Construction Environmental Management Plan

Managing FDC's Safety, Quality and Environmental requirements

Project Details

Project Name:	CAE Flight Training Facility
Project Number:	250144
Project Location:	28-30 Burrows Road, St Peters NSW 2044
Client:	LOGOS Australia
Commencement date:	March 2023
Estimated completion date:	March 2024
Company address:	22-24 Junction Street, Forest Lodge 2037
ABN:	72 608 609 427

Reviewed/Approved Signature .....

Andrew Rigden

Project Manager

Approved Signature .....

Sean Gibbeson

General Manager

Acknowledgement of Country

This project is being undertaken on Gadigal and Wangal people of the Eora nation land.

FDC are proud to acknowledge the Traditional Custodians of the land on which this project is located, and their connections to land, sea and community.

We pay our respects to their elders past and present and extend that respect to all Aboriginal and Torres Strait Islander people and all Aboriginal and Torres Strait Islander workers on this project.

FDC Commitment

"FDC are committed to a reconciled, just and equitable Australia"
(FDC Reconciliation Action Plan)

By these acknowledgements and other actions, FDC will continue to do all we can to contribute to improving the lives and communities of our First Nations People.

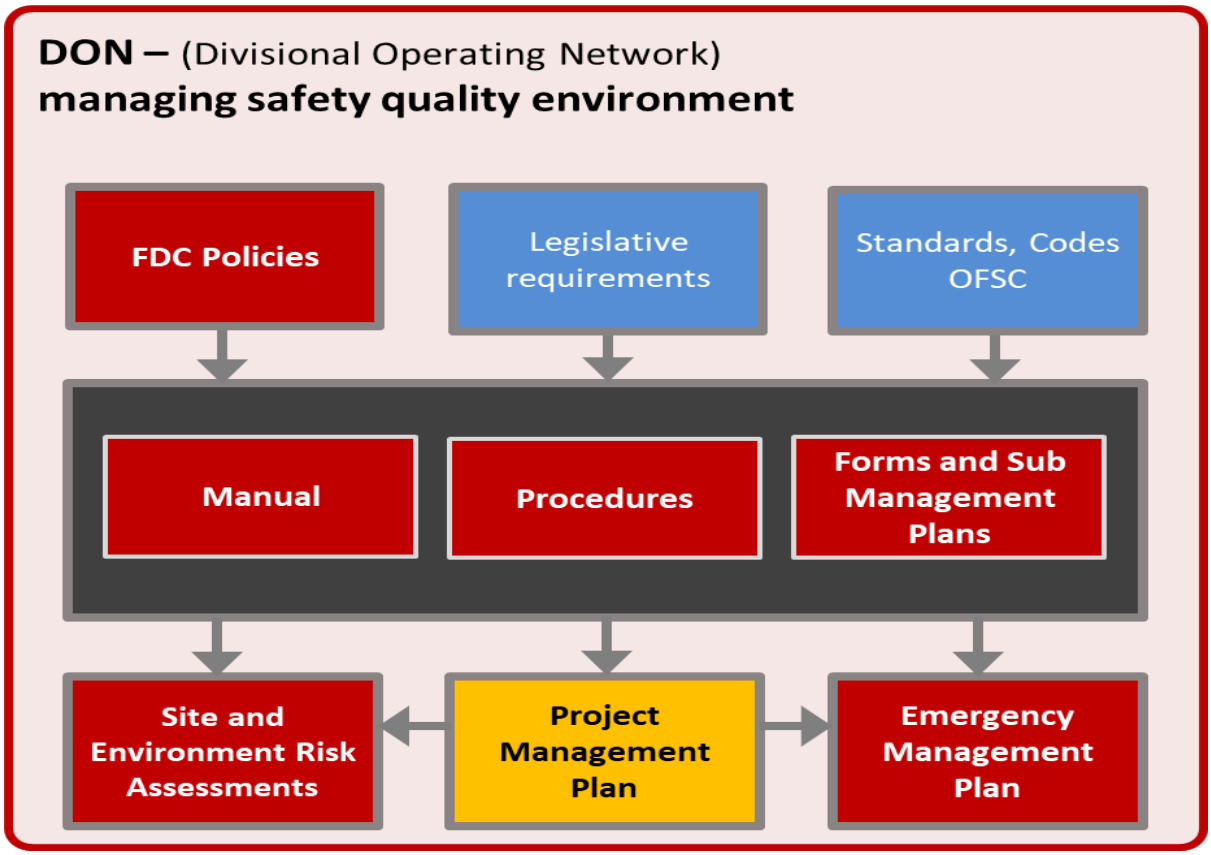
INTRODUCTION

1.1 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

This Construction Environment Management Plan (CEMP) has been developed in accordance with FDC's integrated management system and establishes project responsibilities to achieve project specific health, safety, quality, and environmental requirements. The CEMP enables the project team to deliver the project in accordance with client requirements and without safety or environmental incidents to employees, environment, or the community.

The CEMP links with the Site Risk Assessment and Environmental Risk Assessment to identify potential hazards and aspects at the workplace and develop appropriate control measures to eliminate or reduce potential risks. The documents referenced throughout the CEMP are available for FDC workers on the Vault > Manage My Project. Downloading and storage of templates on project directories for repeat use is not permitted as only new or revised templates uploaded to the Vault. Changes to system documents shall be communicated through alerts to Divisional HSEQ representatives and project teams.

The CEMP addresses FDC's management system that has third party certification to ISO9001, ISO14001, and ISO45001and is accredited with the OFSC Accreditation Scheme. FDC's Divisional Operating Network (DON) integrates FDC's health, safety, quality and environmental requirements and external requirements as illustrated below:



1.2 CONDITIONS

The CEMP required under condition C2 of the determination addresses the following requirements;

(a) Construction Traffic Management Plan (condition B1) *REFER TO APPENDIX C*

(b) Erosion and Sediment Control Plan (see condition B9) *REFER TO APPENDIX E*

(c) Construction Noise and Vibration Management Plan (see condition B19) *REFER TO APPENDIX D*

(d) Heritage Excavation and Construction Methodology (see conditions B35) *REFER TO APPENDIX F (Appended as part of Revision C of this CEMP)*

(e) Unexpected Contamination Finds Procedure (see B37) *REFER TO APPENDIX G Section 8*

(f) Community consultation strategies and Complaints handling system *REFER TO SECTION 1.7 & 2.17.*

1.3 PLAN REVIEW AND APPROVAL

The CEMP shall be reviewed by the Project Manager for General Manager approval prior to issue and subsequent revision. The Project Manager shall be responsible for inducting the project team into the requirements of the CEMP. Team members with assigned responsibilities and accountabilities shall initial the organisation chart thereby acknowledging they have read, understood, and accepted the CEMP requirements and are committed to complying with these.

At least one CEMP hard copy shall be available and accessible on site in addition to the electronic copy retained in the Project drive and provided to stakeholder where requested. The CEMP shall also be issued to subcontractors, together with the Site Risk Assessment, prior to them commencing work on site.

The ongoing suitability of the CEMP shall be reviewed during the monthly site audit. Changes due to reviews, meetings, site-specific outcomes and recommendations through inspections, reports, audits etc. shall be reviewed in consultation with Divisional HSEQ representatives and approved as above prior to re-issue.

The revision table in Appendix B shall record CEMP revisions and the Project Manager shall be responsible for communicating changes to holders of copies and other stakeholders as required and recorded through project correspondence.

1.4 POLICIES

FDC's WHS, Quality and Environmental policies communicate FDC's commitment to delivering this project safely, without impact to the environment and in accordance with client requirements. These policies are included in Appendix A and available on site. Additional policies are available on the Vault and include:

- Code of Conduct and Ethics
- Equal Employment Opportunity
- Unexpected Finds Protocol
- Subcontractor Payment Administration
- Aboriginal Participation Policy
- Drug and Alcohol Policy
- Fatigue Policy
- Hot and Cold Policy
- Industrial Relations
- Return to Work Policy
- Young, Inexperienced Workers Policy
- Training Management Policy
- Travel Policy
- FDC Group Motor Vehicle Policy
- Whistleblower Policy
- Modern Slavery

1.5 ROLES AND RESPONSIBILITIES

General roles and responsibilities for employees are outlined in individual position descriptions. This project PMP assigns project specific roles and responsibilities in accordance with the DON and the Training and Experience Register as applicable. When reading the PMP, the following definitions explain Responsibility and Accountability:

Responsibility – the person with overall responsibility for ensuring the specific task is completed. Only one person can be responsible.

Accountability –the person, or persons, with delegated authority to complete the task. There can be more than one person accountable for a task.

FDC's Project Manager has executive responsibility for safety, quality, and the environment and responsible for implementation of the CEMP requirements. It remains the responsibility of the Project Manager and the project team to ensure the CEMP requirements are complied with.

1.6 PROJECT SCOPE

The project entails the demolition of existing structures and the remediation of contaminated fill in accordance with the HAZMAT and RAP reports. Construction comprises foundation piling and a suspended concrete slab structure with steel framed roof and warehouse area. The building will contain flight simulators as well as office and training spaces. Work on the site will also entail completion of carparking pavements, landscaping, new HV electrical connection and stormwater diversion.

Site Establishment – Site establishment will involve the installation of signage, sediment controls and temporary accommodation along with the disconnection of existing power, water and communications connections. FDC will also arrange for install tiger tails to the overhead wires adjacent to the site (due to Ausgrid extended lead times for the installation of tiger tails, alternate controls will be in place during the early stages of the project – refer to the project risk assessment).

Demolition – The demolition stage will commence under a Complying Development Certificate with the removal of lead paint, asbestos roof sheeting and other areas of contamination identified in the HAZMAT report. Existing structures will be demolished progressively down to slab level and material recycled in accordance with Greenstar requirements.

Remediation – The site remediation stage will commence under a SEPP65 approval with the removal of in-ground storage tanks (UST's) and associated petroleum affected soils under the supervision of a hygienist. The affected soils will be land farmed on site until the minimum acceptable parameters are reached and then spread on the site. Some areas of contamination may be directed to be disposed of off-site and will be removed in accordance with EPA requirements. To complete remediation of the site a VENM capping layer will be installed with depths varying depending on minimum requirements for future site usage. The existing site soils are expected to contain asbestos

material and as such all works will fall under controls outlined in the site risk assessment and relevant SWMS.

Excavation & Substructure – Main construction will commence under a State Significant Development consent (SSD). The final site levels will be raised approximately 1m as part of the VENM capping layer required by the Remediation Action Plan (RAP). Precast concrete driven piles will be installed followed by footings and pits. In-ground drainage and lead-in conduits will also be installed for sewer, stormwater, electrical and communications.

Structure – A post-tensioned slab on ground will be progressively completed in separate pours followed by the construction of concrete columns and post-tensioned suspended slabs to make up level 1, 2 and roof deck for the main building. Precast concrete panels and structure steel will be installed sequentially as progress advances on the structure. Access will be provided

Facade – Following completion of the concrete structure and advancement of structural steel, façade framing and cladding will be progressively installed to the building perimeter. Access will be via perimeter scaffold and also boom lift. Roof sheeting will be installed as areas become available in order to make the building watertight as soon as possible.

Fitout – Once the internal building structure has been completed, fit-out of internal walls and services will commence as floor slabs are progressively stripped. Final finishes will be installed once the building has been made watertight. FDC will also facilitate early access nearing practical completion for the lessee to install training equipment.

Stormwater Diversion – Part of the work entails the construction of a new 525mm stormwater diversion to run in the road reserve and along the western boundary with an outlet into the canal. The works will fall under a Sydney Water 'out of scope' works approval and will require the input and supervision of a Heritage Consultant for works interfacing with Alexandra Canal which is of State Heritage Significance.

Services – WUC includes the construction of two new substations to service the site and a sewer connection to a private rising main which will fall under a Section 73 approval.

1.6 OBJECTIVES AND TARGETS

The following project objectives and targets reflect FDC targets and objectives that are established, reported, monitored, and reviewed annually for suitability and adequacy in accordance with the HSEQ Strategic Framework and company policies. The Project Manager shall be responsible for measuring performance against these targets and reporting to Divisional management monthly through the Project Monthly HSEQ Report (F090). Project targets and objectives specified in the contract shall be included as appropriate.

Environmental

Aspect	Objective
Waste	Minimise waste going to landfill and meet Greenstar objectives.
Sediment and Erosion Control	Prevent sediment from entering waterways or the stormwater system.
Water Quality	Prevent contamination of water ways including the adjacent Alexandra Canal.
Noise and Vibration	Minimise noise and vibration including parameters associated with Alexandra Canal.
Dust	To limit dust and impacts on neighbouring businesses.
Asbestos	Manage existing asbestos and petroleum contaminated fill soils in accordance with b practice.

Work health and safety

Lead Indicator	Target	Responsibility
Project Managers Audit	1 per month	Project Manager
Weekly Site Inspections	1 per week	Site Manager
FDC Toolbox meetings	1 per week	Site Manager
Work Observations	1 per month	Site Manager
Lag Indicator	**Target**	**Responsibility**
Recording of Medical Treatment Injury (MTI*)	MTI = 0	Project Manager
Recording of Lost Time Injury (LTI)*	LTI = 0	Project Manager

* Notes

In accordance with AS1885:

- A Medical Treatment Injury (MTI) is as an injury, which results in a journey to a medical facility where a medical practitioner provides treatment;
- A lost time injury / disease (LTI) is defined as a workplace injury where the injured person is not able to work for at least one full day/shift at any time after the day the injury occurred.

1.7 COMPLAINTS RESPONSE & HANDLING PROCEDURE

The Project Manager is responsible for ensuring that the appropriate management response and handling procedures are instigated and carried through in the event of a complaint. The project specific site induction will be used to ensure all site employees are aware of and understand their obligations for complaints response.

All employees who take receipt of a complaint, either verbal or written, are to immediately notify the Project Manager.

Upon becoming aware of a complaint, the protocol outlined below will be followed;

1. **Record and Acknowledge**

Any employee who takes receipt of a complaint, either verbal or written, is to immediately notify the Project Manager and/or the Site Manager.

The complainant's name and contact details, along with the nature of the complaint, will be recorded in the complaints register.

2. **Assess and Prioritise**

FDC will prioritise all complaints by considering the seriousness of the complaint including risk to health and safety and will attempt to provide a timely response via phone or email.

3. **Investigate**

A field investigation will be initiated in an attempt to confirm details relevant to the complaint and the cause of the problem.

If the complaint is due to an incident, the notification requirements and handling procedures outlined in this CEMP will be followed.

4. **Action or Rectify**

Once the cause of the complaint has been established, every possible effort will be made to undertake appropriate action to rectify the cause of the complaint and mitigate any further impact. The Project Manager will assess whether the complaint is founded or unfounded and delegate the remediation, as required.

5. **Respond to Complainant**

FDC will respond to the complainant once the issue has been resolved. The complainant will be provided with a follow up verbal response on what action is proposed within a timely manner. Where a complaint cannot be resolved by the initial or follow-up verbal response a written response will be provided to the complainant.

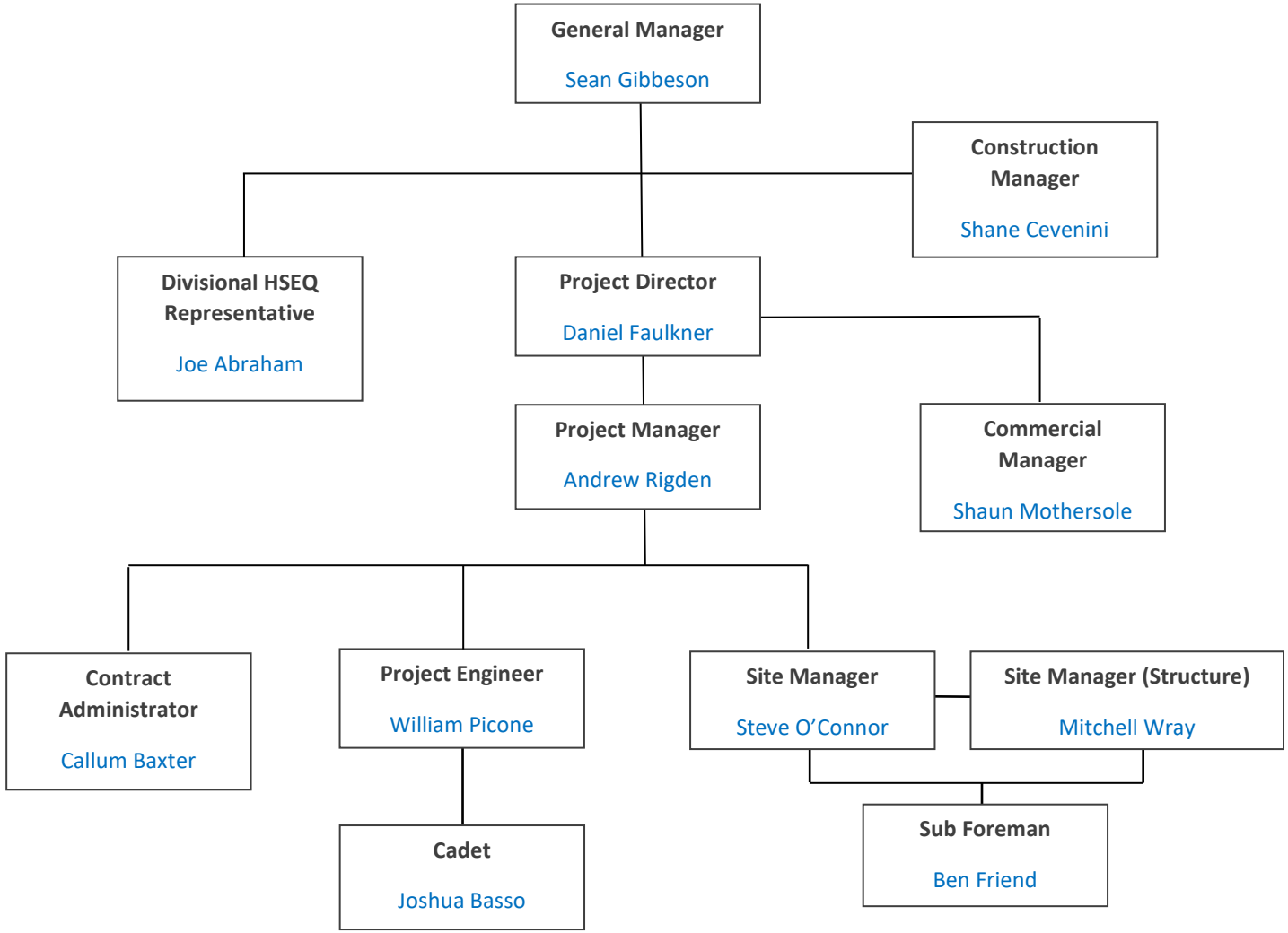
6. **Record**

It is imperative that an assessment of the situation is carried out and documented in order to minimise the potential for similar complaints in the future. On this basis, every complaint received is to be recorded in the Complaints Register.

7. **Preventative Action**

Once the complaint has been suitably handled, appropriate measures will be identified and implemented to negate the possibility of re-occurrence. The Complaints Register is not finalised until the preventative or completion actions are recorded on the register.

1.8 PROJECT ORGANISATION CHART



QUALITY

2.1 LEGAL AND OTHER REQUIREMENTS

Section	Requirements	Responsibility	Accountability	Tools
2.1.1	The legal and other requirements (including Legislation, Australian Standards, Codes of Practice and guidelines) are identified in the Legal Register (G11) in accordance with Cor-4.2-003 Legal and Other Requirements. The Legal Register shall be made project specific taking into consideration customer and local government requirements and associated licenses and permits. To make site specific – delete tabs/legislation/standards/codes and other requirements that do not apply. Add any legal and other requirements that are contract specific. The register shall assist determine appropriate controls for potential hazards in accordance with site safety and environmental risk assessments. Request for access to legal requirements shall be made to FDC site management.	Project Manager	Project Manager	Legal Register (G11)
2.1.2	Changes to the legal register, or the management system, due to legal changes shall be communicated to project teams. Project teams shall be responsible for communicating changes on site using prestart / toolbox meetings, Subcontractor Meetings, or other correspondence. Review of project plans, risk assessments, SWMS and other documents shall be conducted to determine if changes are required due to legal changes.	Project Manager	Project Manager	Legal Register (G11)
2.1.3	Potential system changes resulting from legal changes shall be documented via Systems Change Request and assessed by the National HSEQ Systems Manager.	Divisional HSEQ Representative	Project Manager	Systems Change Request (F056).
2.1.4	FDC and its sub-contractors shall comply with the requirements of the New South Wales Industrial Relations Guidelines: Building and Construction Procurement 2017. The CCU are responsible for monitoring the implementation of the Guidelines and may visit site to confirm and assist implementation.	Project Manager	Site Manager	DON > FDC Guidance

2.2 DOCUMENT CONTROL AND RECORDS MANAGEMENT

Section	Requirements	Responsibility	Accountability	Tools
2.2.1	**Controlled documents** Controlled documents shall be controlled via transmittals and may include: • Project Management Plan; • Drawings; • Programme; • Specifications; and • Shop drawings. A transmittal shall be issued with the documents, when controlled documents are issued to third parties. Superseded documentation shall be marked “Superseded”. Project correspondence shall be transmitted through PROJECT SIMPEL	Project Manager	Project Manager	Transmittal – Collaboration Tool (e.g. Aconex)

2.2.2	**Project Correspondence Received by FDC** The Project Manager shall be responsible for control of incoming correspondence. The Project Manager shall control amendments to the specification and shall ensure that variations are received in writing, filed and the appropriate personnel advised.	Project Manager	Project Manager	Cor-4.2-001 Document Control
2.2.3	**Project Documentation Received by FDC** Project documentation received by FDC shall be controlled via a Document Transmittal or Register. Superseded documentation shall be marked “Superseded”. Copies shall be issued to the relevant parties together with a Document Transmittal.	Project Manager	Project Manager	Cor-4.2-001 Document Control
2.2.4	**Handwritten Changes** Handwritten changes to project documentation are allowed provided that all copies are initialled and dated by the Project Manager.	Project Manager	Project Manager	Cor-4.2-001 Document Control
2.2.5	**Filing Structure** Electronic records shall be filed in accordance with Project Filing Guides located at **The DON > DON Policy and Procedures > 6 – Guidance**. Hardcopy files shall follow the same structure.	Project Manager	Project Manager	Project Filing Guides.
2.2.6	**Archiving** Records generated throughout the project, including records resulting from the PMP implementation shall be maintained in either electronic or hardcopy version. Upon project completion hard copy site records shall be collected for archiving and be kept for a minimum of 10 years unless otherwise noted. Electronic records are backed up daily and archived upon projects completion with the IT Department.	Project Manager	Contracts Administrator	Cor-4.2-002 Records

2.3 TRAINING

2.3.1 Training and Experience Register

Section	Requirements	Responsibility	Accountability	Tools
2.3.1.1	**Training and Experience Register** identifies minimum training requirements for positions and provides a record of individual’s internal training and external qualifications. Training requirements are reviewed throughout the project when there’s a change in project resources, where a skill gap has been identified, or as required by the Project Manager. The register shall be made available through Divisional Management. Additional training for workers shall be arranged with Divisional management where there’s a change in project resources, promotion, where a skill gap has been identified, or where unforeseen or special training skills have been identified (e.g. High risk licence, Confined Space, Working at Heights etc.), to ensure appropriate training and qualifications are gained. Copies of training documentation (certificates, statements of attainment and induction record forms) shall be held in the Personnel files.	Project Manager	Project Manager	Training and Experience Register F024

2.3.2 Site Specific Induction

Section	Requirements	Responsibility	Accountability	Tools
2.3.2.1	Nominated FDC site management shall use the Site Induction to induct workers into site specific requirements and site rules. FDC shall ensure officials, delegates, or other representatives of a building association do not undertake or administer site inductions.	Site Manager	Foreman	Training and Experience Register F024
2.3.2.2	Workers shall complete the site specific induction before commencing work on site. To be inducted workers must provide photographic proof of identity and evidence that they have completed the Construction Industry Induction Card (e.g. White Card/Blue card). A register of all inducted workers shall be maintained. Task specific training and qualifications (e.g. high risk licences etc.) required to perform tasks or operate plant/equipment shall be recorded at the site induction. Where it is not possible to obtain copies of the required certification the person conducting the inductions is to sight the documentation and make note on the induction form that documentation has been sighted and record the required details.	Project Manager	Project Manager	Site Induction-Site Rules F018; Site Induction Register-Construction Large Project F022; Site Induction Register F023.
2.3.2.3	Workers from a non-English speaking background, or having difficulty understanding English, shall have their employer provide a translator to interpret the induction content to the person being inducted.	Project Manager	Sub-contractor	Site Induction-Site Rules F018
2.3.2.4	Visitors to site that are not performing construction work shall sign in, be advised of emergency procedures, and be accompanied at all times by a person who has completed the site induction.	Site Manager	Foreman	Site Sign In Register F005
2.3.2.5	FDC shall ensure completed site inductions are secured in a lockable cabinet or site office to prevent misuse, interference or loss, and unauthorised access, modification, or disclosure.	Site Manager	Foreman	Site Induction-Site Rules F018

2.3.3 Work Activity Training

Section	Requirements	Responsibility	Accountability	Tools
2.3.3.1	Workers shall undertake work activity training prior to commencing work on site. This includes being inducted into and signing Safe Work Method Statements (SWMS) or other relevant safe operating procedures covering relevant high risk construction work. The work activity training may be in a form of toolbox talks, development and/or review of a SWMS) / safe operating procedures/ instructions or training provided by a company, individual or a combination of these.	Site Manager	Foreman	SWMS; Toolbox Site Induction-Site Rules F018.

