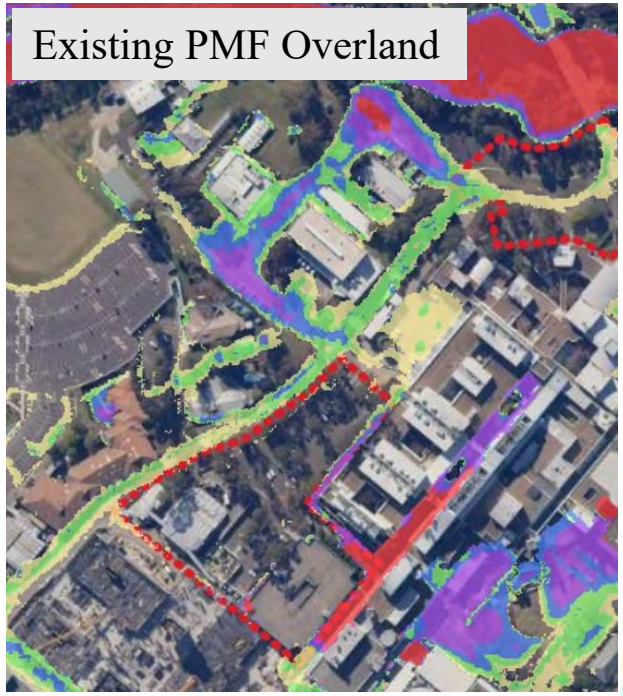
PSB – Stormwater and Flood Risk Management

Proposed design flood results – 1% AEP Afflux River

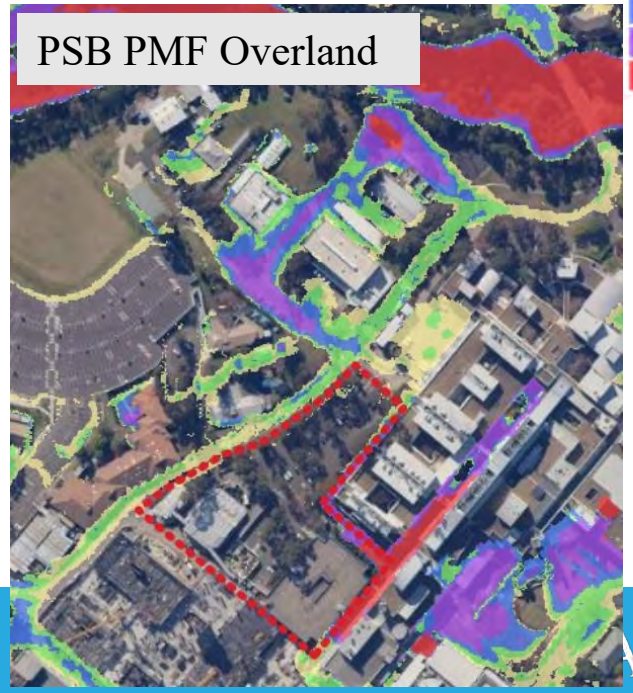
PSB – Stormwater and Flood Risk Management