2.3.4 High Risk Work Licences

Section	Requirements	Responsibility	Accountability	Tools
2.3.4.1	Workers performing high risk work including scaffolding, dogging, rigging, operating cranes, hoists reach stackers, forklifts and pressure equipment must have a high risk work licence. Licences for works in these categories must be verified and recorded during the site induction process. Further guidance on tickets and licences is available through G012 Plant and Equipment Competency and Inspection Schedule.	Site Manager	Foreman	Site Induction-Site Rules F018. SWMS; Plant and Equipment

				Competency and Inspection Schedule G012

2.3.5 Young, Inexperienced Workers

Section	Requirements	Responsibility	Accountability	Tools
2.3.5.1	FDC is committed to ensuring that FDC's young workers and workers new to the industry are given the required training, instruction, and supervision to be able to identify hazards which may affect their health and safety whilst at work. Any training provided to young and/or inexperienced personnel must be recorded. ▪ A young worker is an apprentice or construction worker under 24. ▪ An inexperienced worker is a construction worker with less than two years in the construction industry.	Site Manager	Foreman	Young, Inexperienced Workers Management Record F025

2.4 CONTRACT REQUIREMENTS

Section	Requirements	Responsibility	Accountability	Tools
2.4.1	**Specific Contractual and Trade Requirements** The Project Manager shall prepare a list of trade requirements such as submissions, hold and witness points, test, and warranties.	Project Manager	Project Manager	Con-7.4-001 Procurement
2.4.2	**Programme** The project programme may be amended, and the latest revision will be controlled by the Project Manager	Project Manager	Project Manager	Programme
2.4.3	**Principal Certifying Authority** The Project Manager shall contact the Principal Certifying Authority as soon as possible after FDC has been awarded the project to determine objectives and project timetable and to agree on mandatory inspections and timing. A copy of the Construction Certificate / Building Permit and the approved plans shall be kept on site. Prior to taking over a site where the client has carried out preliminary works such as site clearing, demolition, excavation, etc., ensure that all required inspections have been carried and that the Principal Certifying Authority will be able to issue an Occupation Certificate or Final Inspection upon completion.	Project Manager	Project Manager	Con-7.5-001 Project Start-up
2.4.4	**Practical Completion / Occupation Certificate Checklist** During the early stages of the project, the Project Manager shall prepare a Practical Completion / Occupation Certificate Checklist (F099) which will schedule all items and requirements necessary for the achievement of practical completion, and for the achievement of an Occupation Certificate.	Project Manager	Project Manager	Practical Completion / Occupation Certificate Checklist (F099)

2.5 PROJECT ADMINISTRATION

Section	Requirements	Responsibility	Accountability	Tools
2.5.1	**Site Diary** Record daily events and activities using the Site Diary. Each week a copy of the Site Diary shall be forwarded to the Project Manager for review. The Site Diary shall be reviewed to identify Extensions of Time Claims and other potential claims under the contract etc.	Project Manager	Site Manager	Site Diary
2.5.2	**Sample Control** Samples shall be uniquely identified and logged in the Sample Submission Register. Approval of samples shall be via meetings with the client or client representative or via email / collaboration tool (e.g. Aconex) and any such approval shall be minuted.	Project Manager	Project Manager	Sample Submission Register F085
2.5.3	**Technical Submission** Technical submissions shall include: • Samples; • Product technical and performance information; • Work Shop Drawings; and • Builder supplied sketches. Submissions shall be uniquely identified and registered showing a summary of the submission, date, and approval status. Submissions approvals shall be recorded via meetings with the client or client representative or via email / fax / memo. Any such approval shall be updated on the register.	Project Manager	Project Manager	Submission register
2.5.4	**Dilapidation Report** A Dilapidation Report shall be produced for the building at project start-up to avoid litigation at the end of the project. The report should be conducted for structures in or adjacent to the project, for example, existing roads, adjacent buildings to the site etc. and a copy forwarded to the client. At the end of the project another Dilapidation Report shall be conducted and any discrepancies between the two reports shall be reported to the client to decide on the action to be taken**.**	Project Manager	Project Manager	Dilapidation Report
2.5.5	**Inspection and Test Plans (ITPs)** Inspection and testing requirements shall be determined at project commencement in accordance with project requirements by identifying key areas, trades and/or stages. For each of these determine the level of inspection required and decide: • What should be inspected; • How it should be inspected; • When it should be inspected; • What is the risk (exposure to FDC); • The standards against which inspections and tests will be conducted; • The competencies required by the persons conducting the inspection or test. Project specifications, drawings and contract requirements shall be reviewed to determine the key control points, the level of control required and the risk to FDC associated with project activities.	Project Manager	Site Manager	Refer to **DON > DON Policy and Procedures > 6 – Guidance** for ITP templates

	ITPs shall be developed using the ITP form to identify witness points, hold points, sign off points, samples or prototypes, tests, submissions, calibration records, etc. ITPs should only include those items or processes that require control through inspection or testing. ITPs should allow for WHS risks involved and consider: • The timing and nature of high risk work; • Identified work site hazards including risks and controls; • The likelihood of unforeseen hazards or risks emerging between inspections; • Instructions provided by designers, manufacturers or suppliers of product or equipment; • Any regulatory requirements. ITPs shall be registered in the ITP Register. ITPs shall be reviewed and approved by the Project Manager. ITPs shall be completed as the job progresses and activities should be signed off as they are completed. ITPs shall be maintained on project files when completed.			
2.5.6	**Documentation Accepted by the Client's Representative** Where required by contract, ITP's shall be submitted to the client's representative prior to commencing the activity. The ITP shall include all witness and hold points that require attendance by the client's representative as nominated in the specification. Additional witness and hold points may be inserted, and activities not required may be deleted from the ITP.	Project Manager	Project Manager	Refer to **DON > DON Policy and Procedures > 6 – Guidance** Inspection & Test Plan Register G006.1
2.5.7	**Subcontractor Inspection and Test Plans (ITPs)** Subcontractors shall submit their ITPs to FDC for review to ensure they are adequate and identify witness and hold points. ITPs submitted by subcontractors should reflect the project and identify critical control points including control of WHS risks. Changes to the ITPs shall be communicated to the subcontractor. FDC shall verify that the subcontractor has completed ITPs correctly during the project and that supporting documentation is available.	Project Manager	Foreman	Refer to **DON > DON Policy and Procedures > 6 – Guidance** for ITP templates
2.5.8	**Concrete Pours** The location of each concrete pour shall be recorded on a site drawing by the Site Manager or Site Foreman.	Site Manager	Foreman	Concrete supply register F126

2.6 Requests for Information

Section	Requirements	Responsibility	Accountability	Tools
2.6.1	**Requests for Information (RFI)** RFI's shall be raised by FDC whenever a response is required from a consultant, the client, or the client's representative that requires tracking. RFI's shall be registered and distributed to the relevant parties and a copy filed in the RFI file.	Project Manager	Project Manager	RFI's Register F130
2.6.2	**Receiving Requests for Information (RFI)** Subcontractor submitted RFI's shall be addressed by FDC and the RFI answer shall be filed in the appropriate subcontractor file with the date of the answer recorded on the RFI to enable cross referencing.	Project Manager	Project Manager	RFI's Register F130

2.6.3	**Client Instructions / Architect's Instructions / Site Instructions** FDC will receive instructions in the form of Client Instructions / Architects Instructions and/or Instructions to Contractor (ITC). Instructions shall be registered together with details of the actions taken, or to be taken, to carry out the instruction. FDC shall issue any instructions to consultants, suppliers and/or subcontractors to comply with the client's instruction**.**	Project Manager	Contracts Administrator	Site Instruction Register or Collaboration tool.
2.6.4	**Site Instructions - Subcontractors** A Site Instruction is raised to: • Formally advise a subcontractor to take some action; • Advise of changes in scope; • Highlight poor subcontractor performance; and • Request pricing details, etc**.**	Project Manager	Site Manager	Site Instruction Register or Collaboration tool.
2.6.5	**Contra Charges** Contra Charges occur when a subcontractor creates damage, uses materials purchased by FDC, where FDC cleans up after a subcontractor, or a subcontractor is unable to complete the work it is contracted to do and another subcontractor or supplementary labour is used to complete the work. Contra charges shall be recorded in the Site Diary or Site Instruction. The subcontractor shall be advised in writing of the impending contra charge and a copy of the quotation to rectify the issue shall be attached to the instruction (where available). Contra charges shall be processed with the next claim from the subcontractor.	Site Manager	Site Manager	Site Diary Template F007
2.6.6	**Extensions of Time** Records of delay shall be documented in the Site Diary, and communicated to the Project Manager. Details of the Extension of Time shall be recorded in the EOT Register by the Contracts Administrator. Where the contract provides for FDC to claim for extensions of time, the Project Manager shall prepare the claim using the Notification of Delay Advice / EOT claim forms and forwarded to the client/superintendent	Project Manager	Contracts Administrator	EOT F135 Head Contract Administration procedure 7.5-004

2.7 Variations

Section	Requirements	Responsibility	Accountability	Tools
2.7.1	**By Subcontractors** Variation requests shall be passed on to the Contracts Administrator for actioning in accordance with Subcontract Administration procedure 7.5-005.	Project Manager	Contracts Admin	Head Contract Administration procedure 7.5-004.
2.7.2	**By FDC** Variations against the Head Contract shall be assessed and passed onto the Contracts Administrator for actioning. Where required prices from subcontractors to price the variation may be required. Details of the variation added to the Variation Register (F133) and a Variation Quote/Claim (F132) shall be raised detailing the variation and cost. Copies of subcontractor quotations shall be attached to the Quote/claim as required and submitted to the client for approval. The Variation Register shall be updated with the status (approved/not approved) of the variation claim.	Project Manager	Contracts Admin	Variation Register (F133); Variation Quote/Claim (F132)
2.7.3	**By Client** Variations issued to FDC shall be communicated to the Project Manager for pricing. Where required prices from subcontractors to price the variation may be required. Variation details shall be added to the Variation Register.	Project Manager	Contracts Admin	Variation Register (F133);

2.7.4	**Subcontractor Progress Claim** Claims shall be dated stamped upon receipt by FDC and claim checked in accordance with the Subcontract Administration procedure 7.5-005.	Project Manager	Contract Admin	Subcontract Administration procedure 7.5-005.
2.7.5	**Claims under the Security of Payments Act** Any disputed amounts shall be identified, and the subcontractor advised within 10 business days of receipt of the claim.	Project Manager	Project Manager	Subcontract Administration procedure 7.5-005.
2.7.6	**Product and Service Non Conformances** Non-Conformance Report (F039) shall be raised where non-conforming products and services work are identified and shall be added to the monthly project report. Non-Conforming product or materials shall be quarantined and either returned to the supplier, disposed of or used with client approval. Records of any action taken will be maintained including emails, minutes of meetings, memos, non-conformance reports etc. Non-conformance relating to safety and environmental issues shall be managed in accordance with the NON-CONFORMANCE section of this PMP. Defects shall be managed in accordance with the Defects Management section of this PMP.	Project Manager	Contract Admin	Non-Conformance Report F039 Project Monthly HSEQ ReportF090
2.7.7	**Materials** Purchases shall be made using FDC Purchase Order and approved by the Project Manager and contain the following: ▪ Description of goods or services required; ▪ Delivery address requirements; ▪ Delivery date; ▪ Project details such as name and/or job number, and trade and/or cost reference; ▪ Agreed or estimated price; ▪ Reference to drawings etc. (number and revision); ▪ WHS requirements, including Safety Data Sheets (SDS), labelling, handling, and storage. The Purchase Order shall be sent to the supplier including relevant FDC terms and conditions.	Project Manager	Project Manager	Vista Purchase Order
2.7.8	**Receipt of Goods on Site** Deliveries to site shall be compared against the supplier's Delivery Docket and the Purchase Order. Where goods meet requirements, the Delivery Docket shall be signed and filed. Where goods do not meet requirements, the receiver shall record the discrepancies / issues (e.g. incorrect goods, incorrect quantity, damaged or faulty goods, etc.) on the Delivery Docket. Non-conforming goods shall be segregated from conforming goods and identified that they have been quarantined / put on hold. Any issues should be followed up with the supplier and/or Project Manager and resolved with appropriate actions. The marked up / signed Delivery Docket shall be forwarded to the Contracts Administrator to reconcile and process the purchase order, delivery docket and invoice and pass to accounts department.	Site Manager	Foreman	Non-Conformance Report F039

2.7.9	**Client Supplied Product and Services** Product supplied by the client shall be identified and be subject to the same levels of inspection, risk assessment etc. as purchased product or services.	Project Manager	Site Manager	Procurement Procedure 7.5-001
2.7.10	**Storage of Materials and Equipment** Materials and equipment shall be adequately identified and stored on site in a suitable and safe manner to ensure: ▪ Security; ▪ Protection from damage or deterioration; and that ▪ Damaged or non-conforming goods shall be quarantined and identified as such.	Site Manager	Foreman	Logistic Plan
2.7.11	**Calibration** FDC equipment requiring calibration (e.g. dumpy level, noise / gas meters) shall be calibrated and maintained in accordance with manufacturers requirements. Subcontractor's equipment shall be checked for calibration and equipment shall be registered in the Calibration Register F080 and ITP's used to monitor use and calibration of equipment.	Project Manager	Site Manager	ITPs Calibration Register F080
2.7.12	**Defect Management** A Defect / Incomplete Works Register shall be established during the project for FDC and clients to identify the type of defect, the party responsible for rectifying the defect, the date the defect was detected and the date when the defect was rectified. Defects shall be identified, prioritised and the completion of all defects will be confirmed. This measure will ensure that the cause of defects are identified and prioritised at an early stage and will educate the responsible subcontractor to prevent recurrence. Progressive defect inspections shall be conducted in conjunction with Monthly Project Team Meetings. Where monthly review is not practicable, i.e. for projects of short duration, defect inspections shall be carried out weekly during weekly site inspections. Defects will be progressively reviewed and prioritised for resolution as early as possible and closed out progressively in order of priority to ensure: • Defects are sorted by trade / applicable subcontractor and then distributed to the relevant subcontractors by email; • Subcontractors shall be responsible for actioning each item on the Defects List; and • subcontractor is required to sign off and close out all identified defects once completed. The status of the defect will be changed on the Defect / Incomplete Works Register from "open" to "closed". Defects requiring immediate attention shall be given priority. **Client Involvement -** The involvement of the client or their representative is paramount to the success of defect reduction. The client's representative will be required to attend, review, and critique all built-in prototypes to ensure that the standard set for implementation throughout the project is acceptable.	Project Manager	Site Manager	Defects Register or collaboration tool
2.7.13	**Project Handover Inspections** Implementation of the defects process aims to result in fewer defects at the time of project handover. Areas shall be cleaned, and a final defects list prepared for the area prior to areas being handed over to the client. This list shall be presented to the Client's representative for review and concurrence.	General Manager	Project Manager	Defects List

	The General Manager or nominee shall attend handover inspections. Any further defects identified by the Client's representative shall be added to the list. Once the final list has been compiled, FDC shall endeavour to close out the identified defects as soon as practicable (ideally within two weeks). Update reports will be issued to relevant parties every week until all items are closed out. Once all defects have been closed off, a copy of the completed Defects Lists shall be forwarded to the client for verification/sign-off**.**			
2.7.14	**Practical Completion** Approximately 8 weeks prior to handover a Practical Completion / Occupation Certificate Checklist shall be developed based on the Head Contract. The checklist shall be updated as actions are progressively completed by trades prior to the final inspection occurring. Maintenance manuals, certificates and as FDC drawings will be compiled progressively. The Project Completion form shall be completed within 3 weeks of practical completion. This form ensures our work is documented and can be searched and shared.	Project Manager	Project Manager	Practical Completion / Occupation Certificate Checklist (F099); Project Completion
2.7.15	**Bank Guarantee/Cash Retentions** A letter requesting the release of the Bank Guarantee or Cash Retention shall be forwarded to the client.	Project Manager	Project Manager	Head Contract Administration procedure 7.5-004

2.8 PROCUREMENT – SUBCONTRACTORS AND SUPPLIERS

Section	Requirements	Responsibility	Accountability	Tools
2.8.1	Procurement of subcontractors and suppliers shall be managed in accordance with Procurement 7.4-001 and the Tender Analysis Sheet. Successful tenders shall undergo the Subcontractors Pre Start Checklist (F003) prior to subcontractors starting on site and address any risks to HSEQ raised through the tender analysis.	Project Manager	Estimator	Tender Analysis Sheet F115; Subcontractors Pre-Start Checklist F003
2.8.2	Details of subcontractor insurances and workers compensation shall be recorded and monitored to ensure they remain valid during the project.	Site Manager	Foreman	Subcontractor Insurances F014
2.8.3	Subcontractor performance shall be monitored to ensure contract requirements are being fulfilled, including compliance with the PMP, Site Risk Assessment (F001) and Environmental Risk Assessment (F010).	Project Manager	Site Manager	Refer Monitoring section.
2.8.4	In addition to the above procurement activities, purchased goods and services shall be subject to a risk assessment through activities that include: • Design Management (where applicable) • Hazardous Chemicals; • Risk Management; • Safe Work Method Statements; and • Environmental Aspects and Impacts.	Project Manager	Site Manager	SWMS; Safety in Design Risk Assessment (F008). Hazardous Chemical Register (F086). SWMS Checklist (F029). Environmental Risk Assessment (F010)

2.9 DESIGN MANAGEMENT

2.9.1 No FDC design input

Section	Requirements	Responsibility	Accountability	Tools
2.9.1.1	FDC shall request a Safety in Design Risk Assessment (F008) (or similar) from the client or consultant. If available, FDC shall review the document to identify design related buildability hazards and determine opportunities to eliminate design hazards prior to, during, and post construction. A RFI shall be communicated to the client or consultant for consideration. Where an assessment is not available FDC shall complete a Safety in Design Risk Assessment (F008) in consultation with relevant stakeholders to identify design related buildability hazards and determine opportunities to eliminate design hazards prior to, during, and post construction. The hierarchy of control and applicable legislation, codes of practice and Australian standards shall be used to reduce the potential risk so far as reasonably practicable where hazards are unable to be eliminated. Hazards that cannot be eliminated shall be transferred to the Site Risk Assessment (F001) for control during construction.	Project Manager	Design Manager	Safety in Design Risk Assessment (F008); Site Risk Assessment (F001). RFI

2.9.2 Design and Construct Projects

Section	Requirements	Responsibility	Accountability	Tools
2.9.2.1	A project specific Design Management Plan addressing design requirements in accordance with procedure Con7.3-001 Design Construct shall be developed where required by contract or at the discretion of Divisional management. Where a Design Management Plan is not required, the following requirements shall be applied in accordance with procedure Con7.3-001 Design Construct.	Project Manager	Project Manager	Design Management Plan
2.9.2.2	FDC shall request a Safety in Design Risk Assessment (F008) or similar from the client or consultant. In the absence of this FDC shall complete a Safety in Design Risk Assessment (F008) in consultation with relevant stakeholders to identify design related buildability hazards and determine opportunities to eliminate design hazards prior to, during, and post construction. The hierarchy of control and applicable legislation, codes of practice and Australian standards shall be used to reduce the potential risk so far as reasonably practicable where hazards are unable to be eliminated. Potential hazards in the design phase shall remain Open until Closed or Transferred. Hazards that cannot be eliminated (or 'Closed') shall be transferred to the Site Risk Assessment (F001) for control during construction.	Project Manager	Design Manager	Safety in Design Risk Assessment (F008); Site Risk Assessment (F001)

2.9.3 Communicating Design Risk

Section	Requirements	Responsibility	Accountability	Tools
2.9.3.1	The Safety in Design Risk Assessment (F008) shall identify the method for communicating construction related risks. Methodologies include marked up drawings, amended Site Risk Assessment (F001), toolbox/prestart talks, Site Instructions etc.	Project Manager	Design Manager	Safety in Design Risk Assessment F008. Toolbox Talk (F050).

2.9.3.2	Potential hazards identified through the Safety in Design Risk Assessment (F008) that remain after construction shall be communicated to end users of the building by inclusion in the handover documentation/manuals.	Project Manager	Project Manager	Operations Manuals; handover documentation

2.9.4 Design Changes

Section	Requirements	Responsibility	Accountability	Tools
2.9.4.1	Changes to approved "For Construction" issued drawings/specification shall be identified, documented, and approved prior to use. Changes shall assess impacts in terms of safety against the Safety in Design Risk Assessment to determine new hazards or changes to existing hazard controls.	Project Manager	Design Manager	Correspondence Safety in Design Risk Assessment (F008). Drawing/Design Change Register
2.9.4.2	Changes that introduce new hazards or involve changes to existing hazard controls shall be communicated to workers through toolbox/prestart meetings or correspondence so that safety documentation can be reviewed and updated as required.	Project Manager	Design Manager	Toolbox / Prestart / Meeting Minutes; Correspondence

2.10 SITE ESTABLISHMENT

Section	Requirements	Responsibility	Accountability	Tools
2.10.1	The Site Establishment Checklist (F002) shall be used to assist site established, including site amenities, in accordance with legal requirements prior to commencement of work in accordance with Con-7.5-001 Project Start-up.	Project Manager	Site Manager	Site Establishment Checklist (F002); Amenities Checklist (F006)
2.10.2	The perimeter fencing, security and amenities shall be installed and inspected through the Weekly Site Inspection, if damage has occurred, or where risk assessment which indicates additional inspections are required.	Site Manager	Foreman	Weekly Site Inspection (F049).
2.10.3	Details of inspections of overhead protection / hoardings shall be recorded. An Engineer's Certificate is required for installation and inspection of overhead protection and shall be kept on site.	Site Manager	Foreman	Hoarding Inspection Checklist (F081).
2.10.4	Signage shall be displayed as required by legislation or as directed by FDC and for any work activity where signage is noted in safety documentation. Signs that seek to vilify or harass employees who participate, or do not participate, in industrial activities shall not be displayed on FDC sites. Building association logos, mottos or indicia shall not applied to clothing, property or equipment supplied by FDC. Conduct which implies that membership of a building association is anything other than an individual choice for each employee is not permitted.	Site Manager	Foreman	Site Establishment Checklist (F002)
2.10.5	To assist in potential emergency situations workers and visitors shall record their site attendance and departure.	Site Manager	Foreman	Site Sign In Register (F005).
2.10.6	In accordance with the Site Risk Assessment, a search of potential services (e.g. gas, electricity, fire, water, sewer, telecommunications, etc.) shall be conducted to prevent a breach of service. Services searches, including walls and slabs, shall be conducted by engaging relevant contractors to complete investigations including:	Site Manager	Foreman	Electrical Survey and Protection Plan (F069); DBYD;

	▪ Electrical Contractors to investigate and complete Electrical Survey and Protection Plan (F069); ▪ Contact Dial Before You Dig (DBYD); ▪ Scans; and ▪ Requesting information from client and relevant stakeholders. This information, including location of temporary lighting, shall be transferred to drawings, be displayed on site, and updated throughout the project. Workers shall be notified of these services through inductions, toolbox/prestart meetings or by other means of communication. This information can be used in completion of permits including the Termination of Services Permit (F070), All Services Isolation Permit (F071), Excavation Works Permit (F066) and Concrete Cutting and Coring permit (F068).			Scans; other available information; Site Risk Assessment (F001).

2.11 EMERGENCY PREPAREDNESS AND RESPONSE

Section	Requirements	Responsibility	Accountability	Tools
2.11.1	Complete the First Aid, Emergency and Health Surveillance Risk Assessment (F009) to prepare a site specific Emergency Management Plan addressing potential emergency situations and controls specific to the project.	Project Manager	Chief Warden	First Aid, Emergency and Health Surveillance Risk Assessment (F009) Emergency Management Plan

2.12 MEETINGS

Section	Requirements	Responsibility	Accountability	Tools
2.12.1	**Client Meetings** These monthly meetings are normally initiated by the client and involve the Project Manager to deal with project specific issues. The client is normally responsible for minuting the meeting. Minutes are distributed by the client to the Project Manager. Where FDC is required to take action, it is the Project Manager's responsibility to allocate tasks and to ensure the action has been completed in a timely manner. Evidence that the task has been completed should be noted on the minutes and reported to the client.	Project Manager	Project Manager	Meeting Minutes
2.12.2	**Project Control Group** The monthly Project Control Group (PCG) involves major stakeholders in the project and are run by the client. The Project Manager shall prepare a Project Report for submission to the PCG meeting and attend meetings on behalf of FDC.	Project Manager	Project Manager	Meeting Minutes
2.12.3	**Subcontractor Meetings** The monthly meeting involves the Project Manager, Site Manager or Site Foreman, and subcontractors with the meeting agenda including: ▪ Safety; ▪ Quality; ▪ Environment; ▪ Industrial Relations; ▪ Programme;	Project Manager	Project Manager	Meeting Minutes

	▪ General business; and ▪ Actionable items from the other meetings. The meeting shall be minuted to identify action items and be distributed to all attendees.			
2.12.4	**Services Coordination Meetings** The weekly meeting involves the Project Manager, Site Manager or Site Foreman, Service Coordinator, and services consultants. The meeting covers issues regarding the coordination of drawings and installation of services. The meeting shall be minuted by the Project Manager, identify action items, and be distributed to all attendees.	Project Manager	Project Manager	Meeting Minutes
2.12.5	**Site Coordination Meetings** The weekly meeting involves the Site Manager or Site Foreman and Leading Hand to discuss site issues and to plan the day's / week's activities. The meeting action items are recorded.	Project Manager	Project Manager	Meeting Minutes
2.12.6	**Project Team Meetings** The meeting involves the Project Manager, Site Manager or Site Foreman, Site Safety Representative and Leading Hand and held at least monthly. The meeting is held to discuss project, safety, and environmental issues and to plan the project activities. The meeting shall be minuted and agenda shall include: ▪ Review of Project Management Plan; ▪ Review of Site Safety Rules; ▪ Review of Site Risk Assessment and its effectiveness; ▪ Review of Environmental Risk Assessment; ▪ Project training requirements; ▪ Non-conformances; ▪ Subcontractors performance – safety, environmental, quality; ▪ Incidents; and ▪ Audit and site inspection results.	Project Manager	Project Manager	Meeting Minutes

2.13 MONITORING

2.13.1 Weekly Site Inspection

Section	Requirements	Responsibility	Accountability	Tools
2.13.1.1	Site inspections shall be undertaken to monitor implementation of work practices and identify areas for improvements. These shall be conducted weekly, independent of consultation arrangements, with workers invited to attend. Actions arising from these inspections shall be communicated and addressed by FDC and subcontractors to ensure items are suitably addressed in a timely manner. Hazards identified shall be made safe where practical and details of rectification, or actions required recorded. The Weekly Site Inspection 'SWSM Activity Review' section shall focus on activities rated "High" in the Site Risk Assessment that require additional monitoring.	Site Manager	Foreman	Weekly Site Inspection (F049)

2.13.1.2	The Site Supervisor Weekly Checklist (F004) can be used to assist in the implementation of the PMP and management system requirements.	Project Manager	Site Supervisor	Site Supervisor Weekly Checklist (F004).

2.13.2 Task Observations

Section	Requirements	Responsibility	Accountability	Tools
2.13.2.1	At least one task observations shall be completed each month to verify high risk work activities are being performed in compliance with SWMS. The observation process aims to monitor compliance, identify hazards not documented and control measures that could be improved. Observations of activities not involving high risk work may be conducted at the team's discretion.	Site Manager	Foreman	Task Observation (F053)

2.13.3 Monthly Site Audit

Section	Requirements	Responsibility	Accountability	Tools
2.13.3.1	Monthly site audits shall be conducted and be attached to the Monthly Project Report and forwarded to the General Manager. The audit addresses the physical site as well reviewing the ongoing suitability of key documents including this PMP, Site Risk Assessment and Environmental Risk Assessment. If changes are required, the updated documents will be distributed to key stakeholders. Additional audits and assessments may be conducted in accordance with the Audit procedure COR 8.2-001 by the HSEQ team. The audits shall verify implementation of the PMP and applicable elements of the integrated management system and identify opportunities for improvement.	Project Manager	Site Manager	Monthly Site Audit (F054)

2.13.4 Senior Management Inspections

Section	Requirements	Responsibility	Accountability	Tools
2.13.4.1	Senior management, including the General Manager, Construction / Operations Managers, Project Directors / Senior Project Managers, HSEQ Managers as relevant shall attend site at maximum three monthly intervals to discuss WHS and other relevant matters with the project team. The inspections shall be documented through a weekly site inspection, observation, monthly site audit, HSEQ assessment, project team meeting and or toolbox.	Divisional HSEQ Representative	Nominated Senior Managers	Task Observation (F053), Weekly Site Inspection (F049)

2.14 NON-CONFORMANCE

Section	Requirements	Responsibility	Accountability	Tools
2.14.1	Where a non-conformance with planned requirements (including PMP, SWMS, contract, legal requirements or repeat issues/offences, products and materials) has been identified a Non-Conformance Report (F039) shall be issued and actions agreed, monitored and closed out in consultation with the non-conformance recipient. Non-Conforming product or materials shall be quarantined and either returned to the supplier, disposed of, or used with client approval.	Project Manager	Site Manager	Non-conformance Report (F039). Project Monthly HSEQ Report (F090).

	Non-conformance can be identified through Weekly Site Inspection, Work Observations, Monthly Site Audit, internal/external audits, or general observations. Non-Conformances reports shall be included in Project Monthly HSEQ Report (F090). Where non-conformance has the potential to impact FDC's integrated management system these shall be communicated with the Division HSEQ representative for consultation with the National HSEQ Systems Manager.			

2.15 REPORTING

2.15.1 Internal Monthly Report

Section	Requirements	Responsibility	Accountability	Tools
2.15.1.1	The Monthly Report, including the Cost to Complete and Project Monthly HSEQ Report (F090) is submitted to Divisional management for review. The monthly meeting between the team and management shall address the report and determine actions that are minuted, to assist successful project delivery.	Project Manager	Project Manager	Internal Monthly Report F191 or division equivalent (eg Divisional PowerPoint Template); Project Monthly HSEQ Report(F090)

2.15.2 Project Monthly HSEQ Report

Section	Requirements	Responsibility	Accountability	Tools
2.15.2.1	Project HSEQ performance shall be reported monthly via the Project Monthly HSEQ Report (F090) to the Divisional HSEQ representative on the 1st working day of the following month. The report summarises the month's activities including: ▪ Incidents / LTI / MTI /First aids reports; ▪ Regulatory / statutory / union notices; and ▪ Non-conformance reports. These reports are collated into a Divisional Monthly HSEQ Report and the summary is distributed within Divisions in the interest of keeping employees informed and consulted. The summary forms part of the Divisional Monthly HSEQ Report and reviewed by the General Manager at Senior Managers Meetings Cor-5.6-002.	Project Manager	Project Manager	Project Monthly HSEQ Report (F090)

2.16 INCIDENT MANAGEMENT

Section	Requirements	Responsibility	Accountability	Tools
2.16.1	**Incident Notification** - Incidents shall be managed at the time of the occurrence in accordance with the Incident Notification Flowchart (G014). Incidents shall be verbally notified immediately per the Incident Notification Flowchart to offsite management when:	Project Manager	Site Manager	Incident Notification Flowchart G014

	▪ Emergency services, unions or the media attend site; or ▪ A notifiable incident (eg serious Injury / illness or fatality or dangerous incident) is likely.			
2.16.2	**Critical Incidents** – Class 1 incidents shall be managed in accordance with the Incident Notification Flowchart (G014) and Emergency Management Plan that addresses critical incident protocols for trauma counselling, legal privilege and media management and require senior management involvement.	HSEQ Manager	Site Manager	Incident Notification Flowchart G014; Emergency Management Plan
2.16.3	**Non-disturbance** – Where incidents are notifiable to the regulator the incident location shall remain unaltered until an inspection/investigation or direction has been provided by the Regulator. Work shall cease in the immediate area and appropriate barricades and signage displayed to prevent unauthorised entry and having the scene altered and/or contaminated. The non-disturbance provision does not prevent such actions as helping or removing trapped or injured persons or actions directed by the Regulator.	Project Manager	Site Manager	Nil.
2.16.4	**Regulatory notices** (e.g. Prohibition, Improvement etc.) shall be addressed in consultation with Divisional HSEQ representatives and the regulator to determine and implement suitable actions. Work related to the incident shall not recommence until the notice has been closed as advised by the regulator. Notices shall be copied to the General Manager, Division HSEQ and National HSEQ Systems Manager.	Project Manager	Site Manager	Regulatory notices
2.16.5	**Incident Investigation** - HSEQ Managers, trained in FDC incident management requirements, shall be responsible for incident notification, investigation and reporting and involving the project team and senior management as required to identify causes, contributing factors and actions for improvement. Incident investigations shall be completed for Notifiable Incident or where an incident occurs due to an absence of safe works procedures or physical controls. Investigations, including site attendance where practical, shall include relevant project team, subcontractor members and offsite FDC senior managers. FDC senior managers must be involved in Notifiable and Class 1 incident investigations. Incident Reports shall be completed to assist FDC understand how the incident occurred and identify contributing factors that lead to the incident. HSEQ Manager to review report and work with project teams to close out actions. Incidents shall be communicated through monthly project, division, and group HSEQ reports and monthly HSEQ meetings and HSEQ management reports. This enables FDC to take suitable projects/system actions, including lessons learned as relevant, to prevent incident recurrence. Incident Reports shall not be distributed externally without approval from the General Manager or a Director.	HSEQ Manager	HSEQ Manager	Cor-8.5-001 Incident Management
2.16.6	**Hazard Reporting** - Everyone is responsible for their own safety and of those working with/around them. This includes both physical and mental hazards that may exist on this site. If you have concerns for your own or other workers safety on this site, refer them to your manager, FDC Site Manager or one of the professional services available as appropriate (refer noticeboard and EAP).	Project Manager	Site Manager	Physical Hazards (Non-Conformance Report; Software); Mental hazards (Site Diary) FDC Vault Resources: -EAP - Guidance – Mental Health in our Workplaces

2.17 STAKEHOLDER COMMUNICATION

Section	Requirements	Responsibility	Accountability	Tools
2.17.1	The planning and conduct of works shall be carefully considered to minimise interference with the local community and the environment. The Communication and Stakeholder Plan may be developed in accordance with contract or Divisional requirements. In the absence of a Communication and Stakeholder Plan the relevant details shall be provided to clients, community representative and other interested parties regarding project duration, peak periods of construction, hours of operations, specific environmental management issues, complaints management procedures and project contact details, night work, change in work hours, and disruption to services. Communication pathways, including open forums and/or letterbox drops shall be conducted to inform the residents of the works being undertaken.	Project Manager	Project Manager	~~Communication and Stakeholder Plan~~
2.17.2	External complaints from the community, client and stakeholders shall be reported to the Project Manager for assessment of appropriate action. Where a complaint is found to be an outcome of site activities, a Nonconformance Report shall be issued to the party responsible and actioned as soon as practicable. Information to be included shall address complaint details, action taken to correct the problem and further action recommended to prevent recurrence. Where the complainant leaves contact details, a response shall be communicated regarding the above outcomes.	Project Manager	Site Manager	Non-conformance Report (F039). Correspondence
2.17.3	Where complaints have the potential to impact the management system the Nonconformance report shall be communicated with Divisional HSEQ representatives for consultation with the National HSEQ Systems Manager for action.	Project Manager	Divisional HSEQ Representative	Non-conformance Report (F039).

WORK, HEALTH & SAFETY

3.1 RISK MANAGEMENT

Section	Requirements	Responsibility	Accountability	Tools
3.1.1	The Site Risk Assessment (F001) shall be used to inform FDC, Subcontractors and other interested parties of the potential hazards and FDC's minimum controls. The risk assessment identifies high risk construction work activities and minimum requirements that shall be addressed through safety documentation SWMS, Permits or other documented safety procedures relevant to the specific tasks.	Project Manager	Project Manager	Site Risk Assessment (F001)
3.1.2	The Site Risk Assessment (F001) shall be established prior to construction work commencing and be communicated with the project team to confirm potential hazards and control requirements during the project. The Site Risk Assessment shall be: - prepared by employees trained in FDC risk management procedures; - approved by the Project Manager; - approved by the Division HSEQ Manager; and - issued to subcontractors prior to them commencing work and where revisions are made during the project. The ongoing suitability of the Site Risk Assessment shall be reviewed at the Monthly Site Audit and changes prepared, approved and reissued as above.	Project Manager	Site Manager	Site Risk Assessment (F001)
3.1.3	Only employees trained in FDC risk management procedures addressing the Hazard Identification Risk Assessment and Control (HIRAC) process, including the use of the Site Risk Assessment (F001), shall be responsible for managing HIRAC activities.	Divisional HSEQ Representative	Project Manager	See HSEQ / Division Admin for Training and Experience Register (F024)
3.1.4	The effectiveness of the HIRAC process shall be evaluated after class 1 incidents to determine its effectiveness in managing risks. Proposed changes shall be raised with the National HSEQ Systems Manager in accordance with the Change Management Procedure.	Divisional HSEQ Manager	Divisional HSEQ Manager	Incident Report (F035)
3.1.5	Mental Health / Psychosocial Hazards - Everyone is responsible for their own safety and of those working around them. This includes potential mental and physical safety hazards. If you have concerns for your own, or other workers mental state on this site, refer them to your manager, FDC Site Manager or one of the professional services available as appropriate (refer Site Noticeboard and FDC Vault).	Project Manager	Site Manager	FDC Vault Resources: - Mental Health. - FDC Employee Assistance Program (EAP) - Mates in Construction

3.2 SAFE WORK METHODS STATEMENTS (SWMS)

Section	Requirements	Responsibility	Accountability	Tools
3.2.1	SWMS shall be developed for high risk construction work activities in consultation with workers. SWMS and relevant safe operating procedures shall be reviewed and accepted by FDC using the SWMS Checklist (F029) in accordance with the Site Risk Assessment prior to works commencing on site. High risk construction works are identified on page 2 of the Safe Work Method Statement Checklist (F029) in accordance with legislative requirements.	Site Manager	Site Manager	FDC SWMS Template (F030) SWMS Checklist (F029)

3.2.2	SWMS and/or safe operating procedures shall be reviewed and revised if necessary, whenever construction work changes or if there is reason to believe that risk control measures are not adequate to control the level of risk. All persons affected by the amendment must be advised of the change and retrained.	Site Manager	Foreman	Toolbox Talk F050. Pre-Start Meeting (F051).
3.2.3	A Task Observation (F053) shall be used at maximum monthly intervals to confirm SWMS for high risk construction works are being complied with. In addition, the observation shall determine if hazard controls measures are adequate, and that the SWMS addresses identified hazards. Unsafe activity shall be immediately reported to FDC and a stop work process initiated until the SWMS and/or activity is rectified.	Site Manager	Foreman	Task Observation (F053) Non-Conformance Reports (F039)

3.3 CONSULTATION

Section	Requirements	Responsibility	Accountability	Tools
3.3.1	Consultation involves the sharing of WHS information with the workforce and providing the workforce an opportunity to contribute to the improvement and resolution of WHS issues including: • Work policies, systems, procedures and consultative arrangements; • Risk assessments and control measures; • Work premises, work environment, plant, equipment or substances used for work; • Incidents, illnesses (including mental health), or injuries (in a way that protects the confidentiality of personal information); • Reporting procedures; and • WHS and welfare with workers. Consultation occurs when: • changes to premises, work environment, work methods, plant, and substances that may affect health, safety or welfare are proposed; • risks to health and safety arising from work are assessed or when the assessment of those risks is reviewed; • decisions are made about the measures to be taken to eliminate or control hazards; • When introducing or altering the procedures for monitoring hazards. The Site Manager shall facilitate a toolbox meeting with workers at project commencement to establish the consultation arrangements. Consultative arrangements may include a Health & Safety Representative, a Health & Safety Committee, or any other agreed arrangements in accordance with the legislation and documented on the Consultation Statement. The statement shall be displayed on site and referenced at site inductions. Changes to the established consultation arrangements shall be made in writing to FDC site management and any WHS disputes shall be managed per section 3.4 Dispute Resolution. In accordance with the following consultation arrangements, weekly inspections shall monitor the workplace and related activities (eg plant and equipment, substances, access and egress) using the Weekly Site Inspection. The inspection shall be made available and communicated to workers to enable issues to be rectified and information shared. Raised issued shall be actioned, closed out and a copy of the completed report shall be filed.	Project Manager	Site Manager	Toolbox Talk F050; Consultation Statement (F047); Weekly Site Inspection (F049). FDC Vault Resources: - Mental Health. - FDC Employee Assistance Program (EAP) - Mates in Construction

3.3.2	**Health and Safety Representatives** A worker may request the election of a health and safety representative to represent them on work health and safety matters. If a worker makes this request, work groups must be established to facilitate the election. Health & Safety Representatives shall be elected by members of the work group unless the number of nominations equals the number of vacancies whereby the Site Manager shall facilitate the election if requested to do so by the work group. Negotiations shall commence within 14 days after a worker makes the request and may involve a worker's representative (such as a union official) if requested. Workers shall be notified of the outcome of the negotiations and of any work groups determined by agreement as soon as practicable after negotiations are complete. Management and workers shall agree on the formation of work groups including: • The number of health and safety representatives and deputy health and safety representatives (if any) to be elected; • The workplace or workplaces to which the work groups will apply, and • The businesses or undertakings to which the work groups will apply. The elected Health & Safety Representatives shall hold their position whilst on the project, but no longer than 3 years, unless they leave employment, are removed from office by the members of the work group or are disqualified from holding the position as per the WHS Act. Health & Safety Representatives shall: • Confirm the consultation statement; • represent the work group in matters relating to work health and safety, • monitor the measures taken by the person conducting the relevant business or undertaking or that person's representative in compliance with this act in relation to workers in the work group, • investigate complaints from the work group relating to work health and safety, and • inquire into potential risks to the health or safety of the work group arising from the conduct of the business or undertaking. • Not be entitled to have access to personal or medical information concerning a worker without the worker's consent, unless the information is in a form that does not identify the worker, and could not reasonably be expected to lead to the identification of the worker; • Attend prescribed training to be eligible to be a Health & Safety Representatives; and • Conduct a site inspection with work group representatives to identify areas for improvement.	Project Manager	Health and Safety Representatives	Toolbox Talk (F050); Consultation Statement (F047); Weekly Site Inspection (F049).
3.3.3	**Health and Safety Committee** A Health & Safety Committee must be established within two months after being requested to do so by 5 or more workers or by a Health & Safety Representative. If agreement about the Health & Safety Committee cannot be reached in a reasonable time, either party can request the regulator to appoint an inspector to decide on the make-up of the Health & Safety Committee, or whether it should be established at all.	Site Manager	Committee	Weekly Site Inspection (F049). Toolbox Talk (F050).

	Health & Safety Representatives are eligible to be on the Committee and nominations shall be held for the remaining positions. At least half of the members of the committee shall be workers not nominated by management. If there are more nominations than positions, then an election shall be held, and results published. Health and Safety Committees shall meet [weekly], but not exceed 3 monthly intervals, with meeting minutes published. The first meeting of the Health & Safety Committee should establish the constitution for that committee with the constitution displayed on site and referenced in the site induction. Committee members shall have appropriate prescribed training to be eligible to participate as a Health & Safety Committee member. The functions of the Health & Safety Committee are to: • facilitate cooperation between FDC and workers in instigating, developing, and carrying out measures designed to ensure the workers' health and safety at work; • assist in developing standards, rules and procedures relating to health and safety that are to be followed or complied with at the workplace, • address other functions prescribed by the regulations or agreed between FDC and the committee; and • Conduct a site inspection to identify areas for improvement.			
3.3.4	**Agreed Arrangements** Any other arrangements for consultation shall be established to suit workers and workplace situations ensuring these are consistent with the requirements of the WHS Act. Agreed arrangements shall be determined by the workers at a meeting, records made, and Consultation Statement confirmed. The statement shall be displayed on site and referenced at site inductions. The agreed arrangements for this project shall be managed by [INSERT POSITION AND NAME] and include: • Site toolbox talk conducted [insert days these will be held]; and • Site inspection conducted weekly [insert day], with members of the workforce - all welcome. If there are WHS issues for FDC to address, these shall be communicated at the above inspection/toolbox or directly with FDC site management. Additional toolbox talks/prestarts may be held at any time in support of worker / project needs or as directed by FDC. Where directed by FDC, evidence of subcontract toolbox talks shall be collected and maintained by FDC.	Site Manager	Site Manager	Weekly Site Inspection (F049). Toolbox Talk (F050).

3.4 DISPUTE RESOLUTION

Section	Requirements	Responsibility	Accountability	Tools
3.4.1	WHS Disputes: Where WHS issues cannot be resolved, the disputed issue shall be resolved in accordance with local legislation where the dispute has been raised. The agreed procedure to resolving WHS disputes includes:	Project Manager	Site Manager	Toolbox Talk F050; Correspondence

	• Notifying the FDC Supervisor in charge of the area of the issue. The FDC Supervisor shall, where possible, organise to have the matter rectified immediately. If this is not possible the FDC Supervisor shall inform affected parties of the issue and arrange for workers affected by the issue to be relocated until rectified if necessary; • An inspection shall be then undertaken of the disputed area by the Site Manager per the project consultation arrangements with the FDC Supervisor and affected parties where practical. Where the dispute involves a subcontractor their Site Supervisor and HSR (where nominated) may also be present. • Where the dispute cannot be resolved, the matter may be determined through the local regulatory authority. Records of the issue and agreed action shall be maintained.			
3.4.2	**Industrial Disputes:** Potential disputes shall be notified to FDC site management. Resolution is to be sought through consultation between affected parties and in accordance with applicable regulatory and industrial instruments. Escalation of disputes beyond the directly affected parties, should not occur unless all other possible remedies and negotiations have been exhausted. Records of the issue and agreed action shall be maintained.	Project Manager	Site Manager	Toolbox Talk F050 Consultation Regulatory and/or Industrial Instrument

3.5 INJURY MANAGEMENT

Section	Requirements	Responsibility	Accountability	Tools
3.5.1	Conduct a First Aid, Emergency and Health Surveillance Risk Assessment using the First Aid, Emergency and Health Surveillance Risk Assessment (F009) to identify site first aid equipment and requirements in accordance with relevant legislation, codes of practice and Australian standards. This shall be completed prior to commencement to ensure adequate first aiders, first aid equipment and facilities are supplied. This assessment shall be completed by a qualified first aider. First aid equipment shall be listed on the FDC First Aid and Emergency Equipment Register to assist the ongoing inspection, test and maintenance of equipment on site.	Site Manager	[First Aider]	First Aid, Emergency and Health Surveillance Risk Assessment (F009); Training and Experience Register F024; FDC First Aid and Emergency Equipment Register (F060)
3.5.2	Locations of first aid equipment and facilities, and names of First Aiders, shall be communicated at site induction and displayed on site. First aid equipment and facilities shall be inspected weekly and maintained in compliance with manufacturers and/or legal requirements.	Site Manager	Foreman	First Aid Restock Request (F037). Weekly Site Inspection (F049).
3.5.3	First Aiders shall provide first aid and coordinate additional medical assistance / emergency services as required. The FDC Register of Injury (F036) shall be completed when first aid has been provided through designated First Aiders. Injuries, and provision of first aid, must be notified to FDC on the day of the occurrence to be reported. Late notifications of injuries, without FDC first aid treatment, shall only be noted in the site diary. First aid injuries shall be verbally notified immediately per the Incident Notification Flowchart to offsite management when: ▪ Emergency services, unions, or the media attend site; or	Site Manager	[First Aiders]	Incident Notification Flowchart G014; FDC Register of Injury (F036)

	▪ A notifiable incident (eg serious Injury / illness or fatality) is likely.			
3.5.4	For FDC employees – Where an injured worker seeks additional offsite medical assistance the FDC Register of Injuries shall be copied to Divisional HSEQ to assist the injured worker with the completion of workers compensation paperwork. For all other injured parties - The FDC Register of Injuries (F036) shall be copied to the supervisor of injured workers seeking additional offsite medical assistance. Where a Medical Practitioner prescribes time off work due to reported work related injuries, a clearance certificate from a Medical Practitioner must be provided prior to returning to work.	Site Manager	[First Aiders]	FDC Register of Injury (F036).
3.5.5	Return to work and rehabilitation activities shall be managed in consultation with the Divisional HSEQ representative in accordance with Cor8.5-002 Injury Management.	Divisional HSEQ Representative	Site Manager	FDC Register of Injury (F036); Workers compensation forms

3.6 HAZARDOUS CHEMICALS

Section	Requirements	Responsibility	Accountability	Tools
3.6.1	Where Safety Data Sheets (SDS) identify chemicals to be hazardous or dangerous these shall be recorded, and risk assessed for use in accordance with the Hazardous Chemical Register. Suitable safety documentation (eg SWMS, standard operating procedures as appropriate) are developed prior to works commencing for the safe use, handling, and storing of chemicals. Current SDS shall be identified and readily accessible in either hard copy or electronic format.	Site Manager	Foreman	Hazardous Chemical Register (F086)
3.6.2	Hazardous chemicals and dangerous goods shall be stored and separated as required by the Dangerous Goods Regulation.	Site Manager	Foreman	Hazardous Chemical Register (F086)
3.6.3	The use of hazardous chemicals requiring health surveillance, as defined by legalisation, shall be managed in accordance with the Site Risk Assessment and the Health Surveillance section of this PMP.	Site Manager	Foreman	Site Risk Assessment (F001)

3.7 MANUAL HANDLING AND HOT AND COLD WORK ENVIRONMENTS

Section	Requirements	Responsibility	Accountability	Tools
3.7.1	Workers and subcontractors are encouraged to take sufficient time to assess risks before they perform manual handling tasks in accordance with the national Code of Practice for Manual Handling. Where possible, and after completion of training in the use of equipment, mechanical aids should be used for manual handling in accordance with the Site Risk Assessment. Examples of manual handling tasks include: • Heavy / awkward materials, plaster board sheet, products, packages, cement bags; • Moving plant, equipment and scaffolding; • Using wheelbarrows and trolleys to transport materials; and	Site Manager	Foreman	Evidence of training; Toolbox Talk F050; SWMS

	• Reaching and stretching tasks.			
3.7.2	HOT AND COLD WORK ENVIRONMENTS Where work is conducted in extreme temperatures these require hazard identification, risk, and control through the Site Risk Assessment in accordance with the Hot and Cold Work Environment Policy.	Site Manager	Foreman	Site Risk Assessment F001; Hot and Cold Work Environment Policy.