Proposed design flood results - PMF Afflux Overland

Existing PMF Overland



PSB PMF Overland



Flood Depth (m)
<= 0.05
0.05 - 0.15
0.15 - 0.3
0.3 - 0.5
0.5 - 1
> 1

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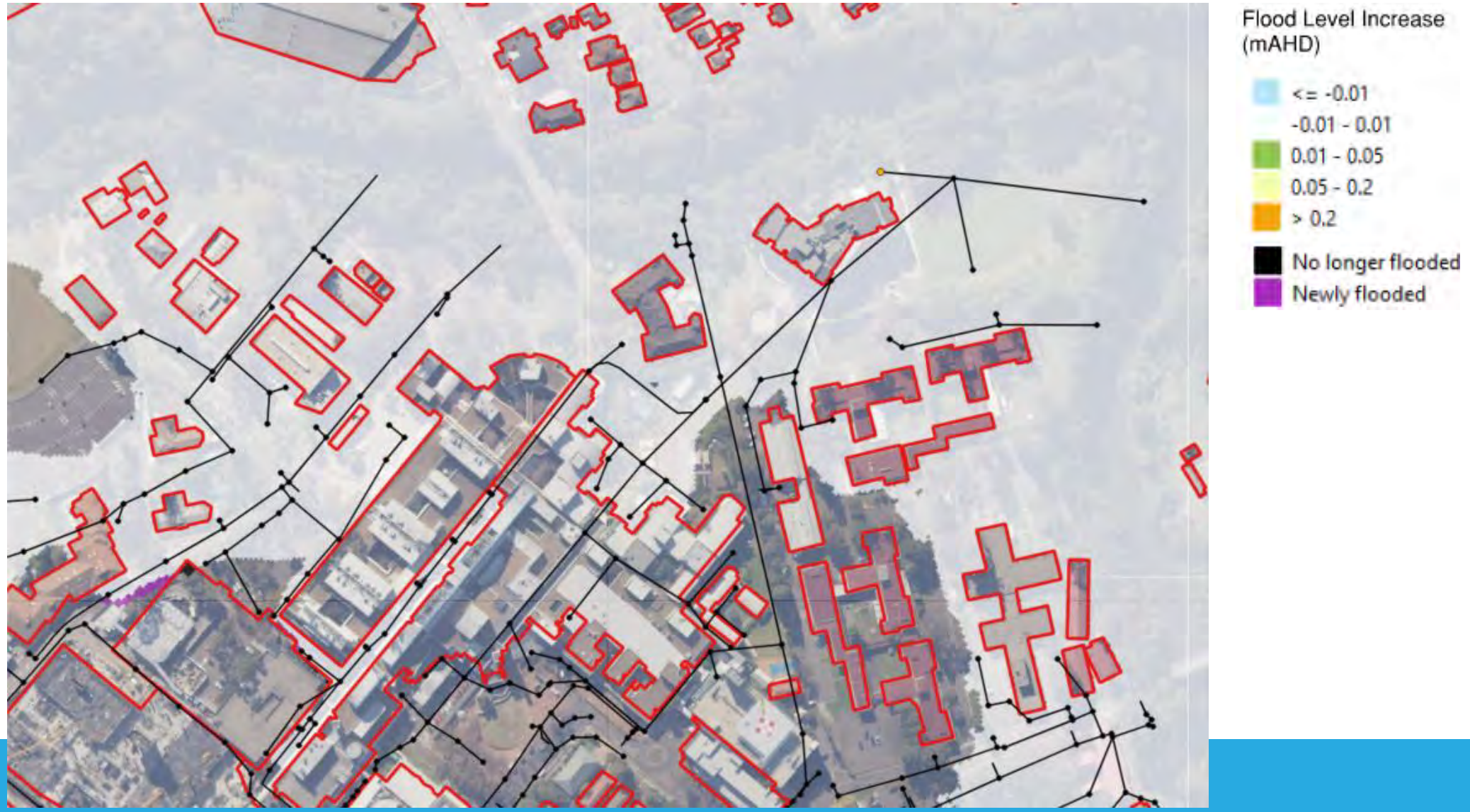
PSB – Stormwater and Flood Risk Management