3.8 CONCRETE CUTTING – CORE HOLES

Section	Requirements	Responsibility	Accountability	Tools
3.8.1	A Concrete Cutting and Coring Permit shall be completed and issued for coring works or penetrating concrete slabs.	Site Manager	Foreman	Concrete Cutting and Coring Permit (F068)

3.9 HOT WORKS

Section	Requirements	Responsibility	Accountability	Tools
3.9.1	Work including oxy/acetylene welding/brazing and cutting, electric welding and cutting, grinding, works that involve the use of a naked flame or other heat-producing or spark-producing source in a hazardous environment require a Hot Works Permit. The permit shall be completed in accordance with the Site Risk Assessment when any one of the following conditions apply: • hot work is being completed within a client or user occupied area (e.g. breaking through into an occupied or completed area such as an extension to the building services / involve retro fitting in a completed area / post occupancy work); and/or • hot work in a high risk zone. A high risk zone is an area containing readily flammable material below, or within 10m of works, that cannot be removed (i.e. carpet and furnishings, cardboard, paper and packaging, dry grass, straw and litter, stored flammable gas or liquids, glues, cleaners, lubricants, oils, paper, insulation, PVC plastic etc.); and/or • hot work is likely to trigger thermal (heat) detectors or activate sprinklers and/or smoke detectors. A permit is not required where the above conditions do not apply. In such cases, the hot works shall be managed through safe systems of work including SWMS, standard operating procedures, ensuring first attack firefighting equipment is readily available.	Site Manager	Foreman	Hot Works Permit F062

3.10 HIGH RISK CONSTRUCTION WORK

Section	Requirements	Responsibility	Accountability	Tools

3.10.1	The following high risk construction work activities establish FDC minimum requirements and shall be managed in accordance with the Site Risk Assessment. Potential hazards shall be controlled through safety documentation including SWMS, safe operating procedures, permits, other documented safety procedures or a combination of these relevant to the specific tasks. Emergency procedures and safe systems of work, including SWMS, safe work/operating procedures, permits etc. shall be established by person's trained in and conducting high risk construction work activities.	Project Manager	Site Manager	Site Risk Assessment F001

3.11 Asbestos

Section	Requirements	Responsibility	Accountability	Tools
3.11.1	Where the removal of asbestos is required an Occupational Hygienist shall provide an Asbestos Management Plan including types of asbestos, locations, and exposure monitoring standards.	Site Manager	Foreman	Asbestos Management Plan
3.11.2	Removal of asbestos shall be in accordance with the Asbestos Management Plan by licenced asbestos removal contractors in accordance with their Asbestos Control Plan and safety documentation including SWMS. Records of worker qualifications/ training and evidence that health surveillance medicals have been conducted shall be made available. The intended removal of asbestos shall be notified to the Regulator by the subcontractor prior to works commencing. Liaison with stakeholders potentially affected by removal activities shall be managed by FDC.	Site Manager	Foreman	Asbestos Control Plan; SWMS; Regulator and stakeholder notification
3.11.3	Air monitoring and sampling activities shall be conducted by an Occupational Hygienist that is independent of the licensed asbestos removal contractor. Clearance certificates shall be obtained from the Hygienist on completion of any asbestos removal work.	Site Manager	Foreman	Clearance certificates
3.11.4	Waste disposal receipts for removed asbestos products shall be obtained from the asbestos removal contractor.	Site Manager	Foreman	Waste removal receipts

3.12 Confined Space

Section	Requirements	Responsibility	Accountability	Tools
3.12.1	The Confined Space Criteria and Entry Permit (F063) shall be used to determine the presence of confined spaces. Inadvertent access to confined spaces shall be prevented by securing the confined space, installing confined space signage, and ensuring access is only by workers with a permit and training as follows.	Site Manager	Foreman	Confined Space Criteria and Entry Permit F063
3.12.2	Persons entering the confined space, and standby persons, shall hold Nationally Recognised Training in Confined Space and have SWMS for the proposed activities. Where a harness is required for access a Harness Permit shall be required.	Site Manager	Foreman	Training/qualification; SWMS; Harness Permit (F064).
3.12.3	When confined space requirements including qualifications, PPE, emergency procedures, equipment maintenance and calibration, isolations, signage, barricading, hot works, and air monitoring have been met a Confined Space Criteria and Entry Permit for the duration of the activity shall be issued. The permit shall be closed out on completion of the activity.	Site Manager	Foreman	Confined Space Criteria and Entry Permit F063;

3.13 Demolition

Section	Requirements	Responsibility	Accountability	Tools
3.13.1	An Occupational Hygienists shall determine the presence of hazardous substances, including review of available asbestos registers, which may be hazardous to the health of the site personnel or the public if disturbed by the stripping or demolition. The nature, location, and proposed methods to control the hazards shall be recorded and provided to FDC and the demolition contractor prior to demolition activities. Where required by contract or Divisional requirements a Hazardous Material Management Plan may be used.	Site Manager	Foreman	Asbestos Register; Hazardous Material Management Plan
3.13.2	Notice of demolition work shall be issued by the Subcontractors to the relevant authority prior to commencement of demolition work if the demolition involves: • demolition of a structure, or a part of a structure that is load-bearing or otherwise related to the physical integrity of the structure, that is at least 6m in height; • demolition work involving load-shifting machinery on a suspended floor; • demolition work involving explosives.	Site Manager	Foreman	Notice of demolition work
3.13.3	Demolition contractors shall provide FDC with SWMS and a Demolition Work Plan addressing Hazardous Material Management Plan, the building structure, including adjacent structures and materials prior to commencing works. Safe systems of work, including SWMS, shall address requirements for working at heights and protecting persons from falling objects.	Site Manager	Foreman	Demolition Work Plan; SWMS
3.13.4	Prior to commencing demolition work Dial Before You Dig requests, Electrical Safety Survey, All Services Isolation Permit or Termination of Services Permit and/or specific client, contractor or utilities permit requirements shall be completed.	Site Manager	Foreman	Electrical Safety Survey and Protection Plan (F069). All Services Isolation Permit (F071). Termination of Services Permit F070; Dial Before You Dig
3.13.5	Where demolition consists of non-structural strip out the Electrical Safety Survey, All Services Isolation Permit or Termination of Services Permit and or specific client, contractor or utilities permit requirements shall be completed. Safe systems of work, including SWMS, shall address requirements for working at heights and protecting persons from falling objects.	Site Manager	Foreman	Electrical Safety Survey and Protection Plan (F069).

				All Services Isolation Permit (F071). Termination of Services Permit (F070). SWMS

3.14 Electrical

Section	Requirements	Responsibility	Accountability	Tools
3.14.1	A Licensed Electrical Contractor shall be responsible for developing safe systems of work, including SWMS and safe work procedures for work on electrical installations (e.g. construction wiring, high voltage power, switchboards, and isolation). The Licensed Electrical Contractor shall ensure workers are licensed and trained in safe systems of work involving the installation, modification, testing and certification of electrical installations. Evidence of licensing and qualifications shall be reviewed during site induction. The Licensed Electrical Contractor shall be responsible for the training and supervision of unlicensed workers (e.g. apprentices, trade qualified workers) whilst on site.	Site Manager	Foreman	Qualifications
3.14.2	The Electrical Safety Survey and All Services Isolation Permit (for de-energising and re-energising) or Termination of Services Permit shall be completed for works involving: • isolation, de-energisation and re-energising activities; • lockout and tag out of electrical isolations; and • working near energised parts. Work on, or testing of, energised electrical equipment shall only be conducted by a Licensed Electrical Contractor in accordance with task specific procedures and legislative requirements. The permits shall only be issued to a Licensed Electrical Contractor when safe systems of work, including SWMS, have been developed for these specific works. The Site Manager must visually check that tags, lockouts etc. have been applied as required.	Site Manager	Foreman	Electrical Safety Survey & Protection Plan (F069). All Services Isolation Permit (F071). Termination of Services Permit (F070). SWMS
3.14.3	The Licensed Electrical Contractor shall ensure electrical work, including switchboards, distribution boards, temporary and permanent wiring has been installed, inspected prior to use, and conforms with relevant legislation, codes of practice and Australian standards (AS3000, AS3012, AS3760) by a qualified electrician. Construction wiring shall be adequately secured, protected, and clearly marked accordingly with "Construction Wiring" sticker and not be tied, bundled, or grouped with permanent wiring.	Site Manager	Foreman	Regulatory Compliance Certificates
3.14.4	Testing and tagging of electrical equipment shall be completed at maximum 3 month intervals by a qualified electrician, or competent person with an industry recognised test and tag training course (e.g. UEENEEPO26A) in accordance with relevant legislation, codes of practice and Australian standards (AS3760).	Site Manager	Foreman	Electrical Test and Tag Register F073

	Records of testing and inspection activity, including Electrical registers and Compliance Certificates, shall be maintained. FDCs Electrical Test and Tag Register may be used in the absence of similar register supplied by a Licensed Electrical Contractor.			
3.14.5	RCD protection is required for portable generators, construction wiring and electrical systems to protect workers from electrical contact. RCD's shall be tested by a Licensed Electrical Contractor at maximum 3 monthly intervals and results recorded.	Site Manager	Foreman	Electrical Test and Tag Register F073

3.15 Excavation

Section	Requirements	Responsibility	Accountability	Tools
3.15.1	The Site Risk Assessment shall be used to develop safe systems of work to manage excavation activities including: - Impacts to adjacent building structures, materials and foundations; - Excavation near above ground and underground services (including liasing with asset owners); - Mobile plant working in or around an excavation; - Potential falls into the excavation; and - emergencies related to excavations. Safe systems of work include the development of Permits, SWMS, drawings/plans, engineering reports or a combination of these in accordance with the below requirements.	Site Manager	Foreman	Site Risk Assessment; SWMS, permits, drawings/plans; haz mat, Geotech / dilapidation reports
3.15.2	Identification and location of services by contacting Dial Before You Dig (DBYD) by telephone 1100 or visit their website www.1100.com.au. Allow at least three days from enquiry submission to receive all your DBYD information. Print DBYD plans including your Enquiry Confirmation Sheet that contains the DBYD Confirmation Number. Printed plans shall be maintained on site for the duration of the excavation activity. DBYD plans have an expiry date that can be found on the Enquiry Confirmation Sheet. A new DBYD enquiry shall be made when excavation activities exceed the expiry date. Relevant asset owners shall be contacted to determine potential impacts of above ground and underground services on excavation activities. Asset owner requirements shall be documented and permits, training needs and encroachment distances complied with. Termination of Services F070 and the All Services Isolation Permit F071 may be required. Where drawings show services within 2 (two) metres of the proposed excavation/penetration, the actual location of those services must be confirmed by either a locating device or by hand excavation.	Site Manager	Foreman	DBYD; Drawings/plans; SWMS; Termination of Services F070; All Services Isolation Permit F071; Excavation Works Permit F066;
3.15.3	An Excavation Works Permit (F066) shall be completed for excavations prior to commencing works and issued to a supervisor / foreman responsible for the activity. The permit and associated safety documentation shall address the nature of the works and note methods to prevent ground collapse. Drawings / plans / permits / reports relevant to the excavation activity shall be attached to the Excavation Works Permit (F066). Inspection of the excavation and control measures shall be conducted by a supervisor / foreman each day the excavation is accessed and recorded on the Excavation Works Permit (F066).	Site Manager	Foreman	Excavation Works Permit F066; drawings/plans; Geotech reports; SWMS

	Note - Excavation Works Permits are not required for Aqua Vac exploratory excavation, potholing for services, other hand tool excavations including driving of star pickets. For these activities instructions (e.g. equipment maximum nozzle pressures) from asset owners and DBYD must be available on site for reference and implemented.			
3.15.4	Excavation support systems including hydraulic shoring, sheet piling, steel shoring/trench lining, sheeting and ground anchors shall be: • designed by a qualified Geotechnical or Structural Engineer; • detailed on current drawings; • installed and verified by persons trained and instructed in the support system being installed in accordance with documented designs/drawings; and • authorised by a qualified Geotechnical Engineer or Structural Engineer where changes to the design or installed system are made.	Site Manager	Foreman	Drawings / designs / Geotech reports
3.15.5	Safe systems of work shall ensure: • Safe access at all times. Where a ladder is used, it must be sufficient to extend 1 (one) metre past the landing place and be secured at the top and bottom to prevent slipping; • Excavations deeper than 1.5m shall be properly benched, battered or shored, or a combination of these. Where the ground is unstable, advice from a Geotechnical Engineer or Structural Engineer may be required; • Excavations shall not be left exposed if unattended. Flagging, para webbing and/or barricading must be erected at a minimum of 1m from the edge and warning signs posted to protect persons from falling into the excavation; • Sufficient controls (eg signage, flagging/para webbing/barricading) are implemented where mobile plant is working in and around excavations in accordance with the Vehicle Movement Plan.	Site Manager	Foreman	SWMS; Vehicle movement plan

3.16 Formwork

Section	Requirements	Responsibility	Accountability	Tools
3.16.1	Subcontractors shall provide the following documentation must be available for inspection on site: • Certification of the maximum loads from stacked materials that the formwork assembly can withstand; • Specifications for the concrete and when formwork can be removed; • Back-propping details (plans and elevations including tying in); and • Drawings for the formwork design. The drawings must be signed by a professional engineer or formwork designer or be accompanied by a certification letter that lists the drawing numbers and drawing revision numbers.	Site Manager	Foreman	Designs, Engineers Certificate; drawings
3.16.2	A structural/geotechnical engineer shall assess building structures/materials/foundations and identify controls required prior to commencing formwork. Subcontractors shall be responsible for developing safe systems of work for the: • erection, use and stripping of formwork;	Site Manager	Foreman	SWMS

	• prevention of persons falling and the management of falling objects, including exclusion zones; • management of penetrations (Open penetrations such as stairwells shall include handrails, mesh, and plywood covers. Slab shall include cast in mesh to be secured prior to pouring concrete. Penetrations on poured slabs shall be covered with formplay and secured in place to prevent inadvertent removal); and • correct installation of systems/structures, including the ongoing monitoring/inspections of the effectiveness of the systems/structures in accordance with legislative and manufactures requirements and applicable drawings or plans; • review and approve design variations that deviate in the erection from the plan or that fall outside the design parameters; and • approve modifications to formwork, outside specified design parameters.			
3.16.3	An Engineer with experience in structural design shall inspect and certify that the completed formwork meets the design specifications, manufacturers' instructions and relevant legislation, codes of practice, Australian standards and applicable drawings/plans and is structurally sound before it is loaded.	Site Manager	Foreman	Engineers Certificate

3.17 Exposure Monitoring

Section	Requirements	Responsibility	Accountability	Tools
3.17.1	The Site Establishment Checklist prompts the completion of site investigations. The Asbestos Registers and Hazardous material/substances survey shall be completed by an Occupational Hygienist to identify potential hazards including biological and chemical/atmospheric contaminants and products identified in legislation that require health surveillance activities to: - determine workplace exposure standards and exposure levels; and - consider potential health hazards when developing safe systems of work for project specific activities in accordance with the Site Risk Assessment. Potential physical hazards, including dust, noise and vibration shall be managed in accordance with the Work Environment section of the Site Risk Assessment. Workplace/Worker exposure monitoring activities for work areas potentially affected by health hazards shall be developed in consultation with Divisional HSEQ representatives and Occupational Hygienists. Safe systems of work including Site Risk Assessment, SWMS, Permits or a combination of these shall address the following activities: • Method and frequency of monitoring; • Sampling and analytical method (including exposure standards); • Interpretation and consultation of results; • Nomination and maintenance of control measures; and • The need for individual health surveillance. When monitoring activities identify that exposure to potential health hazards are approaching accepted exposure standards, the suitability of nominated control measures shall be reviewed in consultation with site management and the Occupational hygienist to determine appropriate actions where appropriate.	Site Manager	Foreman	Site Establishment Checklist; Hygienist Report; Site Risk Assessment F001; SWMS; Permits

3.17.2	The inspection, measuring and test equipment related to health and safety monitoring shall be managed in accordance with manufacturer's specifications and legal requirements with records of calibration maintained. In the absence of registers or calibration certificates from the subcontractor, FDC shall maintain a register of project specific on the Calibration Register.	Site Manager	Foreman	Calibration Register F080
3.17.3	A review of monitoring activities and nominated control measures shall be undertaken when: • a failure of nominated control measures is suspected; • accepted exposure limits are exceeded; or • when individuals are unexpectedly exposed to hazardous substances that weren't previously known to be present on-site. Where potential exposure to hazardous substances has occurred, work shall cease immediately, and the area evacuated and secured. Further work activities shall be assessed in consultation with site management, Divisional HSEQ representative and the Occupational Hygienist to determine improvements to work methods and control measures. Access to closed secured areas due to potential health hazards shall not be permitted until certification is received from the Occupational Hygienist and the suitability of monitoring requirements and nominated control measures have been assessed, recorded, and improved as necessary. The HSEQ Manager shall be notified when individuals have potentially been exposed to health hazards due to absent controls or safe systems of work.	Site Manager	Foreman	Nil.
3.17.4	General information on health surveillance, exposure monitoring and control measures is communicated as appropriate through inductions, toolbox talks, noticeboard etc. Records of health surveillance and exposure monitoring activities however contain personal information and shall remain confidential.	Site Manager	Foreman	Site Induction-Site Rules F018.Toolbox Talks F050. First Aid, Emergency & Health Surveillance Risk Assessment (F009)

3.18 Health Surveillance

Section	Requirements	Responsibility	Accountability	Tools
3.18.1	Individuals potentially exposed to hazardous substances shall be directed to seek medical treatment with a medical practitioner to assess exposure and any requirement for ongoing health surveillance. Where Medical Practitioners identify/advise that health surveillance is required, a review of monitoring activities and nominated control measures, including any recommendations by the registered Medical Practitioner, shall be undertaken in consultation with site management, Divisional HSEQ representatives and Occupational Hygienist to determine appropriate actions. The HSEQ Manager shall be notified when individuals have potentially been exposed to health hazards due to absent controls or safe systems of work.	Site Manager	Foreman	First Aid, Emergency & Health Surveillance Risk Assessment (F009)

3.18.2	Records of surveillance data shall be maintained and actions arising from assessment recorded. Records shall include monitoring equipment calibration records whenever the monitoring is conducted directly by FDC. Ongoing individual health surveillance shall be provided in accordance with the recommendations of registered medical practitioners. Health surveillance requirements shall be communicated to relevant employees in consultation with Divisional management and shall remain confidential.	Site Manager	Foreman	Surveillance Data First Aid, Emergency & Health Surveillance Risk Assessment (F009) Calibration Register F080.

3.19 Mobile Plant

Section	Requirements	Responsibility	Accountability	Tools
3.19.1	The Mobile Plant Induction (F077) shall be completed for mobile plant prior to commencing works on site. The induction shall ensure, as a minimum, a plant risk assessment specific to the plant model, maintenance records, log books and original equipment manufacturers manuals are available. Plant risk assessments shall focus on higher order controls including plant specific warning devices, ROPs/FOPs, guarding, edge protection etc. Operator controls are considered lower order controls and on their own are not acceptable as a plant risk assessment. The mobile plant induction process aims to establish safe systems of work addressing original equipment manufacturers requirements, plant risk assessment outcomes and controls, and the need for ROP's and FOP's. Site specific requirements shall be established through SWMS, vehicle movement plans and permits related to activities.	Site Manager	Foreman	Mobile Plant Induction F077
3.19.2	Upon successful induction the plant shall receive a plant identification sticker and be registered on the Plant Register. Registered items shall be randomly selected, and records verified through Weekly Site Inspections and Monthly Site Audits. The Plant and Equipment Competency and Inspection Schedule is available as guidance regarding plant inspection requirements. The Plant Register shall record plant inspections and maintenance specific to the needs of each type of plant. Inspections shall be in accordance with regulatory inspections, registrations, and manufacturers requirements, including pre-start inspections and/or commissioning prior to commencing on site. The Plant Register shall be used to manage ongoing maintenance requirements.	Site Manager	Foreman	Plant Register F079; Plant and Equipment Competency and Inspection Schedule G012

3.19.3	Where a mobile crane or boom pump is required, the Mobile Crane / Boom Pump Setup form shall be completed. This is required for each new location that a Mobile Crane / Boom Pump is set up for operation. The set-up location shall be communicated to relevant parties. **For mobile cranes** - the subcontractor shall provide a lift plan when complex rigging is required (incl. fragile/irreplaceable loads, long/wide loads, lifting work boxes, working near live overhead power lines, precast/tilt up, demolition work, erecting/dismantling tower cranes or where multiple cranes for a lift are required). **For tower cranes** – the subcontractor shall provide a lift plan when working outside the Original Equipment Manufacturers requirements. A Lift Plan may include crane type / capacity, weight of lift, load charts, rigging/lifting equipment, lifting methods and sequence etc. The subcontractor shall develop safe system of work, including SWMS, in addition to the above documentation. Work boxes - Subcontractors shall develop safe systems of work in accordance with relevant legislation, standards, and codes of practice for using crane lifted work boxes, including crane lifted first aid work boxes. Safe Work Australia has an information sheet including reference to AS 1418.17 and AS 2550.1 crane use, design and construction requirements. The safe systems of work shall address requirements for the use of work boxes and cranes.	Site Manager	Foreman	Mobile Crane/Boom Pump Setup F078 Lift Plan
3.19.4	Operator licensing, qualifications or competency requirements shall be identified through the Mobile Plant Induction. These documents shall be verified at worker site inductions. Further guidance on competency/qualifications is available through the Plant and Equipment Competency and Inspection Schedule to assist this process. NOTE: a letter signed by an employer or supervisor claiming that the worker is competent is not acceptable.	Site Manager	Foreman	Site Induction-Site Rules F018; Mobile Plant Induction F077; Plant and Equipment Competency and Inspection Schedule G012
3.19.5	To manage the interaction between people and mobile plant a vehicle movement plan shall be maintained that illustrates work areas and pedestrian access. These plans shall be displayed and communicated through toolbox/ prestart meetings and updated as necessary to reflect site activities. Plans shall take into consideration site characteristics, barricading, exclusion zones, warning devices and plant/vehicle/worker interactions.	Site Manager	Foreman	Vehicle Movement Plan

3.20 Scaffold

Section	Requirements	Responsibility	Accountability	Tools
3.20.1	Scaffold where a person or object could fall greater than 4m shall be designed by a qualified structural engineer who shall: • provide a scaffold design/plan that includes a site layout, engineer sketch plan, engineer approved as-built or standard drawings for scaffolds; • provide documented design parameters provided by the scaffold manufacturer. These should be located on the scaffold drawings or associated documents;	Site Manager	Foreman	Design/drawings; qualifications

	• review and approve design variations that deviate in the erection from the scaffold plan or that fall outside the design parameters; and • approve modifications to the erected scaffold, outside specified design parameters. A structural/geotechnical engineer shall assess building structures/materials/foundations and identify controls required prior to commencing scaffolding.			
3.20.2	Scaffold where a person or object could fall greater than 4m shall be erected by a person holding a High Risk Work Licence (Basic, Intermediate or Advanced Scaffolder) in accordance with the guidance in G012 Plant and Equipment Competency and Inspection Schedule.	Site Manager	Foreman	G012 Plant and Equipment Competency and Inspection Schedule
3.20.3	Scaffold where a person or object could fall greater than 4m shall not be used or accessed unless a written inspection certificate from the scaffold inspector (HRWL Intermediate or Advanced Scaffolder), has been obtained for the scaffold, or its relevant portion, and is complete, verified as installed in accordance with the manufacturers' instructions and relevant legislation, codes of practice and Australian standards and applicable drawings/plans, inspected and ready for use: • prior to initial use; • after repairs and alterations; • before scaffold is used after an incident that may affect the stability of the scaffold; and • at least every 30 days. Written inspections shall be maintained in site files. Where scaff tags (or similar are used), the above records of inspection are still required. Inspection records by the scaffold inspector shall be in accordance with AS 4576:1995 and include: • The individual identification number or mark of the scaffold; • design, drawing, specification, or manufacturers reference; • The location of the scaffold; • The purpose for which the scaffold is provided; • The date and time of each inspection; and • The name and signature of the person conducting the inspection. The Safe Work Australia – Guide to scaffold inspection and maintenance can be used by FDC team to monitor scaffold suitability.	Site Manager	Foreman	Scaffold Inspections
3.20.4	The assembly, dismantling and re-assembly of fixed or mobile scaffolds where a risk of fall of a person or object is less than 4m shall be by persons trained in the use of the scaffold components in accordance with manufacturers requirements These scaffolds shall be inspected to monitor the effectiveness of the system / structure in accordance with specified requirements through the Weekly Site Inspection. The Task Observation may also be used as applicable to observe the scaffold in use for a specific task. Work platforms with no assembly requirements (e.g. Snappy Scaffold) are exempt from this process.	Site Manager	Foreman	Evidence of training; SWMS, Weekly Site Inspection (F049). Task Observation (F053)