Proposed design flood results – PMF Afflux River

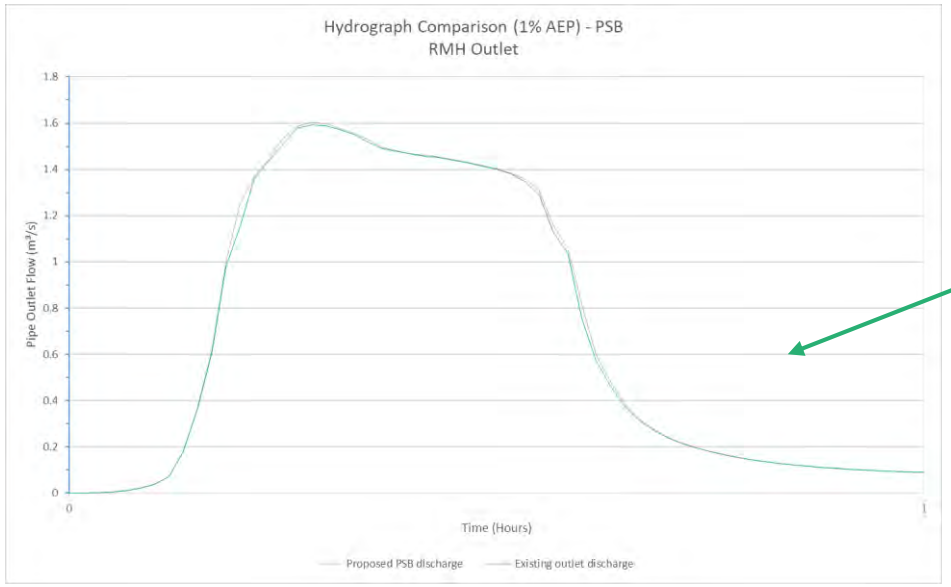


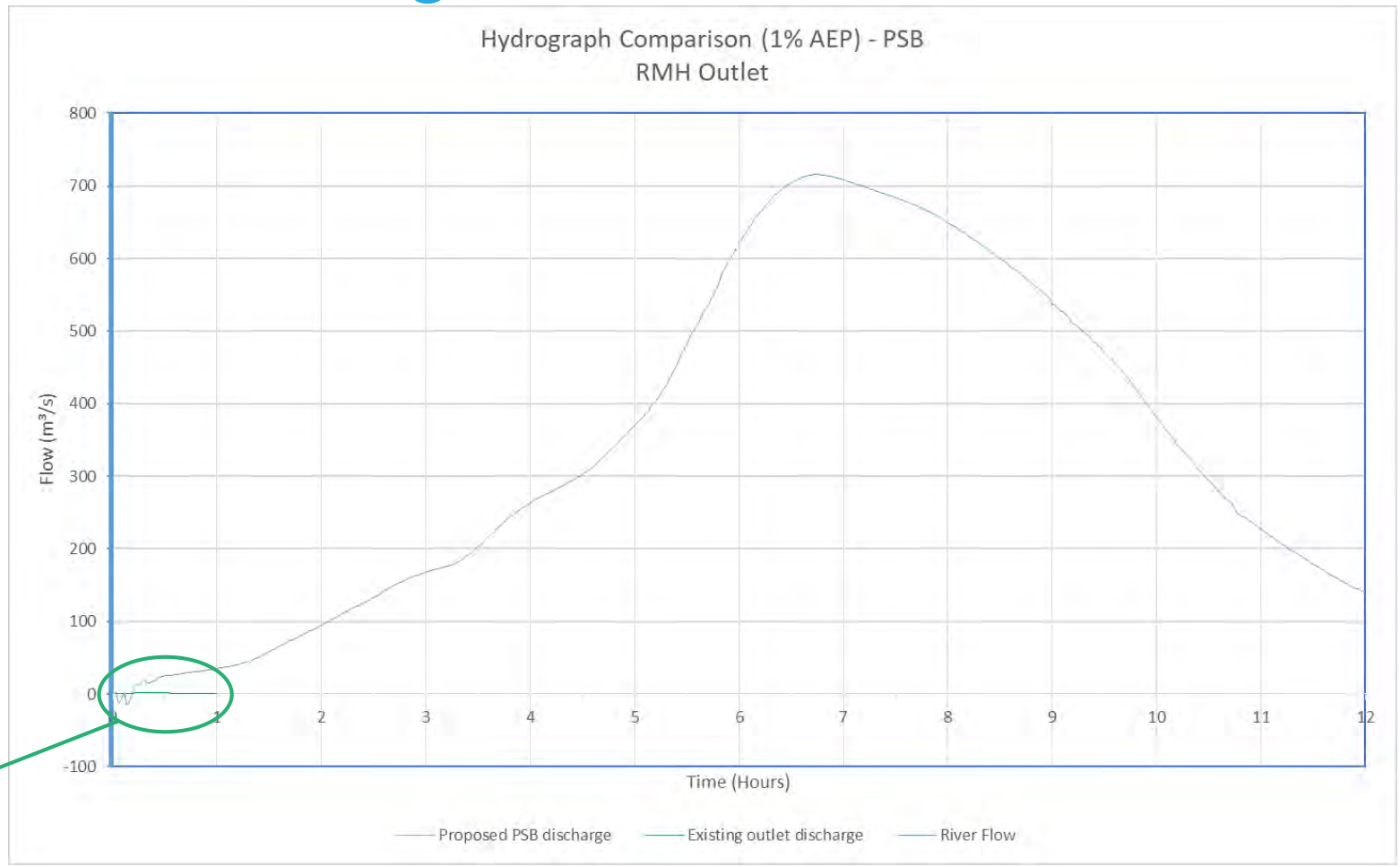
PSB – Stormwater and Flood Risk Management

Proposed flood levels and building thresholds

PSB – Stormwater and Flood Risk Management

Downstream outlet assessment





PSB – Stormwater and Flood Risk Management

PSB summary:

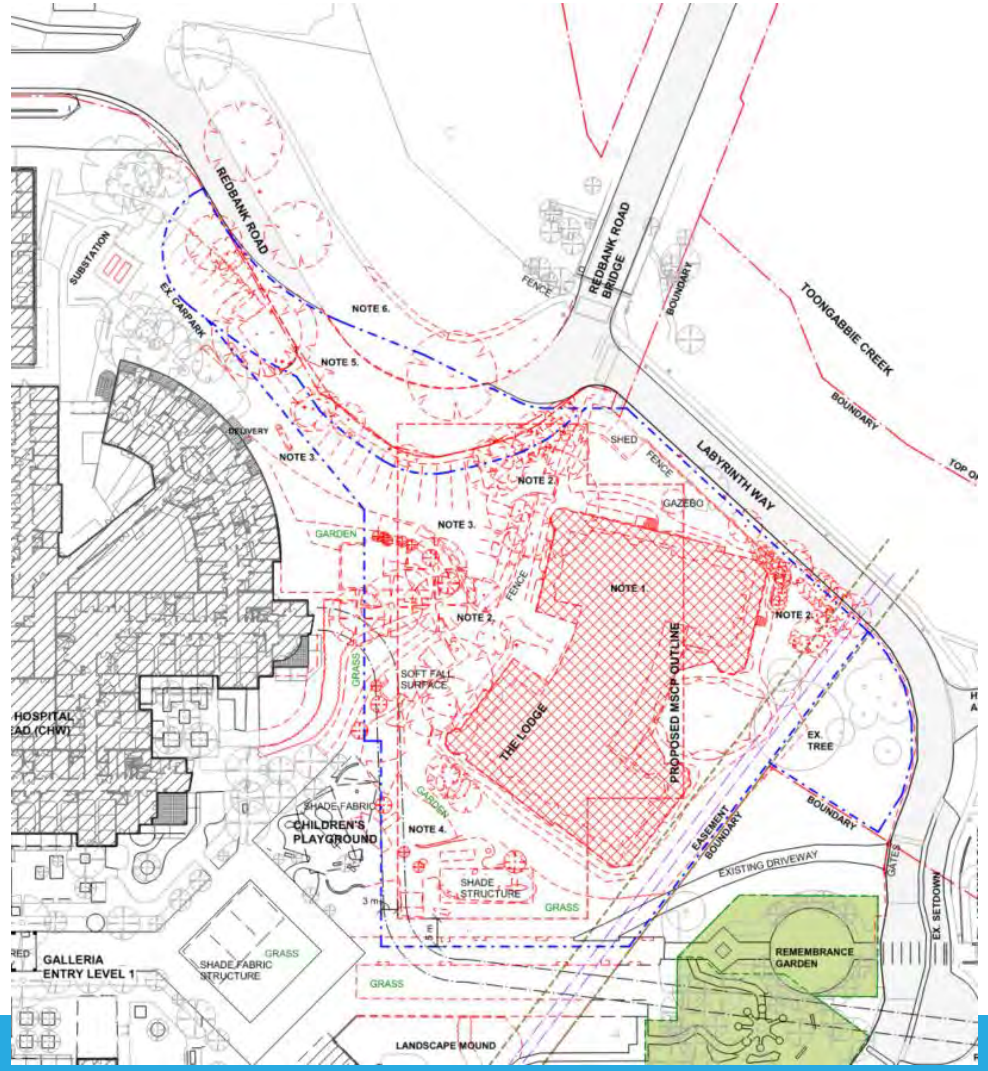
- Direct stormwater connections into the existing stormwater network to discharge flows before river peak.
- Generally no significant flood impacts nearby areas.

Next steps:

- Existing CHW forecourt modelled, but further design development required for proposed CHW forecourt and PSB entryway threshold.

MSCP – Stormwater and Flood Risk Management

Existing Site



Proposed design

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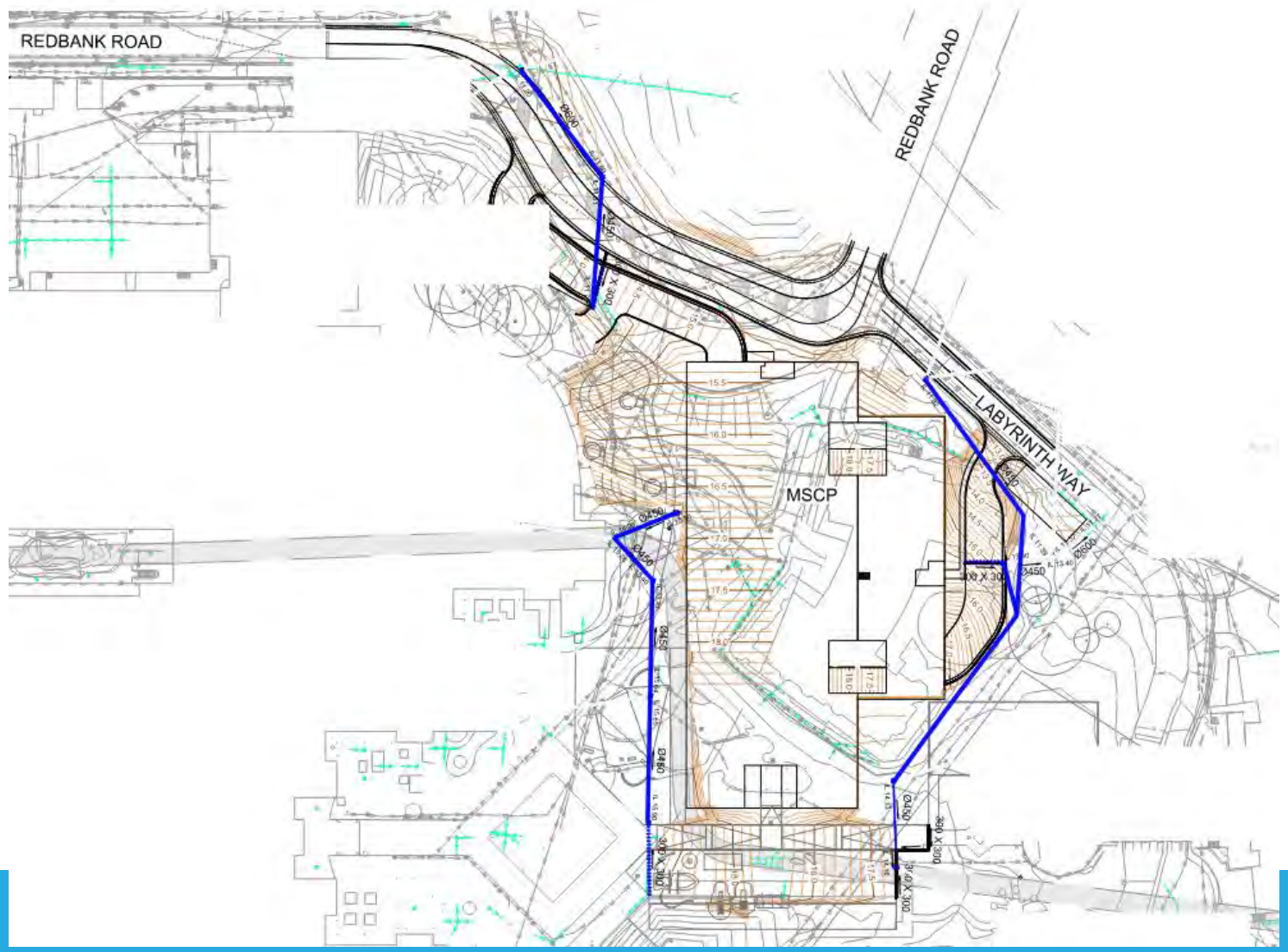
MSCP – Stormwater and Flood Risk Management

Proposed Stormwater Strategy



MSCP – Stormwater and Flood Risk Management

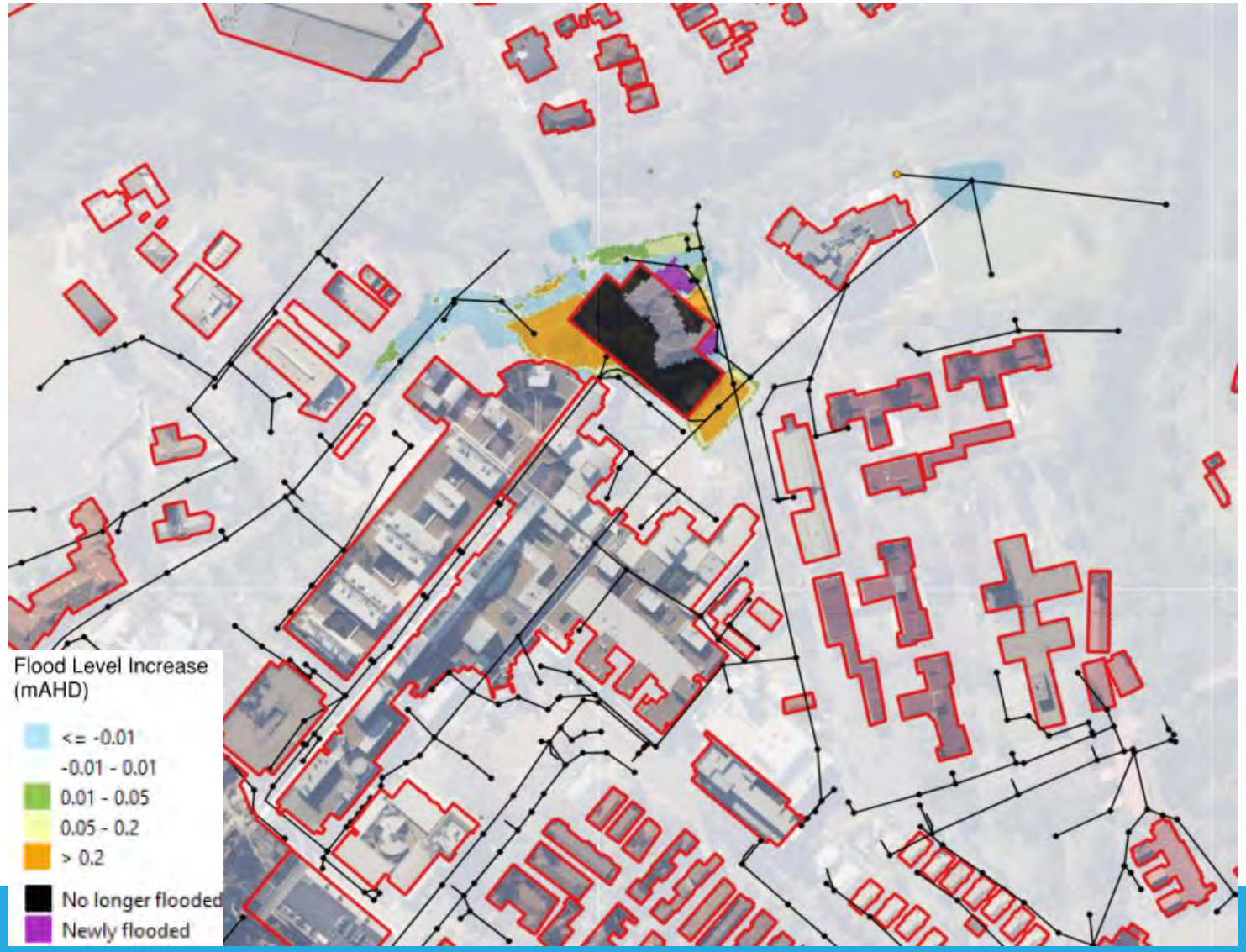
Proposed design flood results – 1% AEP Overland