3.20.5	Swinging stages shall only be erected and operated by persons holding the relevant High Risk Work Licence in accordance with the Plant and Equipment Competency and Inspection Schedule.	Site Manager	Foreman	G012 Plant and Equipment Competency and Inspection Schedule

3.21 Tilt-up / Precast Concrete

Section	Requirements	Responsibility	Accountability	Tools
3.21.1	A Design Plan for Tilt-up/Precast activities shall be developed and certified by a Structural Engineer qualified as a member of the Institution of Engineers Australia to address: • design and construction of panels including identifiers for each panel; • lifting points and panel placement; • erection requirements that include panel bracing and details of anchorage designs; and • inspection requirements for panels, lifting points, bracing prior to, during and after installation.	Site Manager	Foreman	Design Plan
3.21.2	Prior to commencing Tilt-up/precast activities the following must be provided to FDC: • project design engineer's certificate of compliance; • manufacturer's certificate of compliance; • component schedule; • design drawings, including approval of proprietary or manufactured inserts and fixings; and • shop drawings.	Site Manager	Foreman	Compliance certificates; drawings; schedules
3.21.3	The subcontractor shall develop safe system of work, including SWMS prior to activities commencing on site to address: • that a Lift Plan has been developed in consultation with crane crew; • erection, bracing and stripping; • protection of workers under and around Tilt-up/Precast; • falls and falling objects; • unloading and slinging panels and cranage requirements and the protection of panels and bracing from damage by inadvertent contact with Mobile Plant or other site activities; and • changes to the design approved by the design engineer	Site Manager	Foreman	SWMS; Lift Plan
3.21.4	Subcontractors shall provide FDC evidence of inspections to verify that Tilt-up/Precast panels have been installed in accordance with the manufacturers' instructions and relevant legislation, codes of practice and Australian standards and applicable drawings/plans. Changes to the design or installed system shall be approved by the design engineer. Ongoing inspection by subcontractors that provide FDC evidence of ongoing inspection of braces / props / fixtures / bolts conducted in accordance with the frequencies and requirements of the Design Plan. Daily visual inspections of braced and bracing concrete elements shall be conducted and recorded where corrective action is required.	Site Manager	Foreman	Inspection records

3.22 Traffic

Section	Requirements	Responsibility	Accountability	Tools
3.22.1	The Site Risk Assessment shall identify who is responsible for developing and implementing the traffic management plan for roads around the site. A Vehicle Movement Plan shall be developed for onsite activities in accordance with the Mobile Plant section of this PMP.	Site Manager	Foreman	Site Risk Assessment F001
3.22.2	A project specific Traffic Management Plan (TMP) shall be developed to inform, control and guide road users and to protect the safety of construction personnel and the public. The TMP shall: • be prepared in accordance with relevant legislation, Codes of Practice, Australian Standards, or other requirements; • include location specific traffic control plans (e.g. diagrams/drawings); • detail the methodology for safely implementing and dismantling traffic control devices; and • be approved as specified by the relevant authority prior to implementation where required. The TMP and associated control plans shall be prepared by qualified and licensed personnel. The FDC Traffic Management Plan template shall be used in the absence of any externally provided TMP. Traffic management requirements shall be communicated through Site Inductions, as a minimum, and other communication forums (e.g. Prestart Meetings) as required.			Traffic Management Plan
3.22.3	FDC shall ensure that personnel developing, installing, using, and monitoring traffic control devices are suitably qualified and licenced with the relevant road authority. G012 Plant and Equipment Competency and Inspection Schedule is available for further guidance. Evidence of specific qualifications and licensing shall be recorded through the site inductions.	Site Manager	Foreman	G012 Plant and Equipment Competency and Inspection Schedule
3.22.4	Monitoring of traffic management shall be conducted at least daily when traffic controls are active. Inspections shall ensure controls are in accordance with requirements specified in the TMP and that controls have not been vandalised or tampered with. Inspections shall be documented and maintained.	Site Manager	Foreman	Traffic control inspections
3.22.5	FDC shall ensure that the TMP is reviewed at frequencies specified in the plan and following an incident to determine its adequacy in managing traffic and potential hazards. Reviews shall verify that: • Revisions to the plan have been made, approved/acknowledged, uploaded, and communicated; or • the current plan remains unchanged and has been confirmed as adequate in managing project requirements.	Site Manager	Foreman	TMP Review

3.23 Working at Height

Section	Requirements	Responsibility	Accountability	Tools
3.23.1	The primary methods to prevent falls from height and falling objects shall be managed in accordance with safe systems of work for Demolition, Excavation, Formwork, Mobile Plant, Scaffold and Tilt Up / Pre Cast activities.	Site Manager	Foreman	Site Risk Assessment F001

	Proposed working at heights activities not covered by those activities shall be identified, assessed, and controlled in accordance with the hierarchy of control and applicable legislation, codes of practice and Australian standards in the Site Risk Assessment and the following requirements. To reduce potential risk of harm work methods to avoid working at heights shall be considered. Where not reasonably practicable the following sections for harness use; temporary edge protection and ladder use shall apply.			
3.23.2	**Harness Use** Training - Workers using fall restraint/fall arrest equipment shall hold Nationally recognised Work at Height training course or applicable high risk construction work license including EWP >11m, Riggers/Scaffolders tickets. Maintenance - Evidence of equipment maintenance and inspections shall be provided prior to works commencing, and continue throughout the project in accordance with an equipment maintenance schedule. Attachment Point Design - Engineering design for proprietary attachment points (e.g. eye bolts, static lines) shall be in accordance with manufacturers' requirements and provided and certified by a qualified Engineer with experience in fall restraint/fall arrest equipment and a member of Engineers Australia. Evidence of qualifications and competency must be kept on site. Attachment Point Installation - Installation and inspection of proprietary attachment points (e.g. eye bolts, static lines) shall be in accordance with manufacturers' requirements and conducted and certified by a competent person trained in the use of the anchor points design and manufacturers requirements. Attachment Point Inspection – Prior to harness use, inspections of installed anchor points shall be conducted by a competent person trained in the use of the installed systems manufacturers requirements. Where fall restraint / fall arrest equipment is attached to a structural element (e.g. a concrete column) this shall be done so by a person holding Riggers (All) / Scaffolders (Advanced / Intermediate) high risk work license.	Site Manager	Foreman	Training/Qualification Equipment maintenance; Design documentation Harness Permit (F064).
3.23.3	The Harness Permit shall be issued by FDC where safe systems of work, including SWMS and associated design, installation, maintenance, inspection, and training records are developed where the risk of working at heights is identified. The Permit shall be approved by FDC when safe systems of work have been developed and evidence of SWMS, equipment inspections, design and installation information of attachment points and training records have been received. The Permit shall remain valid for one week from date of issue unless a new harness user is required, or equipment and attachment points change within that period. A permit is not required when using a harness as a secondary control measure such as EWP and Work Box.	Site Manager	Foreman	Harness Permit (F064).
3.23.4	**Temporary edge protection** systems (including proprietary and engineered systems) shall: • be installed as directed by either the designers, manufacturers, or suppliers of the system; • be installed and inspected by a Ticketed Scaffolder, or a Rigger, or a worker trained in the use of the system, prior to handover. Evidence of the initial installation/inspection shall be documented;	Site Manager	Foreman	Training/Qualification Equipment maintenance; Design documentation;

	• Ongoing inspections are conducted through weekly inspections by a Ticketed Scaffolder, or a Rigger, or a worker trained in the use of the system shall be documented.			SWMS
3.23.5	Safe systems of work shall be developed to prevent people or objects falling through penetrations. Safe system may include handrails, mesh, plywood covers and signage. Where subcontractors are installing roof safety mesh the Roof Installation Permit shall be required in accordance with the Site Risk Assessment and SWMS. Safe access and egress for workers working at height shall be assessed and controlled in accordance with the Site Risk Assessment > Working at Heights. Controls may include scaffold stair access, hoist, good lift etc.	Site Manager	Foreman	SWMS, Roof Installation Permit (F061), Site Risk Assessment F001
3.23.6	**Ladders** shall primarily be used as a means of access (e.g. access to mobile scaffolds, formwork decks etc.) and not a working platform. The use of ladders (i.e. A frames/rung ladders) for other purposes shall only be considered if safer alternatives, such as scaffolding or elevating work platforms, Platform Ladders or trestles are not reasonably practicable. The A-Frame Ladder permit is required where scaffolding, elevating work platforms, platform Ladders or trestles are not reasonably practicable. The permit shall ensure safe systems, including SWMS, Site Risk Assessment or other standard operating procedure shall be developed to address potential hazards and controls relating to working from the ladder. In these cases the safe use of ladders shall only be used for light duty work of short duration. Domestic ladders are not permitted.	Site Manager	Foreman	A-Frame Ladder Permit F065; SWMS

3.24 COVID-19

Section	Requirements	Responsibility	Accountability	Tools
3.24.1	The following requirements have been created to minimise the spread of COVID-19 on our projects in accordance with Australian Government guidelines, legislation, and client requirements. These requirements shall be read in accordance with the FDC COVID-19 Group Response Plan and the Site Risk Assessment. If you are unwell, including experiencing fever, flu-like symptoms (eg coughing, sore throat and fatigue) or shortness of breath – don't come to work.	Site Manager	Foreman	COVID-19 Group Response Plan Site Risk Assessment; SWMS
3.24.2	**COVID-19 Vaccinations** Workers and visitors shall comply with legal and client vaccination requirements for this site. If you are unwell, including experiencing fever, flu-like symptoms (eg coughing, sore throat and fatigue) or shortness of breath – don't come to work.	Project Manager	Site Manager	Site Sign In Register F005; Site Induction-Site Rules F018
3.24.3	**COVID-19 Safety Plan** for construction sites where required by authorities. The COVID-19 Safety Plan specific to this project has been completed and attached to this Project Management Plan.	Project Manager	Site Manager	Covid-19 Safety Plan;

3.25 PERSONAL PROTECTIVE EQUIPMENT				
3.25.1	Workers must wear the mandatory personal protective equipment (PPE) including hard hats, high visibility clothing and steel capped safety footwear when performing construction work. Additional PPE shall be worn where specified in safe systems of work, including SWMS, permits or the workplace specific induction. Visitors must wear the mandatory personal protective equipment (PPE) including hard hats, high visibility clothing and enclosed footwear when visiting construction sites. Additional PPE shall be worn where specified in safe systems of work, including SWMS, permits or the workplace specific induction	Project Manager	Site Manager	Site Risk Assessment; SWMS; Site Induction

ENVIRONMENTAL

4.1 ENVIRONMENTAL ASPECTS AND IMPACTS

Section	Requirements	Responsibility	Accountability	Tools
4.1.1	Potential environmental obligations and risks associated with the project shall be identified prior to the start of the project by commencing the Environmental Risk Assessment. The Environmental Risk Assessment identifies project specific aspects and impacts, and operational controls used to manage and monitor environmental issues. The Environmental Risk Assessment shall be developed, approved, and issued to subcontractors and be reviewed for ongoing suitability during the monthly project review. Where updates are required these shall be made, approved, and reissued to relevant parties.	Project Manager	Project Manager	Environmental Risk Assessment F010
4.1.2	Information of hazardous materials, including material's potential impact on the environment and measures to be taken in the event of accidental release will be managed via the Hazardous Chemical Register.	Project Manager	Project Manager	Hazardous Chemical Register F086
4.1.3	FDC shall notify as soon as possible the statutory authority in the event of pollution incidents that have occurred during its activities that has caused or is likely to cause serious or material environmental harm from pollution. Failure to notify may lead to a maximum penalty of $5,500 for an individual or $27,500 for a company.	Divisional HSEQ representative	Project Manager	Incident Report F035

4.2 LICENSES AND APPROVALS

Section	Requirements	Responsibility	Accountability	Tools
4.2.1	Licences and approvals required for the project are listed below (Insert relevant local authorities): **Licence/Approval:** / **Number:** Complying Development Certificate — 2022/1512 (Demolition) SEPP 65 — TBC (Remediation) SSDA — TBC (Construction) Sydney Water — TBC (Out of scope approval & section 73) Ausgrid — TBC (Level 1 connection)	Project Manager	Site Manager	Licence/approval documents
4.2.2	In addition to key aspects and impacts identified through the Environmental Risk Assessment additional Sub Plans may be required by the contract, Development Application or as deemed necessary by the Project Manager shall be developed. The following environmental sub plans are available for FDC workers on the Vault > Manage My Project > Project Set Up > Plans: ▪ Air Quality Management Plan ▪ Flora and Fauna Management Plan ▪ Hazardous Materials Management Plan ▪ Infection Control Management Plan ▪ Noise and Vibration Management ▪ Noise Management and Communication Plan ▪ Soil and Water Management Plan ▪ Waste Management Plan	Project Manager	Site Manager	Environmental Risk Assessment F010; Sub plans

4.3 CONTAMINATED SITE MANAGEMENT

Section	Requirements	Responsibility	Accountability	Tools
4.3.1	Projects undertaken on contaminated sites shall undergo a Contaminated Site Assessment (CSA) by an external consultant. A report of the CSA shall be provided as part of planning approvals process of a proposed development. All relevant CSA reports, documents and approvals will be obtained and reviewed prior to site activities commencing. Operational controls may include any specific procedures described in the report or approvals.	Project Manager	Site Manager	CSA Report
4.3.2	Where required, ITPs and/or SWMS will be developed to address requirements of CSAs and to ensure verification of the works being completed safely and with minimal impact as described.	Project Manager	Site Manager	SWMS; ITP's
4.3.3	The site workforce shall be made aware of potential contamination issues through the site induction, toolbox, or prestart meetings. Advice shall be provided should problems be identified. Spoil disposal records shall be maintained.	Site Manager	Foreman	Site Induction – Site Rules (F018). Toolbox Talks (F050).

4.4 ENVIRONMENTAL RATING TOOLS

Section	Requirements	Responsibility	Accountability	Tools
4.4.2	Green Star rating system is a comprehensive, national, voluntary environmental rating scheme that evaluates the environmental design and achievements of buildings. Green Star is Australia's trusted mark of quality for the design and construction of sustainable buildings, fitouts, and communities. Green Star rating tools help the property industry to reduce the environmental impact of buildings, improve occupant health and productivity and achieve real cost savings, while showcasing innovation in sustainable building practices. New Generation Green Star rating tools include Green Start – Communities; Green Star - Design and As Built; Green Star – Interiors; and Green Star – Performance. Potential risks to Green Star including controls measures and responsible parties shall be documented in the Environmental Risk Assessment. The Green Star rating for this project is 5 star	Project Manager	Project Manager	Environmental Risk Assessment (F010).

4.4 ENVIRONMENTAL RISK ASSESSMENT

Environmental Aspect/Impact	Legal Requirements	Environmental Actions, Controls and Criteria	Operational Controls			Monitoring			Checking, Corrective & Preventative Action
			Induction and/or toolbox	FDC	Subcont. SWMS & contracts	Type	Frequency	Responsibility	NCR/ Refer PMP
Dust Generation Particulate Emissions (General)	NSW - POEO Act (Sections 124-126)	• Install shade cloth on perimeter fencing. • Vehicle corridors will be clearly identified and restricted to control vehicle access onsite. • Limit vehicle speed onsite to 10km/hr. • Fixed and mobile (water tanker) water sprays. • Reduce work activities /stop work during moderate to high wind velocity periods. • Maintain equipment. Smokey plant to be stopped until repair works completed. • Turn off vehicle engines whilst not in use (no long periods of idling).	Y	Y	Y	Visual Inspection	Daily Weekly	Diary Site Inspection Checklist	As required
Dust Generation (Demolition)	*NSW - POEO Act* (Sections 124-126)	• Breakers and crushing equipment to be fitted with dust filtration equipment or water sprays to control dust emissions.	Y	Plant/ Machinery Register	Y	Visual Inspection	Daily Weekly	Diary Site Inspection Checklist	As required
Dust Generation (Construction)	*NSW - POEO Act 1997* (s 124-126)	• Minimise areas of site disturbed and stage works where possible. • Dust suppression strategies to be used, i.e. water sprays, soil binders, hydromulching, controlled speed onsite, roadbase + shaker grids. • Stockpiled topsoils and rubble will be restricted to 4m high. Stabilise if insitu for >4-6months. • On site drilling or coring operations will be undertaken by equipment fitted with air filtration equipment.	Y	Y	N	Visual Inspection	Daily Weekly	Diary Site Inspection Checklist	As required
Odour	NSW - (POEO Act 1997 s 142	• If odorous materials uncovered, recover immediately. • Seek advice from consultant regarding soil /materials management.	N	Y	N	Visual	Daily	Diary	As required

Environmental Aspect/Impact	Legal Requirements	Environmental Actions, Controls and Criteria	Operational Controls			Monitoring			Checking, Corrective & Preventative Action
			Induction and/or toolbox	FDC	Subcont. SWMS & contracts	Type	Frequency	Responsibility	NCR/ Refer PMP
Emissions to Air	NSW (*POEO Act* 1997, s 124-125	• Ensure machinery is maintained correctly.	Y	Y	Y	Visual	Daily	Diary	As required
Stormwater (Discharge from sedimentation basins, flooding)	*NSW - POEO Act* (Section 120) ANZECC Water Quality Guidelines NSW Department of Housing's Managing Urban Stormwater (2004)	• Water quality to meet ANZECC Water Quality Guidelines. → **PH 6.5- 8.5, Turbidity <50NTU, No visible oil & grease.** • Obtain advice for use of flocculants to settle sediment from water. • Sedimentation pond to be maintained at low levels to ensure capacity during rainfall event. • DO NOT DISCHARGE IF CONTAMINANTS SUSPECTED. Obtain advice.	Y	Stormwater & Sediment Control Plan	Y	Visual Inspection	Daily Weekly	Diary Site Inspection Checklist	As required
Adjoining waterways (dewatering, soil erosion & runoff)	*NSW - POEO Act 1997(s 120, 122)* *NSW - PEO (General) Regulation 1998,cl 55;* *NSW - Local Government Act 1993, s 638]* NSW Department of Housing's Managing Urban	• Temporary drainage systems will be established to divert clean waters around the land development areas as appropriate. • Erect silt fences, bunds and construct swale drains. • Inspect at least weekly and after rainfall. • Maintain and/or replace as required. • Street sweepers will be employed on regular basis. • Install erosion and sediment controls before work starts. • Leave as much vegetation as possible. • Install temporary fences to define 'no go' areas in those areas that are not to be disturbed. Include the area under the canopy of trees so that tree roots will not be damaged by soil compaction. • Divert run-off from upslope away from the site, but ensure that you do not flood your neighbours. For example, dig	Y	Stormwater & Sediment Control Plan	Y	Visual Inspection	Daily Weekly	Diary Site Inspection Checklist	As required

Environmental Aspect/Impact	Legal Requirements	Environmental Actions, Controls and Criteria	Operational Controls			Monitoring			Checking, Corrective & Preventative Action
			Induction and/or toolbox	FDC	Subcont. SWMS & contracts	Type	Frequency	Responsibility	NCR/ Refer PMP
	Stormwater (2004) ANZECC Water Quality Guidelines	drainage channels (catch drains sized to accommodate the upslope catchment). • Install sediment controls downslope of the site to catch sediment. • Check the erosion and sediment controls every day and keep them in good condition. • Leave or lay a kerbside turf strip (for example, the nature strip) to slow the speed of water flows and to trap sediment. • Limit vehicle entry and exit to one point, and lay geotextile and blue metal to stabilise it for all-weather access. • Clearly mark the access point and give an access map to all suppliers. • Protect all drains with a gravel sausage made from geotextile filled with blue metal. • Save the topsoil and stockpile it for use later in revegetation. Never place it around trees as this will kill them. • Store all stockpiles and building materials behind sediment fences. Cover them with plastic to prevent erosion by wind. • Get council approval before placing stockpiles or other materials on the nature strip or footpath. • Connect downpipes from the guttering to the stormwater drain as soon as the roof goes on. • Build a dam below the area used for cutting tiles, concrete and bricks. • Surround the wash-out area with a sediment fence that slows down the water flow. Site this area upslope of another sediment control. • Fill in all trenches immediately after services have been laid.							

Environmental Aspect/Impact	Legal Requirements	Environmental Actions, Controls and Criteria	Operational Controls			Monitoring			Checking, Corrective & Preventative Action
			Induction and/or toolbox	FDC	Subcont. SWMS & contracts	Type	Frequency	Responsibility	NCR/ Refer PMP
		• Spread the topsoil back when the work is finished and revegetate the site as soon as possible to control erosion. • Remove the sediment and erosion controls only after this is done. • Sweep the road and footpath every day. Washing down is unacceptable. • Never place any materials in the gutter or on the road. You will be fined for this. • Filter or settle-out all water pumped off the site. The water must be clear before it enters the stormwater system or creeks. Gypsum can be applied to muddy (turbid) water to help clay particles settle.							
Sewer (Trade waste)	Comply with the conditions of the trade waste consent or permit, or the local council approval, including acceptance standards	• No paints or other chemical to be poured down drains. • If required, obtain trade waste licence for discharge or local council approval.	Y	Stormwater & Sediment Control Plan	Y	Visual Inspection	Daily Weekly	Diary Site Inspection Checklist	As required
Land (Acid sulphate soils, contaminated soils, imported fill)	NSW - Contaminated Land Management Act 1997, s 60; NSW - Contaminated Land	• Stop work if unexpected potentially **contaminated soils** are encountered. • Obtain waste classification from consultant in accordance with OEH\EPACW\EPA guidelines Environmental Guidelines: Assessment, Classification & Management of Liquid & Non-Liquid Wastes (June 2004) www.environment.nsw.gov.au/waste/envguidlns/index.htm.	Y	Acid Sulphate Soils Management Plan	Y				As required

Environmental Aspect/Impact	Legal Requirements	Environmental Actions, Controls and Criteria	Operational Controls			Monitoring			Checking, Corrective & Preventative Action
			Induction and/or toolbox	FDC	Subcont. SWMS & contracts	Type	Frequency	Responsibility	NCR/ Refer PMP
	Management Regulation 1998, cl 3 Acid Sulfate Soils Management Advisory Committee	• Where required a Remediation Action Plan will be developed and implemented. • Sign off by Site Auditor may be required to validate cleanup. • Any groundwater or ponded rainwater will be tested and classified by consultants prior to disposal. • Check geotech requirements. Ensure soil classification suitable for land use i.e. Schools, residential, commercial etc.							
Land	NSW - Contaminated Land Management Act 1997, s 60 NSW - Contaminated Land Management Regulation 1998, cl 3	• Potential for **acid sulphate soils** will be assessed based on the sites proximity to low-lying coastal areas e.g. Coastal plains, wetlands and mangroves where the surface elevation is less than five metres above mean sea level. • If odorous soils (rotten egg gas) or grey/yellowed mottled soils encountered, stop work. • If suspected, consultant to prepare Acid Sulphate Soil management Plan (ASSMP). • Excavation and neutralisation to be supervised by consultants as per ASSMP. • The requirements to **import fill** will be minimised by utilising on site cut material wherever possible. • All analysis certificates shall be handed over as part of the completion documents to the client. • Record all imported fill on Form F067 – Imported Fill Register. • Mark up locations where fill compacted in site plan. Survey if required		Y	Y				As required
Resources – water, materials, energy		• For design and construct jobs, refer to the design specification for ESD requirements and product choices. • Buy local wherever possible to reduce impacts of transport on environment.		Y					As required

Environmental Aspect/Impact	Legal Requirements	Environmental Actions, Controls and Criteria	Operational Controls			Monitoring			Checking, Corrective & Preventative Action
			Induction and/or toolbox	FDC	Subcont. SWMS & contracts	Type	Frequency	Responsibility	NCR/ Refer PMP
Noise	NSW - POEO Act (Sections 139, 140)	• Refer to DA for noise restrictions and working hours. • Use hoarding or acoustic mats as required. • Situate generators and plant away from sensitive receivers. • Turn off machinery. Maintain equipment and stop noisy plant until repaired. • No early deliveries.	Y	Noise Management Plan	Y	Visual Inspection	Daily Weekly	Diary Site Inspection Checklist	As required
Vibration		• Conduct dilapidation report prior to work starting. • Limit the use of vibratory rollers, rock breakers, impact piling etc. adjacent to buildings (>7m). • Regenerated noise may also transfer through bedrock and building structures. • Obtain advice if required.	Y		Y				As required
Community Concerns		• Provide information (e.g. Signage, letterbox drops) to community on programmed works. • Provide contact name for inquires. • Advice locals of “noisy” work. • If required in noise sensitive areas and/or in response to complaints, engage consultants to undertake monitoring at nominated receivers. • Vehicles will not be permitted to queue outside the site or in residential areas unless a defined area is established which does not adversely impact on neighbours.	Y	Y					As required
Flora	NSW - State Environmental Planning Policy No 14 - Coastal Wetlands, s 7(1, 5), 7A;	• Review planning documentation to determine the presence of any protected, threatened or significant flora. Obtain approvals as required. • Engage aborist to develop tree management plan or refer DA and aborist reports. • Education and training at site toolbox meetings and induction. • Report all sightings to the Site Manager.	Y	Y Consultant Report		Visual Inspection	Daily Weekly	Diary Site Inspection Checklist	As required