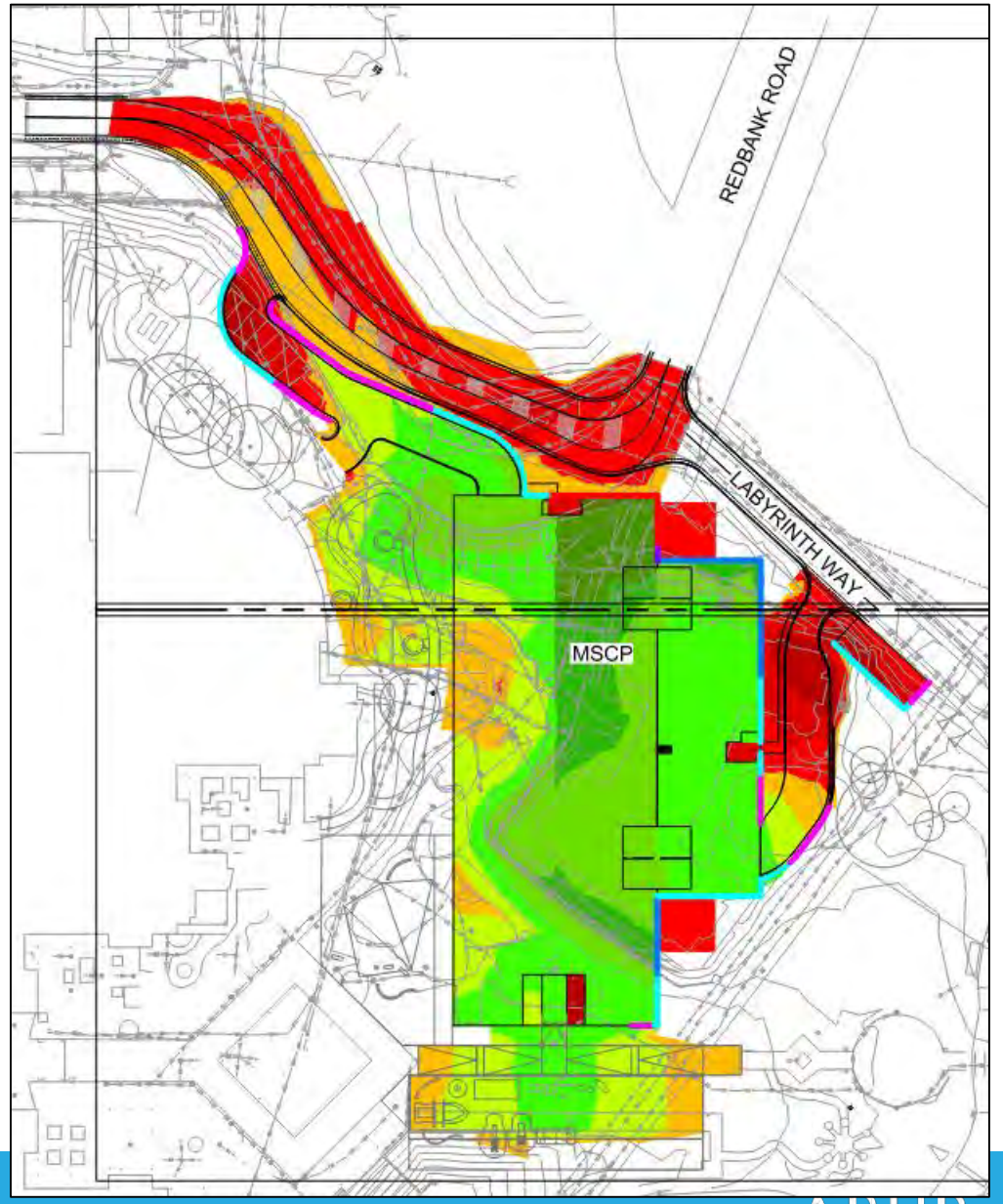
MSCP – Stormwater and Flood Risk Management