Environmental Aspect/Impact	Legal Requirements	Environmental Actions, Controls and Criteria	Operational Controls			Monitoring			Checking, Corrective & Preventative Action
			Induction and/or toolbox	FDC	Subcont. SWMS & contracts	Type	Frequency	Responsibility	NCR/ Refer PMP
	NSW - Native Vegetation Act 2003, s 12; Forestry Act 1916, s27(1); NSW - National Parks and Wildlife Act 1974, s 117(1), 118(1)] Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth), s 12, 15B, 16, 18, 20, 21, 23	• Fence or barricade protected flora at the drip zone. Erect Keep Out signage. • Do not stack materials under/against trees. • The potential for reuse of vegetative wastes by mulching, chipping or on-site placement of trunks or limbs shall be reviewed for each project.							
Fauna	NSW Environmental Planning and Assessment Act 1979, s 5A, 78A(8))(b), 79B, 111 & 112-112E NSW - Threatened Species Conservation Act NSW - 1995; National Parks	• All native animals protected. • Review planning documentation to determine the presence of any protected, threatened or significant fauna. Obtain approvals as required. • Site rules/induction to include information regarding of the • For injured animals, to relocate call WIRES.	Y	Y Consultant Report		Visual Inspection	Daily Weekly	Diary Site Inspection Checklist	As required

Environmental Aspect/Impact	Legal Requirements	Environmental Actions, Controls and Criteria	Operational Controls			Monitoring			Checking, Corrective & Preventative Action
			Induction and/or toolbox	FDC	Subcont. SWMS & contracts	Type	Frequency	Responsibility	NCR/ Refer PMP
	and Wildlife Act 1974, Part 8A Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth), s 12, 15B, 16, 18, 20, 21, 23								
Waste Litter	*NSW - POEO Act (Section 116, 142),* *NSW - Waste Avoidance and Resource Recovery Act 2007* *NSW –PEOAAct 1997, s 143, 144-146* *NSW Crown Lands Act 1989, s 155* *NSW Management of*	• Hazardous materials surveys to be completed. • Materials to be removed prior to demolition. • Registers and waste disposal requirements as per WorkCover and OEH\EPACW\EPA requirements for removal, storage, transport and disposal. • General site wastes –use one bin system and sort in contractors yard to produce quantities of material for recycling, reuse, disposal etc. • Empty drums are to be taken off-site for disposal. • Empty drums shall be crushed prior to recycling/disposal. • Do not overfill skip bins. Provide plenty for use. Cover where potential for windblown litter.	Y	Waste Management Plan	Y	Visual Inspection	Daily Weekly	Diary Site Inspection Checklist	As required

Environmental Aspect/Impact	Legal Requirements	Environmental Actions, Controls and Criteria	Operational Controls			Monitoring			Checking, Corrective & Preventative Action
			Induction and/or toolbox	FDC	Subcont. SWMS & contracts	Type	Frequency	Responsibility	NCR/ Refer PMP
	Waters and Waterside Lands Regulations - N.S.W., cl 13; *NSW - PEO (Waste) Regulation 2005, cl 49*								
Landfilling	*NSW - POEO Act (Section 116, 142)*	• Reduce, reuse and then dispose. • Dispose of hard construction wastes for recycled gravels and sands. • Do not send soil to landfill until alternatives for beneficial reuse have been explored as per consultants advice. • Consideration should be given to chipping of the vegetation and reuse. • Reuse packaging to protect works.	Y	Y					As required
Chemicals	*NSW - POEO Act (Section 116, 142,)* *NSW - Occupational Health and Safety Regulation 2001*	• Chemicals to be **stored** in bunded areas (impervious + 110% of largest container) away from stormwater drains & pits. • Refer Workcover Code of Practice for Storage & Handling of Dangerous Goods, OEH\EPACW\EPA Guidelines for Bunding & Spill Management. Appropriate chemicals storage is in conformance with: → AS 1940 The Storage and Handling of Flammable and Combustible Liquids → Storage and Handling of Dangerous Goods WorkCover Code of Practice 2005– refer p. 86	Y	Y	Y	Visual Inspection	Daily Weekly	Diary Site Inspection Checklist	As required

Environmental Aspect/Impact	Legal Requirements	Environmental Actions, Controls and Criteria	Operational Controls			Monitoring			Checking, Corrective & Preventative Action
			Induction and/or toolbox	FDC	Subcont. SWMS & contracts	Type	Frequency	Responsibility	NCR/ Refer PMP
		• OEH\EPA requirements *http://www.environment.nsw.gov.au/water/bundingspill.htm* • Ponded water within **bunds** will not be discharged to stormwater. • **Fuel and hydraulic leaks** to be cleaned up immediately. • **Drilling muds** to be contained within bunds and reused. • **Liquid paints** NOT to be poured down drains. Spread on waste cardboard or similar and leave to dry. Paint brushes to be rinsed and paint solids allowed to settle. Container of paint solids to be disposed to liquid waste facility. • Construct **concrete washout** pit for washout, away from stormwater drains. Send back to batch plant where possible. • **Concrete cuttings** to be contained and wetvac to prevent runoff into stormwater drains. • Storage of **bulk fuels** (>200L) on site is prohibited. All refuelling shall be undertaken by a mobile facility with appropriate spill control and containment control equipment. • MSDS's must be provided to the Foreman prior to a chemical being received on site and by subcontractors using chemicals/products.							
Traffic	*Local Government Requirements*	• Develop and implement traffic management plans. Submit to local council as required. • Signage and notices regarding disruptions. • Use crushed concrete, mulches etc. along site access roads. • Install shakers and wheel wash as required. • Organise regular street sweeping. • Haulage routes and rules will be provided to subcontractors prior to commencing on site.	Y	Traffic Management Plan	Y	Visual Inspection	Daily Weekly	Diary Site Inspection Checklist	As required

Environmental Aspect/Impact	Legal Requirements	Environmental Actions, Controls and Criteria	Operational Controls			Monitoring			Checking, Corrective & Preventative Action
			Induction and/or toolbox	FDC	Subcont. SWMS & contracts	Type	Frequency	Responsibility	NCR/ Refer PMP
		• All loads of soil, demolition wastes, general wastes etc. are to be tarped							
Hazardous Materials (Lead paint)	*NSW - POEO Act* (Section 142)	• If disturbing or removing dust or paint that could contain lead, wear a respirator or dust mask and protective clothing. • Seal the rooms with plastic. • Do not use open-flame torches on lead paint as they create lead fumes. If you must use a heat gun, use it on the lower setting to keep the paint temperature below 370 degrees C. • Avoid using dry-sanding techniques: keep the surface wet to minimise dust. • Don't sweep or use a domestic vacuum cleaner to clean up; lead dust will pass right through it. Use a high-efficiency particulate air (HEPA) vacuum cleaner. These can be hired. • When finished, wipe all surfaces with a damp cloth and high-phosphate detergent. • Wash face and hands before eating, drinking or smoking. • Refer to **Lead Safe: A Renovator's Guide to the Dangers of Lead** and the Australian Standard AS4361.2 Guide to Lead Paint Management: Part 2 Residential and Commercial Buildings 1998.	Y	Consultants Report	Y				
Hazardous Materials (Asbestos)	NSW - POEO Act (Section 142) NSW PEO (Waste) Regulation 2005, cl 42	• A licence subcontractor must be used to demolish, remove, repair or disturb asbestos. • A WorkCover asbestos licence is required to remove 10 square metres or more of bonded asbestos. • A Workcover licence is required to remove, repair or disturb friable asbestos.	Y		Y				

Environmental Aspect/Impact	Legal Requirements	Environmental Actions, Controls and Criteria	Operational Controls			Monitoring			Checking, Corrective & Preventative Action
			Induction and/or toolbox	FDC	Subcont. SWMS & contracts	Type	Frequency	Responsibility	NCR/ Refer PMP
Aboriginal heritage	National Parks and Wildlife Act 1974, s 90-91 NSW - Heritage Act 1977, s 146	• Education and training at site toolbox meetings and induction. • **It is illegal to destroy heritage items.** • Review local or regional environmental plans, or on the State Heritage Register is to be consulted prior to work starting onsite. • Obtain excavation permit issued by the Heritage Council of NSW if required. • Any heritage relics or sites discovered during construction shall be reported to the Office of Environment and Heritage. • Work in the subject area to cease until specialist advice is obtained. • The area will be fenced and signs erected to restrict access. • Heritage consultants may be required to provide advice on demolition/construction processes and finishes.	Y	Consultant Report	Y	Visual Inspection	Daily Weekly	Diary Site Inspection Checklist	As required
European heritage	NSW - Heritage Act 1977	• Education and training at site toolbox meetings and induction. • **It is illegal to destroy heritage items.** • Check the OEH\EPACW\EPA Aboriginal Heritage Information Management System (AHIMS). • Also check the register of the National Estate. • Obtain approval from NPWS (Section 90 consent). • Any evidence of Aboriginal relics discovered during construction shall be reported to the National Parks and Wildlife Service. • Local Land Council representatives may be required to monitor stripping/excavation. • Work in the subject area to cease until specialist advice is obtained.	Y	Consultant Report	Y	Visual Inspection	Daily Weekly	Diary Site Inspection Checklist	As required

Environmental Aspect/Impact	Legal Requirements	Environmental Actions, Controls and Criteria	Operational Controls			Monitoring			Checking, Corrective & Preventative Action
			Induction and/or toolbox	FDC	Subcont. SWMS & contracts	Type	Frequency	Responsibility	NCR/ Refer PMP
		• The area will be fenced and signs erected to restrict access.							
Emergency Preparedness		• Spill kit onsite. • Refer to the MSDS for advice and procedures. • All spills must be reported to the Site Manager & cleaned up. **Complete FDC Incident Report (F035).** • Sediment pond pumped out regularly to maintain capacity in case of emergency. • Ensure you know where stormwater drains are and have materials to block them in case of a fire.	Y	Y	Y	Inspection	Weekly	Site Inspection Checklist	As required

APPENDIX A – Key Policies

Work Health And Safety Policy

The work, health and safety elements of FDC's integrated management system manages the provision of project and construction management for residential, industrial and commercial building, including ground up construction, refurbishment or additions and interior fitout to existing buildings and the provision of project management, design management, installation and maintenance of electrical, communication and mechanical services to industrial, commercial and civil buildings.

The directors and senior management of FDC are committed to ensuring the health and safety of workers and visitors and stakeholders that interact with our activities.

Our aim is to provide safe and healthy work conditions to prevent work related injuries and illness.

To achieve this, FDC is committed to the following key objectives:

- Implementing a strategic framework to enable continual improvement of systems, people and performance;
- Providing systems and resources to effectively manage work, health and safety including rehabilitation and return to work processes;
- Ensuring work is conducted in accordance with applicable WHS legislation, standards and workplace directions;
- Identifying and eliminating hazards and reducing the risks of activities with the potential to produce injury or illness;
- Consulting with workers on work, health and safety matters and ways to identify, assess and control workplace hazards;
- Providing instruction, training and supervision to enable understanding of workplace hazards, safe work practices and emergency procedures; and
- Conducting workplace inspections to identify opportunities for improvement.

FDC managers and supervisors are responsible and accountable for the health and safety of workers, visitors and company property and ensuring applicable WHS legislation, procedures and safe work practices are followed.

Bentley Cottle
Managing Director

Rev.:1 Date: 25 / 08 / 2020 Page 01

Quality Policy

The quality elements within the integrated management system manage the provision of the project and construction management for residential, industrial and commercial buildings, including ground up construction, refurbishment or additions and interior fitout to existing buildings and the provision of project management, design management, installation and maintenance of electrical, communication and mechanical services to industrial, commercial and civil buildings.

The directors and senior management of FDC recognize the importance of providing quality management to meet the needs and expectations to our clients. FDC is committed to the achievement of a level of quality and professional competence to ensure our clients receive the best value for service in the market. Our aim is to be recognized for outstanding performance, the quality of our people, our relationship with clients and associated enterprises and authorities.

Our goal and commitment to providing quality management solutions is maintained by:

- Compliance with statutory obligations, standards and relevant codes of practice;
- Establishing, monitoring and auditing our system that meet the requirements of AS/NZS ISO 9001;
- Providing resources to implement and maintain the quality management system;
- Continually improving worker skills and knowledge via education and further training of staff;
- Identifying, investigating and suitable resolving any non-conformances to maintain and improve compliance;
- Reviewing performance measures and taking action to improve performance; and
- Monitoring and evaluating quality performance via implementing effective communication on quality and non-conformance issues.

The FDC quality framework is based upon the requirements of AS/NZS ISO 9001 and allows workers at all levels within the company structure to understand the quality and organizational objectives of the company, and position themselves to achieve these goals.

Bentley Cottle
Managing Director

Rev.:0 Date: 01 / 04 / 2019 Page 01

Environmental Policy

The environmental elements within FDC's integrated management system manage the provision of project and construction management for residential, industrial and commercial building, including ground up construction refurbishment or additions and interior fitout to existing buildings.

FDC shall:

- "Reduce, re-use and recycle" wherever possible, be it on site or within the office environment;
- Promote environmentally friendly solutions;
- Ensure that environmental considerations form part of our business planning and decision-making processes;
- Promote a culture of responsible environmental management;
- Protect the natural environment and social surroundings, preserve biodiversity, prevent pollution and minimize waste;
- Comply with applicable environmental laws;
- Continually improve our environmental performance;
- Establish measurable objectives and targets; and
- Communicate with stakeholders on environmental matters.

FDC encourage, on a personal and corporate basis, sound environmental considerations for protection of our natural resources.

We discourage any practice or product selection that is knowingly detrimental to environmental protection. FDC Management and staff are committed to the implementation and maintenance of an environmental management system based on ISO14001.

Bentley Cottle
Managing Director

Rev.:0 Date 01 / 04 / 2019 Page 01

APPENDIX B – Revision Table

Rev.:	Rev. Date	REVISION DESCRIPTION	PM's INITIALS (approval of changes)
A	17/03/23	INITIAL SUBMISISON (ADAPTED FROM EXISTING PROJECT PMP)	AR
B	6/04/23	FOOTER DATE AMMENDED	AR
C	23/05/23	HERITAGE CONSTRUCTION EXCAVATION METHODOLOGY APPENDED	AR

APPENDIX C – Construction Traffic Management Plan

13 March 2023

Sydney Flight Training Centre SSD-47601708 Construction Traffic Management Plan

For: **FDC**

Site Address: **28-30 Burrows Road, St Peters**

Document Control

Issue	Date	Issue details	Author	Reviewer
1	09/03/2023	Draft	KP	DB
2	10/03/2023	Draft	KP	DB
3	13/03/2023	Final	KP	DB

For the attention of:

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Appendices

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List of Tables

List of Figures

1. Introduction

1.1. Project Summary

ptc. has been engaged by FDC Construction for the preparation of a Construction Traffic Management Plan (CTMP) pursuant of approval for the construction process for SSDA-47601708.

The proposed development involves the design and construction of flight training centre consisting of a 3-storey warehouse/industrial development accommodating a flight simulation facility, comprising of 2,175m^2 of simulation halls and 5,070m^2 of office/training area. The site address is 20-30 Burrows Road, St Peters.

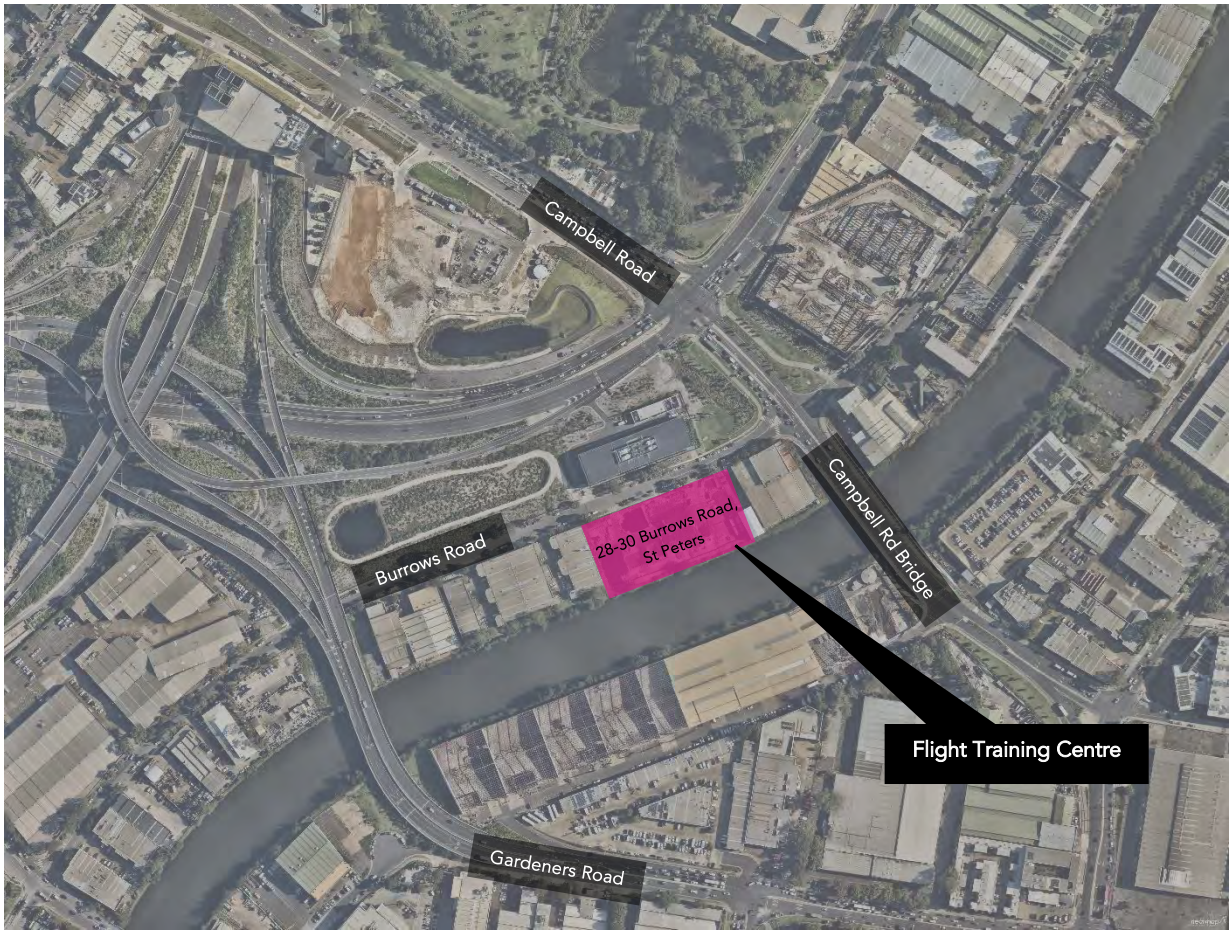


Figure 1: Site Location (Image Source: NearMap)

1.2. Site Context

The site lies within a IN1 (General Industrial Zone) that extends to the west and is surrounded by various land uses including;

Industrial zoning B6 (Enterprise Corridor) along the Airport Line

R2 (Low Density Residential) to the northwest along Bridge Road

RE1 Public Recreation to the north

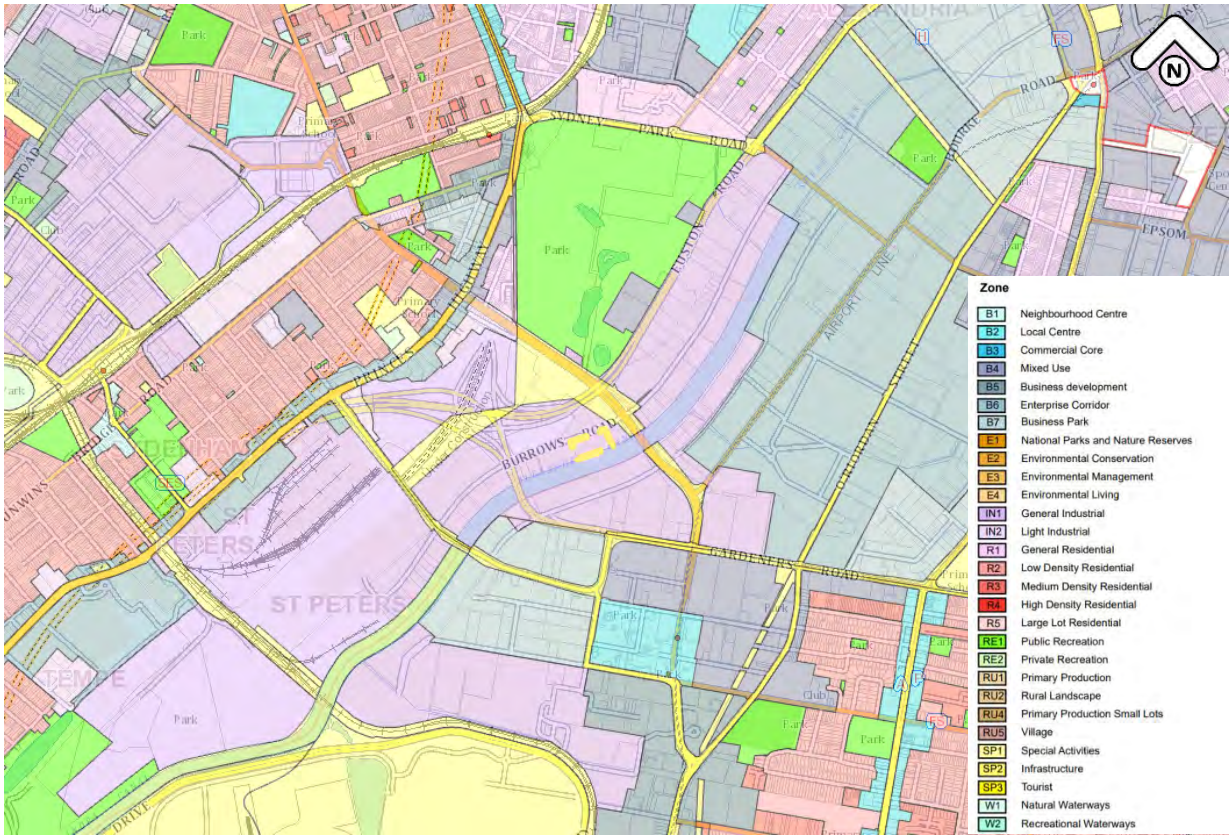


Figure 2: Local Land Zoning Map

1.3. Development Proposal

The development site is accessed through Burrows Road between Ricketty Street and Campbell Road. Alexandra Canal is located on south of the site. Construction works are expected to be ongoing from March 2023 through to March 2024, with various phasing detailed in Section 3.7.

Construction and operation of a flight training centre within a three-storey building that will comprise the following elements:

- A flight training hall with eight bays housing flight simulators
- Emergency procedures facilities
- Ancillary classrooms, office space, meeting rooms, reception areas, loading docks, plant, and other amenities
- Two new access driveways to the site from Burrows Road
- Removal of eight trees (four street trees and four trees in the north-west corner of the site)
- Associated landscaping works, at-grade parking, and general site improvements
- Business identification and wayfinding signage
- Installation of a new stormwater outlet to Alexandra Canal

The development has a total gross floor area (GFA) of 6,510 m2 over three levels, comprising –

Simulator Hall: 1840 m2 GFA and Emergency Training & Teaching Areas: 4,670 m2 GFA.

1.4. Purpose of this Report

This CTMP addresses the potential construction activity associated with construction stages of the development, including:

- Location of any proposed Works Zones, site boundary, and any site office, crane locations, material and waste storage area and other components as necessary;
- Haulage routes (both to and from the site);
- Construction vehicle access arrangements;
- A heavy vehicle swept path assessment, demonstrating feasibility of any proposed Works Zones or site access;
- Proposed construction hours;
- Estimated number of construction vehicle movements and vehicle types;
- Construction program;
- Any potential impacts to general traffic, cyclists, pedestrians and bus services within the vicinity of the site from construction vehicle during the construction of the proposed works; and
- Measures proposed to mitigate any associated general traffic, public transport, pedestrian, and cyclist impact.

1.5. Development Consent

	Condition	Report Reference
Traffic and Access		
B1	Construction Traffic Management Plan Prior to the commencement of construction of the development, the Applicant must prepare a Construction Traffic Management Plan for the development to the satisfaction of the Planning Secretary. The plan must form part of the CEMP required by condition C2 and must: (a) be prepared by a suitably qualified and experienced person(s); (b) be prepared in consultation with Council; (c) detail the measures that are to be implemented to ensure road safety and network efficiency during construction; (d) include details of: (i) vehicle types, heavy vehicle routes, parking and access arrangements; (ii) the strategies that would be implemented to minimise the number of construction workers who will drive to the site; and (iii) potential overflow construction worker parking area(s) in the vicinity of the site (iv) any potential impacts to general traffic, cyclists, pedestrians within the vicinity of the site from construction vehicles during the construction of the proposed works; (e) include a Driver Code of Conduct and Induction Program to: (i) minimise the impacts of earthworks and construction on the local and regional road network; (ii) minimise conflicts with other road users; (iii) minimise road traffic noise; and (iv) ensure truck drivers use specified routes; (f) include a program to monitor the effectiveness of these measures; and (g) if necessary, detail procedures for notifying residents and the community (including local schools), of any potential disruptions to routes.	(a) See title page for qualified persons (b) See Section 1.6 (c) Detailed throughout Section 3 (d) – i) Sections 3.8, 3.9, 3.20 ii) Section 3.19 iii) Section 3.19 iv) Section 3.22, 3.23 (e) – i) Sections 3.9, 3.10, 3.23 ii) Sections 3.21, 3.22, 3.23 iii) Section 3.6 iv) Section 3.9 (f) Section 4 (g) Section 3.25
B2	The Applicant must: (a) not commence construction until the Construction Traffic Management Plan required by condition B1 is approved by the Planning Secretary; and (b) implement the most recent version of the Construction Traffic Management Plan approved by the Planning Secretary for the duration of construction.	-

1.6. Consultation with Authorities

Consultation with the City of Sydney Council Construction Regulations Unit (CRU) has been undertaken as part of the development of this CTMP. The following email correspondences were recorded:

Date	From	To	Subject	Outcome
01.03.2023	Kalyani Patil (ptc.)	CRU (City of Sydney)	SSD-47601708 Flight Training Centre at 28-30 Burrows Road, St Peters – CTMP Consultation	Automatic reply received indicating that our email was received
07.03.2023	Joshua Faull (CoS)	Kalyani Patil (ptc.)	Provided comments on surrounding construction/roadworks	Joshua indicated that there is no other major construction/roadworks on-going near subject site. There are 2 construction sites on Gardeners Road between Bourke St and Botany Road.