Proposed design flood results – 1% AEP River

MSCP – Stormwater and Flood Risk Management

Proposed design flood results - 1% AEP Afflux Overland





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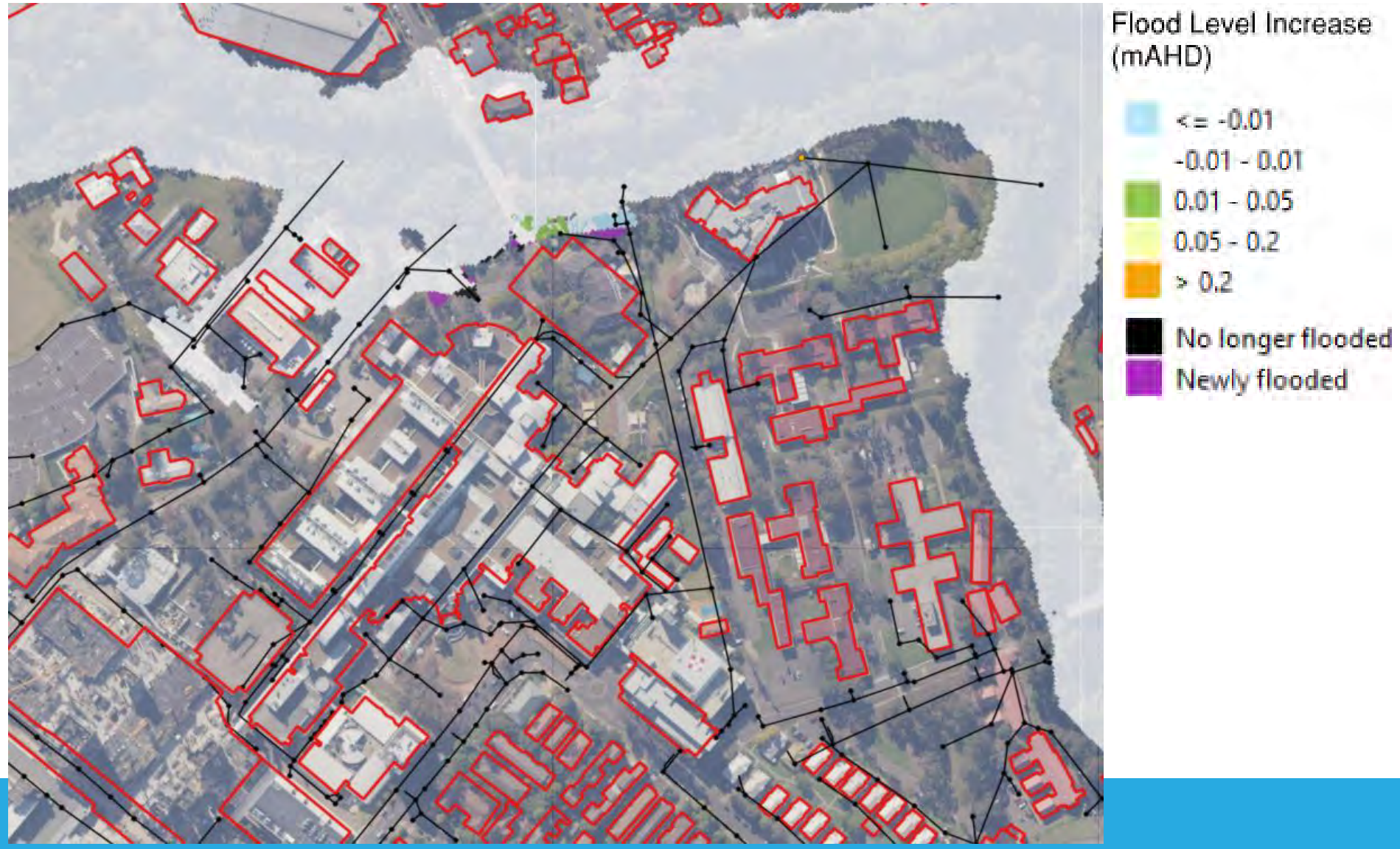
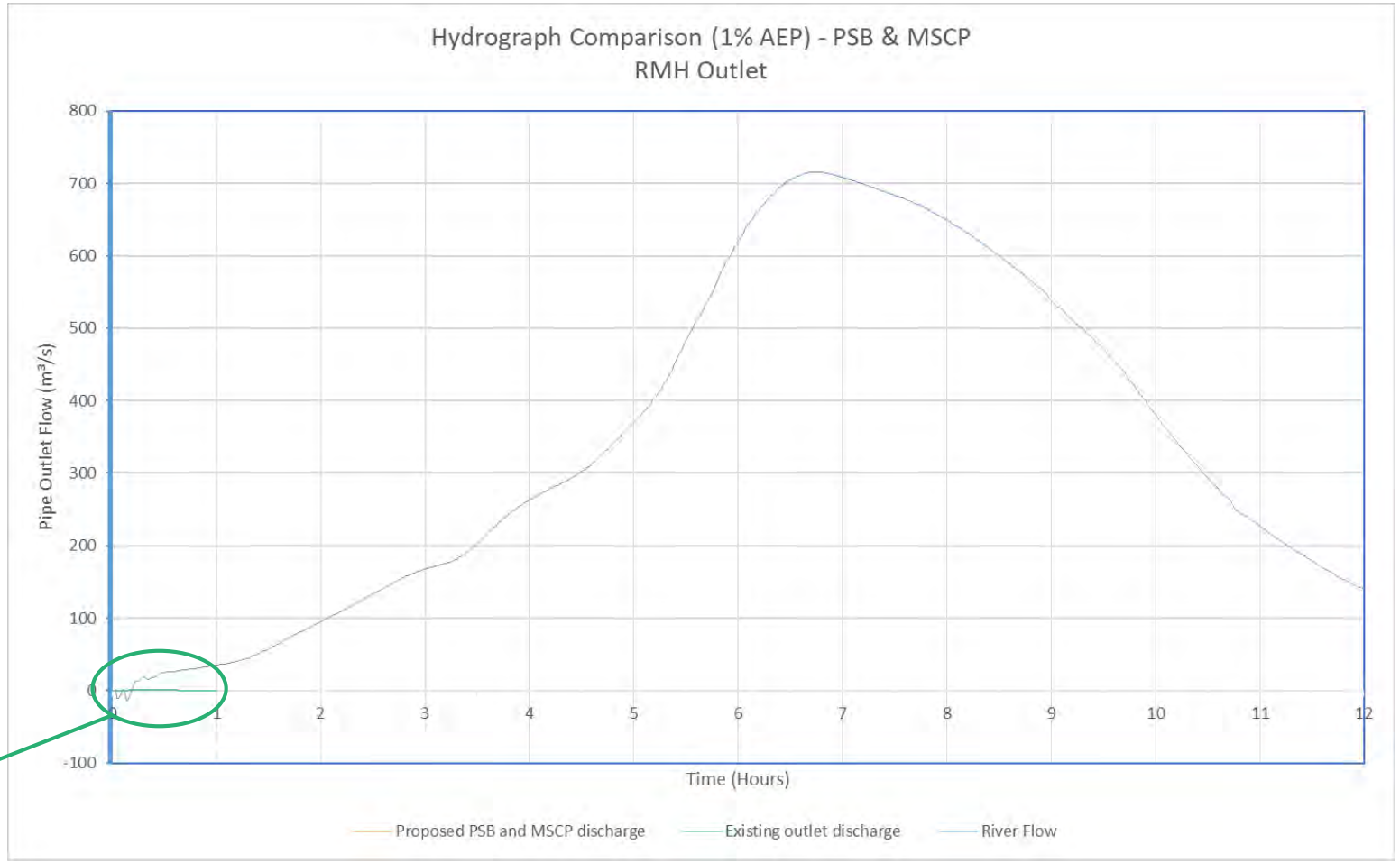
MSCP – Stormwater and Flood Risk Management