Consultation with Transport for NSW has been undertaken as part of the development of this CTMP. The following email correspondences were recorded:

Date	From	To	Subject	Outcome
01.03.2023	Kalyani Patil (ptc.)	Development CTMP CJP	SSD-47601708 Flight Training Centre at 28-30 Burrows Road, St Peters – CTMP Consultation	Automatic reply received indicating that our email was received.
07.03.2023	Maryam Yadak (TfNSW)	Kalyani Patil (ptc.)	SSD-47601708 Flight Training Centre at 28-30 Burrows Road, St Peters – CTMP Consultation	Received response outlining the details CTMP document should contain.

2. Existing Transport Environment

2.1. Road Hierarchy

The site sits within the City of Sydney LGA, at its southernmost boundary with Gardeners Road. To the southern side of Gardeners Road is Bayside Council LGA.

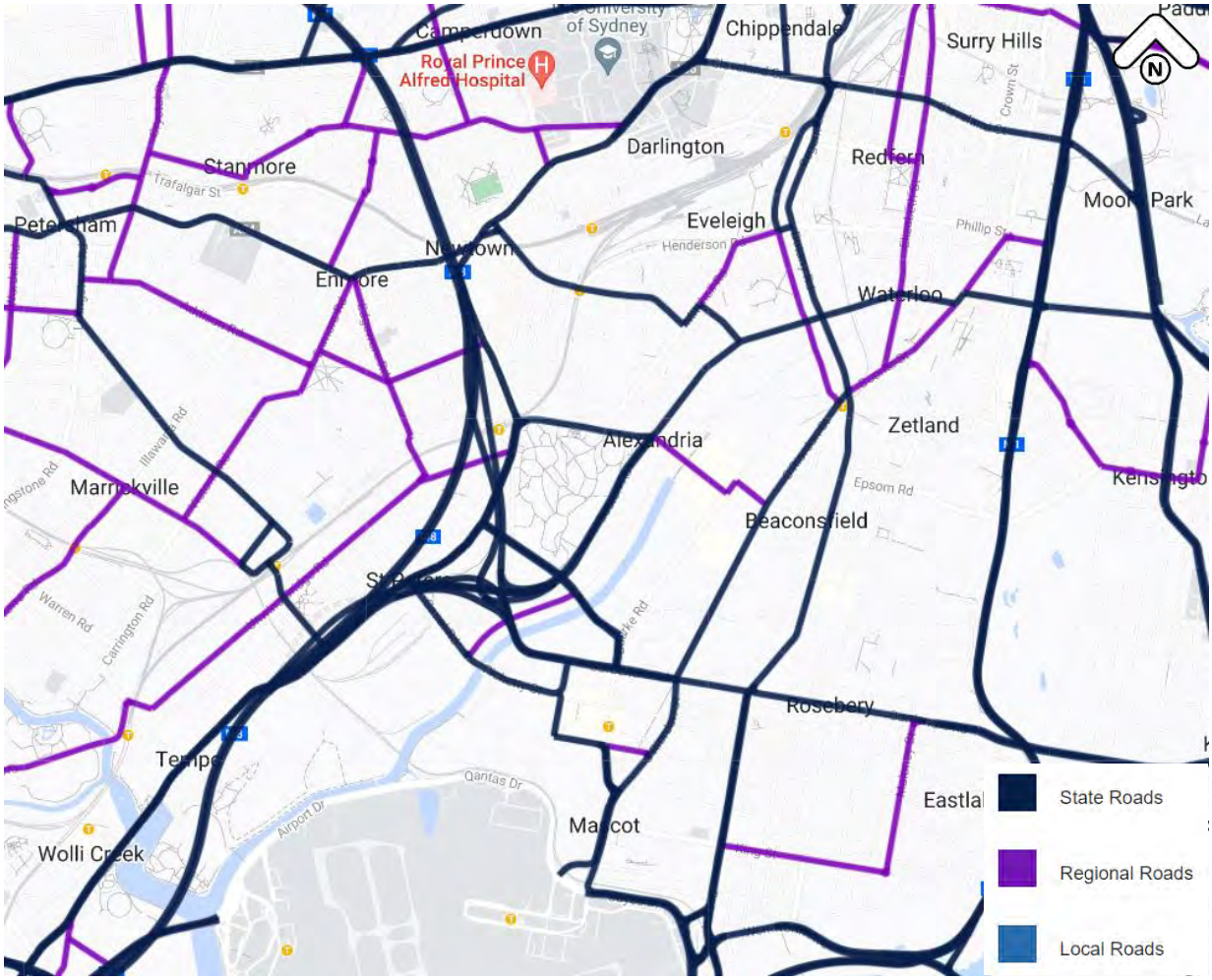


Figure 3: Road Hierarchy (Source: NSW Road Classifications)

The NSW administrative road hierarchy comprises the following road classifications, which align with the generic road hierarchy as follows:

State Roads	Freeways and Primary Arterials (TfNSW managed)
Regional Roads	Secondary / sub arterial (Council managed, partly funded by the State)
Local Roads	Collector and local access roads (Council managed)

Burrows Road	
Road Classification	Local Road
Alignment	Southwest - Northeast
Number of Lanes	2 each way
Carriageway Type	Undivided
Carriageway Width	12m
Speed Limit	50km/hr
School Zone	No
Parking Controls	Parking on both sides
Forms Site Frontage	Yes

Campbell Road	
Road Classification	State Road
Alignment	Southeast – Northwest
Number of Lanes	3 south eastbound, 2 north westbound
Carriageway Type	Divided
Carriageway Width	18m
Speed Limit	60km/hr
School Zone	No
Parking Controls	No Parking
Forms Site Frontage	No

Ricketty St/Canal Road	
Road Classification	State Road
Alignment	Northwest – Southeast
Number of Lanes	4 north westbound, 3 south eastbound
Carriageway Type	Divided
Carriageway Width	25m
Speed Limit	60km/hr
School Zone	No
Parking Controls	No Parking
Forms Site Frontage	No

Gardeners Road	
Road Classification	State Road
Alignment	East – West
Number of Lanes	3 eastbound, 4 westbound
Carriageway Type	Divided
Carriageway Width	22.5m
Speed Limit	60km/hr
School Zone	No
Parking Controls	No Parking, Clearways
Forms Site Frontage	Yes

2.2. Key Intersections

The key intersections in the vicinity of the development site and their characteristics are listed below:

Burrows Road / Campbell Road	3-leg priority intersection
Burrows Road / Canal Road/Ricketty St	4-leg signalised intersection

2.3. Public Transport

This section outlines public transport accessibility to the site, which may be utilised by construction staff over the project duration. Staff inductions will include information on the available travel options that staff may take to access the site.

The subject site has been assessed for its potential accessibility via modes of existing public transport likely to be utilised by prospective residents, employees and visitors of the proposed development. When defining accessibility, the NSW Guidelines to Walking & Cycling (2004) suggests that 400m-800m is a comfortable walking distance.

2.3.1. Bus Network

The site has several nearby bus stops which connect the site with the wider Sydney city and east. The bus routes that pass in close proximity to the site are detailed in Table 1;

Table 1: Bus Network

Bus Route	Route Description	Frequency
358	Sydenham to Randwick (Loop Service)	**Mon-Fri**: every 10-20 minutes **Sat-Sun:** every 20 minutes
305	AM: Mascot Stamford Hotel to Redfern PM: Redfern to Mascot Stamford Hotel	**Mon-Fri**: every 30 minutes from 6-9am and every 30 minutes from 2-6pm **Sat-Sun:** No service

Figure 4 details the bus stops in close proximity to the site.

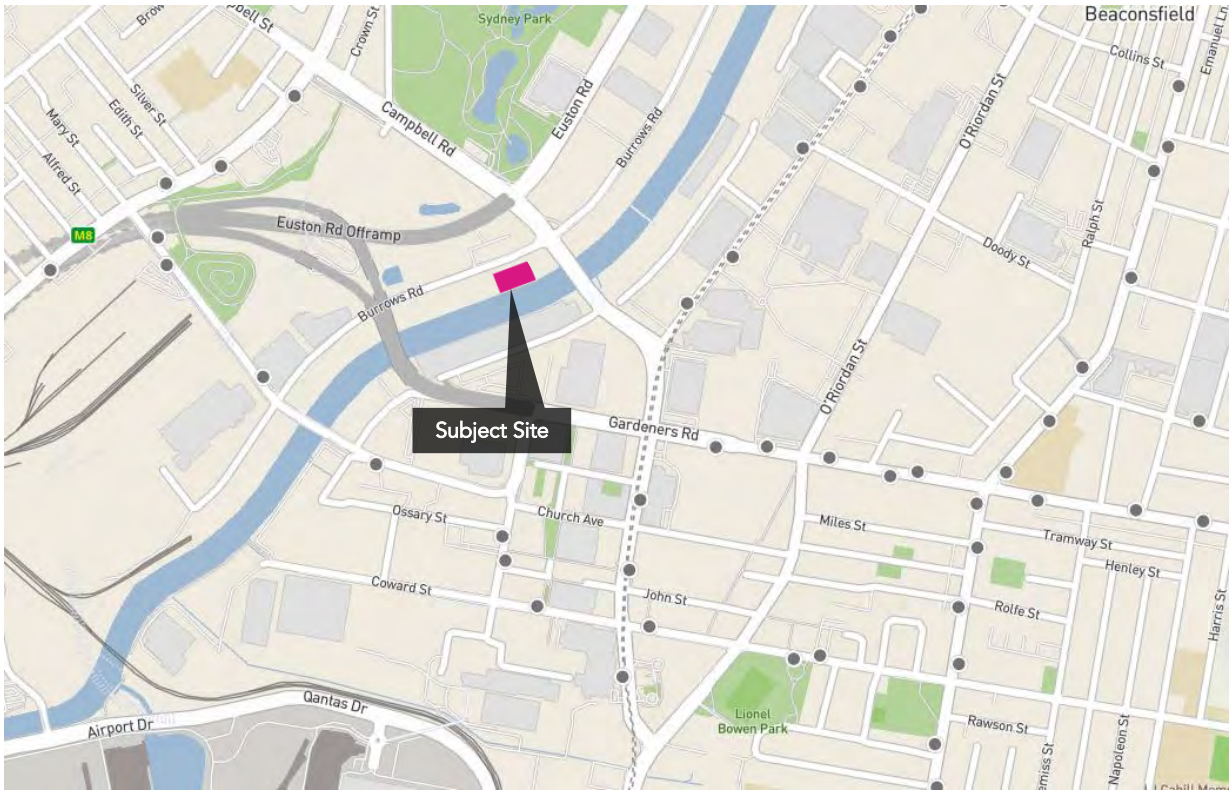


Figure 4: Nearby Bus Stops (Source: Transport NSW)

2.3.2. Rail Network

In close proximity to the site is Mascot Station, approx. 1 km from the site. The T8 (Airport) line passes through Mascot Station and offers connection to wider Sydney, detailed in Table 2.

Table 2: Train Network

Train Route	Route Description	Frequency
T8	City to Macarthur via Airport or Sydenham	**Mon-Fri:** every 5-10 minutes **Sat-Sun:** every 5-10 minutes

Figure 5 details the wider Sydney rail network and connection to Mascot Station and the site.

Figure 5: Sydney Rail Network (Source: Transport NSW)

2.4. Active Travel

Active travel, including walking and cycling, is a suitable mode of transit for those travelling locally, or who live nearby to the site. The provision of dedicated cycleways, or cycling routes developed by council, greatly increase the potential for active travel over short to medium distances. A map of cycling routes from the City of Sydney Council is shown in Figure 6, and the cycling network for the Bayside Council region is shown in Figure 7 (Source: NSW Cycleway Finder).

Figure 6: CoS Cycling Map

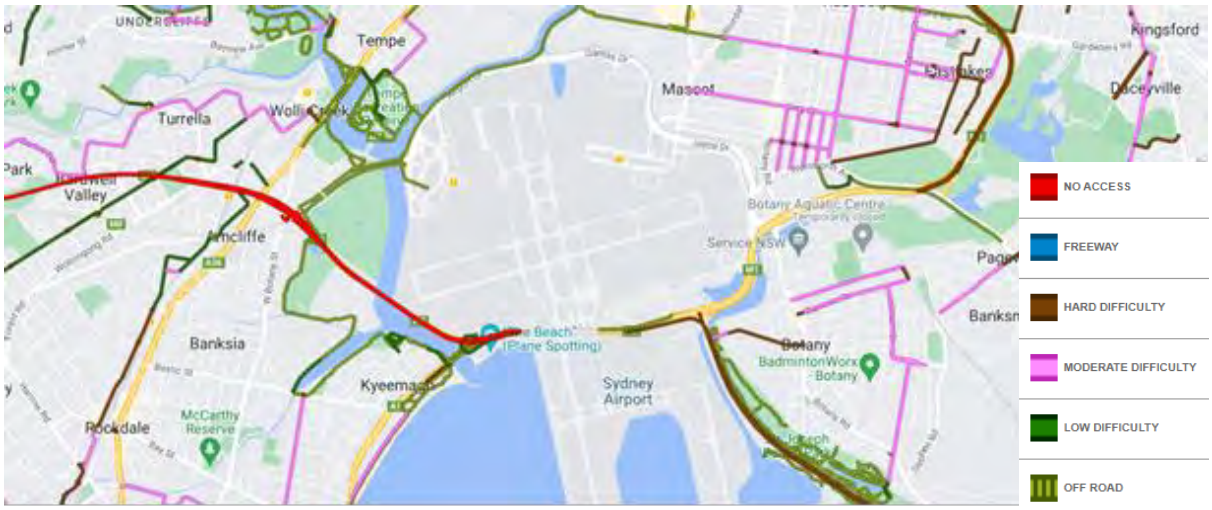


Figure 7: NSW Cycleway Finder (Bayside Council Region)

To support active travel, secure areas shall be made available within the work compounds for staff to store equipment, making light travel via alternative modes more viable.

The combination of adequate public transport and the potential for active travel enables the site and its workers to travel using more sustainable forms of transport, such as walking, cycling, bus or train.

3. Construction Traffic Management Plan

The following sections outline the proposed construction activity, anticipated timeline as well as the proposed management measures relating to vehicular access, pedestrian access and other key considerations for the duration of the works.

3.1. Objectives

The traffic management plan associated with the construction activity aims to ensure the safety of all workers and road users within the vicinity of the construction site and the following are the primary objectives:

- To minimise the impact of the construction vehicle traffic on the overall operation of the road network;
- To ensure continuous, safe and efficient movement of traffic for both the general public and construction workers. One movement is defined as a single vehicle performing either entry or exit to site in a single direction, not both.
- Installation of appropriate advance warning signs to inform users of the changed traffic conditions;
- To provide a description of the construction vehicles and the volume of these construction vehicles accessing the construction site;
- To provide information regarding the changed access arrangement and also a description of the proposed external routes for vehicles including the construction vehicles accessing the site; and
- Establishment of a safe pedestrian environment in the vicinity of the site.

3.2. Traffic Management Planning Process

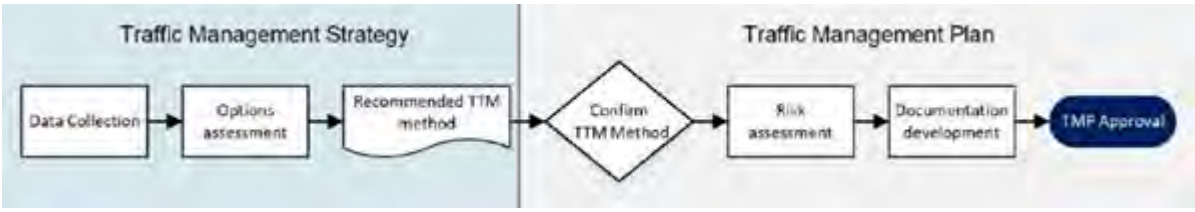


Figure 8: Traffic Management Planning Process

Temporary Traffic Management (TTM) for the project has been planned in accordance with Transport for NSW, *Traffic control at work sites – Technical Manual, Issue No.6.1,* March 2022 (TCAWS). The process is shown in Figure 8.

An iterative process is being adopted in collaboration with relevant stakeholders to adopt the most appropriate traffic management approach and develop the associated documents for the work.

3.3. Traffic Management Strategy

A traffic management strategy has been chosen to support the appropriate allocation of time, funds and resources for the project, and allow for consultation in determining the safest and most efficient way for road users to interact with the work site. The following have been considered in determining the TTM method:

Detour Options

No detours are necessary or proposed by the client and therefore, disproportionate disruption to the road users will not be introduced. A pedestrian detour and footpath closure is anticipated for early stages of work.

Site Location

The site of the works does contain existing street parking that may obstruct signs and devices needed for certain strategies. TGS should be set out by a certified Traffic Controller in accordance with TCAWS 6.1 to minimise these obstructions.

Work Area

The area needed to safely perform the work does not require the full closure of sections of road. All work and construction traffic shall enter the site to undertake duties. Some work is expected to be done out of hours; however, the details are not available at this stage.

There will be extension of stormwater in the road (parking lane adjacent site) and connections to power, data. Also, public domain works including new driveway crossovers, kerb/gutter etc.

Vulnerable Road Users

Desire lines of pedestrians, cyclists, motorcyclists do not significantly impact on works or create undesired interaction between these road users and traffic. Consideration has been taken to minimise impact on the daily ongoing operations of the centre and its users while works are undertaken.

Community Facilities and Needs

Access to all nearby facilities will remain possible during these works. Signage or directions for any detours or changes are to be implemented where necessary. It is anticipated that there will be a reconfiguration of the traffic signals to suit new crossovers. This would require consultation and approval from TfNSW.

3.4. Decision of TTM Method

The method selected is Around (elimination) where all truck and excavation/construction activity will take place on site, including the delivery of plant and site goods. Traffic is fully separated from the works.

In any instances where work occurs outside the boundary of the site, the Past (isolation) methodology is to be approved by council prior to implementation, to safely guide traffic along an adjacent path to the work area.

3.5. General Requirements

No tracked vehicles will be permitted or required on any paved roads. Public roads and access points will not be obstructed by any materials, vehicles, refuse skips or the like, under any circumstances. No construction vehicles are permitted to double park, or park on the public road.

No building, demolition, excavation or material of any nature and no hoist, plant and machinery (crane, concrete pump or lift) shall be placed on Council's footpaths, roadways, parks or grass verges without Council approval.

No trees or native shrubs or understorey vegetation on public property (footpaths, roads, reserves, etc.) or on the land to be developed shall be removed or damaged during construction unless specifically approved in this consent including for the erection of any fences, hoardings or other temporary works.

3.6. Hours of Work

All works associated with any construction, and activities in the vicinity of the site generating noise associated with the preparation for the commencement of work (e.g., loading/unloading of goods, transferring of tools etc.) in connection with the proposed development will be limited to the permitted work hours in accordance with conditions of consent:

Monday – Friday	07:00 – 18:00
Saturday	08:00 – 13:00
Sundays or on Public Holidays	No works shall be carried out

Notwithstanding the above, the use of a crane for special operations including the delivery of materials, hoisting of plant and equipment and erection and dismantling of onsite tower cranes which warrant the on-street use of mobile cranes outside of the above hours can occur, subject to a separate application being submitted to and approved by Council under Section 68 of the Local Government Act 1993 and Sections 138/139 of the Roads Act 1993.

3.7. Construction Phasing

The proposed construction activity and anticipated time frames are outlined in Table 3.

Table 3: Construction Phases

Phase	Description	Duration
1	Site Establishment & Enabling Works	Commencing on March 2023
2	Piling & Foundations	Finishing around May 2023
3	Concrete Structure	Finishing around September 2023
4	Structural Steel and Roofing	Finishing around October 2023
5	Internal Fitout	Finishing around February 2024
6	Commissioning & Finalisation	March 2024

3.8. Construction Vehicle Types and Volumes

The delivery of materials to and from the site will result in some generated traffic activity associated with the works. Where possible, deliveries are to be scheduled to occur outside of the peak commuter periods.

The following construction vehicles (detailed in Table 4) are likely to be generated by the proposed activities related to the phases detailed above:

Table 4: Construction Vehicle Volumes (provided by FDC)

	Phase	Anticipated Vehicle Types	Volume
1	Piling	Concrete trucks, HRV, (semi by application)	20 daily
2	Structure	Concrete Trucks, HRV, MRV, (semi by application)	30 daily
3	Façade & Fitout	HRV, MRV, Small delivery, (semi by application)	50 daily
4	External Works	Concrete Trucks, MRV, HRV, (semi by application)	30 daily

Typically, the largest anticipated vehicle accessing the site on a regular basis is a 12.5 metre Heavy Rigid vehicle. City of Sydney requires prior approval to be sought and granted for the use of vehicles larger than 12.5m HRV on any City of Sydney Road.

Semi-trailers will also be required for movement of piling rig, excavation plant, pile cages, precast concrete panels, reinforcement, structural steel, façade panels and a number of other oversized plant and materials. These items are too large to be transported with smaller vehicles. FDC will make the necessary applications to the council when semi-trailers are required. These applications will be separate to this CTMP.

Any oversized vehicle (including the use of mobile cranes) that is required to travel to the project into the vicinity of the site will be dealt with separately, with the submission of required permits to and subsequent approval from Council and TfNSW prior to any delivery being undertaken.

Refer to Section 3.16 for further details regarding special deliveries.

3.9. Construction Vehicle Routes

The site is located in close proximity to major throughfares which provides suitable heavy vehicles access to the area from the wider Sydney network. Therefore, the proposed construction vehicle routes have regard for the surrounding traffic arrangements in the vicinity of the site. No queuing or marshalling of trucks is permitted on any public road and all loading and unloading of materials will be undertaken within the site.

The site is accessible from the Campbell Bridge Road, Burrows Road and Ricketty Street. The proposed construction vehicle routes are outlined in Figure 9.

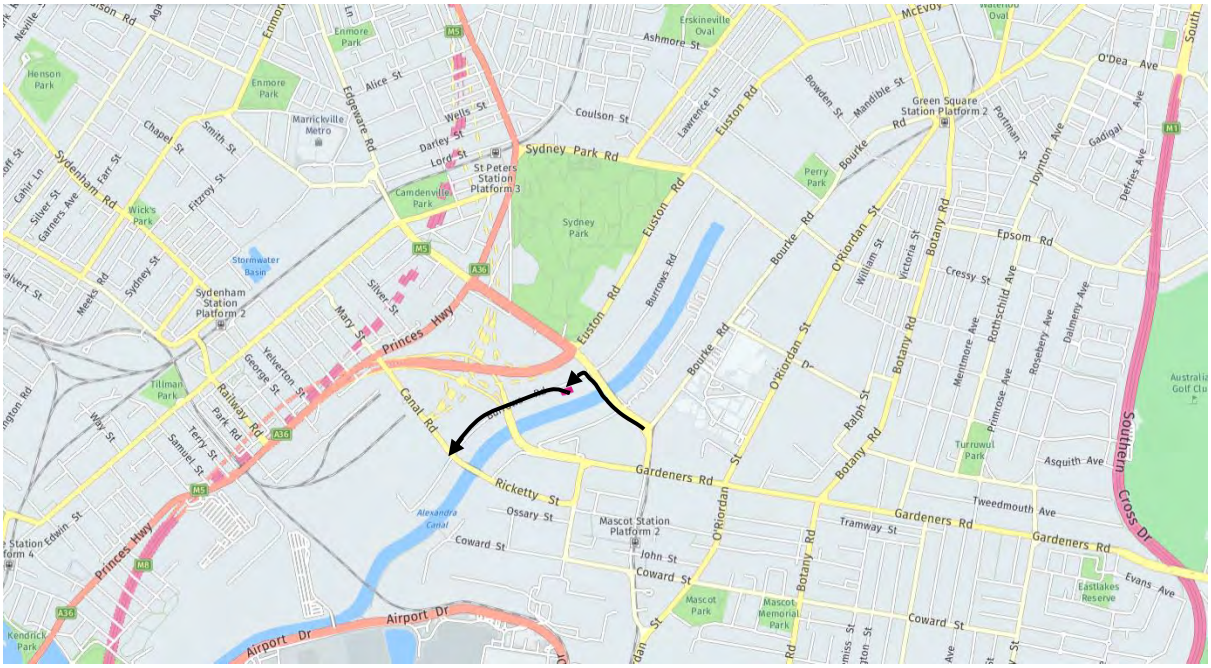


Figure 9: Construction Vehicle Routes

3.10. Construction Vehicle Site Access

Construction vehicle access and egress to the site shall be predominantly from Burrows Road and all vehicles will enter and exit in forward direction. The Burrows Road provides connection state roads.