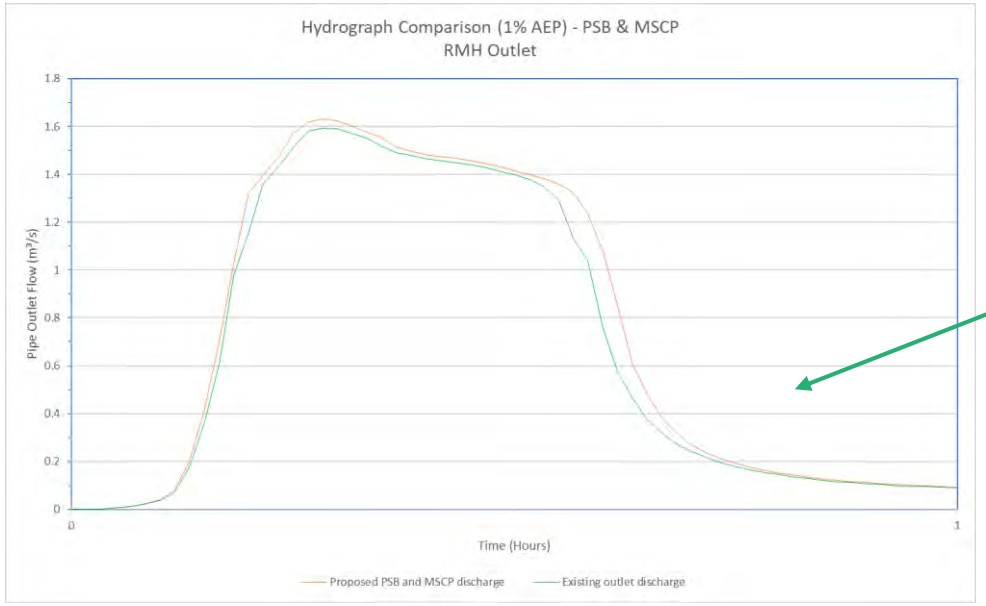
Proposed design flood results – 1% AEP Afflux River



MSCP – Stormwater and Flood Risk Management

Downstream outlet assessment





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MSCP – Stormwater and Flood Risk Management

MSCP summary:

- Direct stormwater connection into the existing stormwater network to discharge flows before river peak.
- Afflux due to raising of proposed levels.

Next steps:

- Further MSCP design development to external battering and stormwater infrastructure to reduce afflux to adjacent CHW building.
- Further modelling of PMF and climate change events.