Swept path assessment for the site gates using the largest anticipated vehicle (12.5m HRV) has been performed and is detailed in Appendix B. .

Traffic controlled are required at all site entry and exit points, to control entering and exiting vehicles. These traffic controllers are not to operate outside of the site on public roads and are instead implemented to withhold exiting vehicles if needed. Refer to Section 3.15 for management of pedestrian and construction vehicle interactions.

Staging Plans are attached in Appendix D.

3.11. Works Zones

If a Work Zone is to be required at any point, an application to the City of Sydney Council is required prior to commencing works. This would be a separate application to this CTMP.

3.12. Road and Lane Closures

No full road closures are proposed for these works.

Traffic Guidance Schemes (TGS) shall be developed by the appointed traffic control company at the time of implementation when details of the closures and night works are known.

When road or lane closures are necessary, relevant applications to authorities shall be undertaken by the contractor for Road occupancy Licences, separate and distinct from this CTMP.

3.13. Emergency Vehicle Access

The proposed traffic control arrangements do not propose closure of any local roads. Any emergency vehicles requiring access to the project site will do so via the site gates.

A detailed Emergency Management Plan will be further developed by the contractor prior to site establishment works.

3.14. Traffic Control Measures

The Traffic Guidance Scheme (TGS) outlines the proposed traffic management to inform road users of the changed traffic conditions in the vicinity of the works site.

High-level concept TGSs have been prepared and included in Appendix C. .

It is noted that detailed TGSs are to be prepared by the appointed traffic management contractor prior to commencement of works and submitted to Council and TfNSW for approval. All Traffic Guidance Schemes associated with the CTMP must comply with the Australian Standards and Roads and Maritime Services (RMS) Traffic Control at Work Sites Guidelines Issue 6.1 (2022).

3.15. Pedestrian Access

The general public will not be allowed access to the site. The contractor will ensure that the site perimeter fences are maintained in a clean and safe manner at all times, throughout the duration of the project. Existing street lighting shall be retained for the safety and amenity of pedestrians. The site perimeter boundaries shall consist of hoarding, installed throughout the various construction phases. These boundaries will be established, and from then on maintained, immediately following site possession and fitted with appropriate public directional signage.

The contractor shall provide a dedicated traffic & pedestrian management team at all site interfaces with the public road, in the form of traffic controllers. This will ensure truck movements and deliveries are undertaken efficiently and safely. These traffic controllers are required only on occasions or days where construction vehicle arrivals and departures are occurring.

It should be noted that Traffic Controllers are NOT to stop traffic on the public street(s), pedestrians and cyclists to allow trucks to enter or leave the site. They MUST wait until a suitable gap in traffic allows them to assist trucks to enter or exit the site. The Roads Act does not give any special treatment to trucks leaving a construction site – the vehicles already on the road and pedestrians on the footpath have right-of-way.

Pedestrians may be held only for very short periods to ensure safety when trucks are leaving or entering BUT you must NOT stop pedestrians in anticipation i.e. at all times the pedestrians have right-of-way on the footpath not the trucks.

The Applicant must apply to Council to organise appropriate approvals for fencing / hoarding prior to commencement of works.

3.16. Special Deliveries

It is understood that oversize and over-mass vehicles are generally not allowed to travel on Local Roads unless approval for a one-off occasion is obtained from the National Heavy Vehicle Regulator (NHVR) and Council. Requests to use these vehicles must be submitted to the NHVR 28 days prior to the vehicle's scheduled travel date. For more information, please contact the NHVR on 1300 696 487 or www.nhvr.gov.au.

Should the contractor require a partial road closure on State, Regional and/or Local Roads, or carry out work within 100m of traffic signals, an application will be made to the relevant authority to obtain their approval.

3.17. Work Site Security

As discussed in Section 3.15, to provide security to the works site and protection to the general public, it is proposed that the site perimeter boundaries consist of hoarding. These boundaries will be established immediately following site possession and fitted with appropriate directional signage.

All gates are securely locked outside of working hours and may be regularly patrolled by security staff. This security network shall continue to work closely with the contractor to ensure that security is being maintained throughout construction.

The contractor shall maintain a site entry register requiring all visitors to sign in upon entry. All visitors are required to wear an identification "visitor" badge and wear appropriate PPE at all times while on site.

3.18. Plant/Equipment Management

At the commencement of construction, plant and equipment, including construction fencing/scaffolding material, site sheds, mobile cranes and machinery will be required to be delivered to the site. The delivery and removal of plant and equipment to and from the site will be undertaken from the on-site materials handling/loading area.

The delivery and removal of plant and equipment that requires a wide or long load vehicle will be subject to a separate application/permit and separate prior approval from Council and other relevant authorities. In order to minimise traffic disruption during the delivery of the plant and equipment, it is proposed to undertake this work during the evening/early morning period (outside of peak traffic hours). All plant and equipment deliveries will be carried out in accordance with Council/TfNSW requirements and the NSW Police regulations.

All sediment and loose material shall be removed from construction vehicles before returning to public roads.

3.19. Staff Induction

All contractor staff and subcontractors are required to undergo a site-specific online induction which outlines the construction procedures and management framework specific to the project. The induction is aimed at instilling in each person a common-sense approach to safety, to ensure they employ the responsible environmental practices and awareness needed to deliver the project in accordance with the relevant regulations and standards. Furthermore, inductions are to deliver information specific to the site including but not limited to access and parking arrangements, public transport and travel, work site security.

3.20. Staff Access and Parking

Contractor staff and on site employees are expected to make suitable arrangements to travel to and from the site. The site is accessible via public transport.

Very limited parking is available on site. Mascot station is in close proximity to the site and workers will be encouraged to drop off tools with temporary unloading zones on the site.

As part of the induction program, staff shall be made aware of the numerous public transport options and cycling opportunities (see Section 2.3) and encouraged to use such alternative means of transport.

City of Sydney CTMP Standard Requirements condition 10 states "All vehicles associated with the development shall be parked wholly within the site. All site staff related with the works are to park in a designated off-street area or be encouraged to use public transport and not park on the public road".

3.21. Access to Adjoining Properties

Access to all adjoining properties will be maintained throughout the works. The adjacent landowners will be notified of works via letter box distribution and road signage to advised of anticipated truck movements in operation with access to adjoining properties being maintained at all times.

3.22. Impacts to Surrounding Public Transport Services

The construction activities associated with the development are expected to have no detrimental impacts on the surrounding public transport networks. Construction traffic shall be coordinated and minimised during peak AM and PM hours to mitigate negative impacts on the surrounding traffic network.

3.23. Cumulative Construction Traffic Activity

The contractor shall liaise with Council and any nearby construction sites to ensure that minimal cumulative effects are introduced into the road network. Consideration should be taken regarding the timing and staggering of heavy vehicle arrivals and departures.

3.24. Occupational Health and Safety

Any workers required to undertake works or traffic control within the public domain shall be suitably trained and will be covered by adequate and appropriate insurances. All traffic control personnel will be required to hold SafeWork NSW accreditation in accordance with Section 8 of Traffic Control at Worksites.

A comprehensive Work Health and Safety management plan will be implemented by the contractor and available upon request by council or residents and shall be constantly reviewed as the design and construction methodology progress.

3.25. Consultation and Method of Communicating Traffic Changes

Traffic Guidance Schemes in accordance with Australian Standards (AS 1742.3 – Traffic Control Devices for Works on Roads) and TfNSW Traffic Control at Worksites will advise motorist of upcoming changes in the road network.

During site operation the contractor shall, each morning, prior to work commencing, ensure all signage is erected in accordance with the TGS and clearly visible. Each evening, upon completion of work, the contractor is to ensure signage is either covered or removed as required. Sign size is to be size "A".

Any variation to the layout of the TGS on site is to be recorded and certified by authorised SafeWork NSW accredited personnel. The associated TGS road signage will inform drivers of works activities in the area including truck movements in operation. It must also be approved by CRU prior to implementing any changes.

3.26. Hazard and Risk Identification

All construction projects entail a set of risks—from a transport perspective—that may need to be mitigated. Some of these hazards and risks are related to:

- Moving traffic;
- Queued traffic;
- Site vehicle access and egress points;
- Highly vulnerable road user activity;
- Other construction activity or roadworks in close proximity to the proposed work site; and
- Reduced lane and shoulder widths.

This is appropriate for the construction of the development because of the following:

- Conflict between vehicles and pedestrians along Burrows Road at the site entry and exit points.

  Risk Matrix Reference: R1

- Queued traffic could pose safety and manoeuvrability issue for trucks turning into and out of the site, prolonging and delaying the construction process and impacting on surrounding local traffic.

  Risk Matrix Reference: R2

- Cumulative effects of nearby construction works or truck movements could create detrimental impact on the road network.

  Risk Matrix Reference: R3

A risk matrix has been prepared to assist with rating the risk of deviation to the procedures described in this report. The risk matrix is shown in

Table 5 using the following definitions:

Risk Rating

- Very High (VH)
- High (H)
- Medium (M)
- Low (L)

Consequence

- Insignificant: Illness, first aid or injury not requiring medical treatment. No lost time.
- Minor: Minor injury or illness requiring medical treatment. No lost time post medical treatment.
- Moderate: Minor injuries or illnesses resulting in lost time.
- Major: 1 to 10 serious injuries or illnesses resulting in lost time or potential permanent impairment.
- Severe: single fatality and/or 11 to 20 serious injuries or illnesses resulting in lost time or potential permanent impairment.
- Catastrophic: multiple fatalities and/or more than 20 serious injuries or illnesses resulting in lost time or potential permanent impairment.

Likelihood

- Almost certain: expected to occur multiple times (10 or more times) during any given year.
- Very likely: expected to occur occasionally (1 to 10 times) during any given year.
- Likely: expected to occur once during any given year.
- Unlikely: expected to occur once every 1 to 10 years.
- Very unlikely: expected to occur once every 10 to 100 years.

- Almost unprecedented: not expected to occur in the next 100 years.

The resulting level of risk and treatment approach is:

- Intolerable: Must be corrected.
- High: Should be corrected or the risk significantly reduced, even if the treatment costs is high.
- Medium: Should be corrected or the risk significantly reduced, if the treatment cost is moderate, but not high.
- Low: Should be corrected or the risk reduced if the treatment cost is low.

Table 5: Risk Matrix

Likelihood	Consequence						
		Insignificant	Minor	Moderate	Major	Severe	Catastrophic
	Almost certain						
	Very likely						
	Likely						
	Unlikely						
	Very unlikely		R2, R3				
	Almost unprecedented				R1		

Some recommended risk mitigation measures include:

- Gate controllers at the work site will need to ensure that there are no approaching pedestrians prior to allowing a construction vehicle to enter or exit the site. Retractable gates may be used to temporarily prevent pedestrian/cyclist access across the proposed vehicular crossovers when a construction vehicle is entering or exiting the site. Pedestrians are not to be stopped to allow vehicle entry or exit.
- Preparation of TGSs to communicate to road users within the vicinity of the work site of the changed traffic conditions.
- Coordinating truck arrival and departures to avoid queuing and congestion compounding on local roads.
- Consideration shall be given to nearby construction activity and truck movements to ensure cumulative effects on the road network are minimised.

3.27. Contact Details for On-Site Enquiries and Site Access

All enquiries are to be directed to:

Name:	Steve O'Connor
Role:	Site Manager
Mobile:	0423027954

3.28. Maintenance of Roads and Footpaths

The roads and footpaths along the route of travel will be kept in a serviceable state at all times. Any damage arising as a result of the proposed truck movements will be treated / repaired by the principal contractor at no cost to Council.

4. CTMP Approval, Monitoring and Review

This CTMP has been reviewed and endorsed by the designer's one-up manager who holds a current Prepare Works Zone Traffic Management Plan qualification. This approved CTMP has been used to inform the development of all TGSs for the work.

Regular monitoring and review are to be conducted throughout the life of the project to ensure that the CTMP remains current and addresses all risks at the work site for the duration of the project or activity.

To ensure that this CTMP is kept up to date, the activities identified in Table 6 will be undertaken to facilitate review and continuous improvement.

Table 6: Monitoring Activities

Stage	Activity	Purpose	Qualification	Tools and checklists
Planning	TGS verification	To ensure that the TGS selected or designed is suitable for the works and location.	ITCP or PWZTMP	TCAWS Appendix E.2 TGS verification checklist
During TTM	Weekly TTM inspections (includes preopening inspection)	To ensure that the CTMP and relevant TGS are appropriate and operating safely, effectively and efficiently	PWZTMP	TCAWS Appendix E.3 Weekly TTM inspection checklist
	Shift TTM inspections	To ensure that the TGS is implemented as designed. This includes at a minimum, twice per shift and when: A TGS is installed, changed or updated. At regular frequency afterwork commences, recommended every 2 hours; and Once after care arrangements have been installed if required	ITCP or PWZTMP	TCAWS Appendix E.4 Shift / Daily TTM inspection checklist
	CTMP review	To ensure that CTMP controls are achieving the required outcomes.	PWZTMP	Not provided
	Client inspections	Verification of TTM through the Transport Traffic Engineering Services, Work Health and Safety Branch, Surveillance Officers, or other client representatives.	Divisionally determined	Not provided
Post Completion	Post-completion inspection	To ensure that the site has been demobilised as planned and is safe for opening to traffic	ITCP or PWZTMP	Appendix E.5 Post completion inspection checklist

Any changes to the CTMP must be submitted to and approved by Council. A copy of all documentation relating to the endorsement of the changes must be available to be accessed, either electronically or in hard copy, by the person responsible for the works.

5. TGS Confirmation and Approval

The Traffic Guidance Schemes (TGSs) shown in Appendix C. outline the proposed traffic management to inform road users of the changed traffic conditions in the vicinity of the works site. The TGSs must be set out in accordance with Issue 6.1 of the Traffic Control at Work Sites Technical Manual, 2022 (TCAWS).

TGSs are to be implemented throughout the project to warn road users that trucks will be turning into and out of the site, in accordance with TCAWS TGS D.4.7. A TGS in accordance with TCAWS TGS D.4.18 is to also be implemented to warn road users of the presence of traffic controllers managing traffic, in addition to advance warning of any lane closures.

It is noted that any changes to the existing parking restrictions will require a minimum fourteen (14) days notification to adjoining property owners prior to the implementation of any temporary traffic control measures.

Any revisions or additional TGSs must be prepared by a SafeWork NSW qualified person upon engagement of the traffic management contractor and prior to commence of works on site.

5.1. TGS Verification

Site confirmation must be undertaken via the completion of the TGS verification. A TGS verification must be undertaken to confirm the selected or designed TGS is fit for purpose. A TGS verification must be completed in accordance with Section 8.1.2 TGS verification by an ITCP or PWZTMP qualified person. TGS verification must include an inspection of the work site where the TGS will be implemented.

5.2. TGS Approval

The SafeWork NSW qualified person who has designed or modified the relevant TGS has approved the TGS for use. Approval of the TGS includes:

- Review of the relevant TMP, risk assessment and associated TTM specific documentation;
- Design, redesign or modification of the TGS must be in accordance with the requirements of TCAWS;
- Confirmation that the TGS provides the relevant information for the ITCP person to safely implement on-site.

The one up manager of the SafeWork NSW qualified person has approved the TGS, including:

- Any non-standard or unaccepted signs or devices;
- Any departures from the requirements of TCAWS;
- If a manual traffic controller is proposed for use.

5.3. The Role of Traffic Controllers

Traffic Controllers (TC) have been implemented at site entry and exit gates as a supplementary measure to further mitigate the risk of conflict between pedestrians and construction vehicles. TCs are not permitted to stop oncoming traffic or hold pedestrians to assist a vehicle to leave the site. The TCs are implemented to control exiting vehicles and limit conflict between entering and exiting should these two movements occur simultaneously.

6. Summary

This CTMP has been prepared to outline the construction traffic measures to assist in providing a safe work environment while maintaining a safe and efficient journey for all road users.

With the measures described in the CTMP in place, the construction activity is anticipated to have minimal disruption to the daily activities within the vicinity of the site.

It is envisaged that this document will be continually reviewed and amended if required, due to changes in design, TfNSW, the City of Sydney Council or any other authority requirements. Should any changes be made, they will need to be reviewed and approved by Council and TfNSW.

Appendix A. City of Sydney CTMP Requirements

The City of Sydney
Standard Requirements for Construction Traffic Management Plan

The Applicant or contractor undertakes to follow and abide by the following requirements at all times during the demolition, excavation and construction works.

1. Details of routes to and from site and entry and exit points from site – site specific

   Refer to Section 3.9

2. Details of roads that may be excluded from use by construction traffic i.e. roads with load limits, quiet residential streets or access/turn restricted streets – site specific

   Refer to Section 3.9

3. The approved truck route plan shall form part of the contract and must be distributed to all truck drivers.

   Refer to Section 3.9 and 3.10

4. All vehicles must enter and exit the site in a forward direction (unless specific approval for a **one-off occasion** is obtained from the City's Construction Regulation Unit).

   Refer to Section 3.10

5. Trucks are not allowed to reverse into the site from the road (unless specific approval for a **one-off occasion** is obtained from the City's Construction Regulation Unit).

   Refer to Section 3.10

6. The Applicant must provide the City with details of the largest truck that will be used during the demolition, excavation and construction.

   Refer to Section 3.8

   NOTE: No dog trailers or articulated vehicles (AV) to be used (unless specific approval for a **one-off occasion** is obtained from the City's Construction Regulation Unit).

7. Oversize and over-mass vehicles are not allowed to travel on Local Roads (unless approval for a **one-off occasion** is obtained from the City's Traffic Operations Unit). Requests to use these vehicles must be submitted to the City 28 days prior to the vehicle's scheduled travel date. For more information, please contact the National Heavy Vehicle Regulator (NHVR) on 1300 696 487 or www.nhvr.gov.au.

   Refer to Section 3.8, 3.9 and 3.16

8. No queuing or marshalling of trucks is permitted on any public road.

   Refer to Section 3.10

9. Any temporary adjustment to Bus Stops or Traffic Signals will require the Applicant to obtain approval from the STA and RMS respectively prior to commencement of works.

   No changes to bus stops or traffic signals are proposed.

10. All vehicles associated with the development shall be parked wholly within the site. All site staff related with the works are to park in a designated off-street area or be encouraged to use public transport and not park on the public road.

    Refer to Section 3.10 and 3.20

11. All loading and unloading must be within the development site or at an approved "Works Zone".

    Refer to Section 3.11

12. The Applicant must apply to the City's Traffic Works Co-ordinator to organise appropriate approvals for Work Zones and road closures.

    Refer to Section 3.11

13. The Applicant must apply to the City's Construction Regulations Unit to organise appropriate approvals for partial road closures.

    Refer to Section 3.12

14. The Applicant must apply to the Transport for NSW's Transport Management Centre for approval of any road works on State Roads or within 100m of Traffic Signals and receive an approved Road Occupancy Licence (ROL). A copy of the ROL must be provided to the City.

    Refer to Section 3.12

15. The Applicant must apply to the City's Construction Regulations Unit to organise appropriate approvals for temporary driveways, cranes and barricades etc.

    Refer to Section 3.10

16. The Applicant must comply with development consent for hours of construction.

    Refer to Section 3.6

17. All Traffic guidance schemes associated with the CTMP must comply with the Australian Standards and Roads and Maritime Services (RMS) Traffic Control At Work Sites Guidelines.

    Refer to Section 3.14 and 5

18. Traffic Controllers are NOT to stop traffic on the public street(s) to allow trucks to enter or leave the site. They MUST wait until a suitable gap in traffic allows them to assist trucks to enter or exit the site. The Roads Act does not give any special treatment to trucks leaving a construction site - **the vehicles already on the road have right-of-way.**

    Refer to Section 3.14

19. Pedestrians may be held only for very short periods to ensure safety when trucks are leaving or entering BUT you must NOT stop pedestrians in anticipation i.e. **at all times the pedestrians have right-of-way on the footpath not the trucks**.

    Refer to Section 3.15 and 5.3

20. Physical barriers to control pedestrian or traffic movements need to be determined by the City's Construction Regulations Unit prior to commencement of work.

    Refer to Section 3.15, 3.17

21. The Applicant must obtain a permit from the City's Construction Regulation Unit regarding the placing of any plant/equipment on public ways.

    Refer to Section 3.18

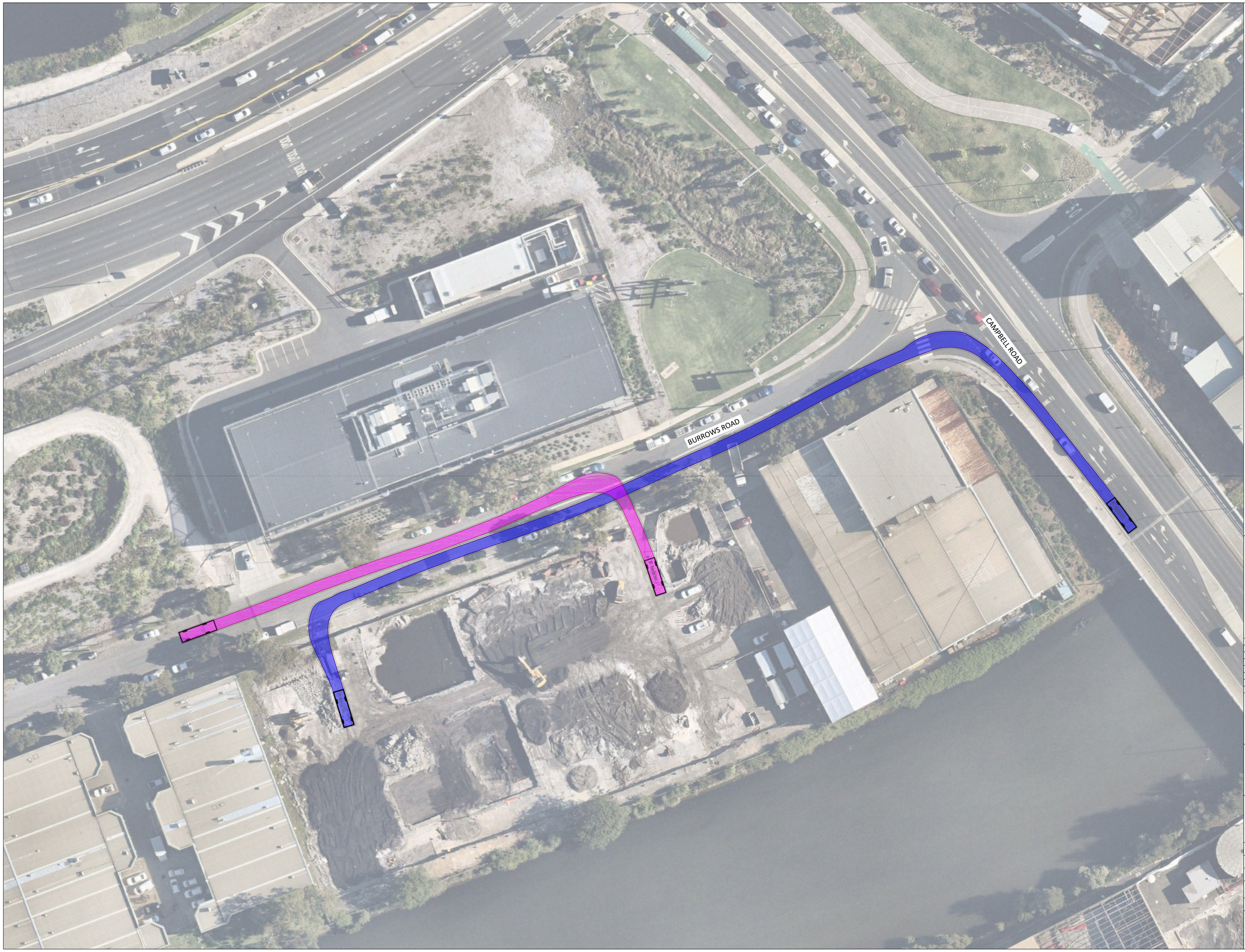
22. The Applicant must apply to the City's Building Approvals Unit to organise appropriate approvals for hoarding prior to commencement of works.

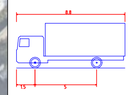
    Refer to Section 3.17

23. The CTMP is for the excavation, demolition and construction of building works, not for road works (if required) associated with the development. Any road works will require the Applicant or the contractor to separately seek approval from the City and/or RMS for consideration. Also, WorkCover requires that Traffic guidance schemes must comply with Australian Standards 1742.3 and must be prepared by a Certified Traffic Controller (under RMS regulations).

24. Please note that the provision of any information in this CTMP will not exempt the Applicant from correctly fulfilling all other conditions relevant to the development consent for the above site.

Appendix B. Vehicle Swept Paths





MRV - Medium Rigid Vehicle

Overall Length	8.800m
Overall Width	2.500m
Overall Body Height	3.633m
Min Body Ground Clearance	0.428m
Track Width	2.500m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	10.000m

ENTRY SWEPT PATH

EXIT SWEPT PATH

DRAWING KEY

REV	DATE	DESCRIPTION	DRAWN	REVIEWED
P1	09/03/23	FOR INFORMATION	KP	DB

PROJECT

SYDNEY FLIGHT TRAINING CENTRE

DRAWING TITLE

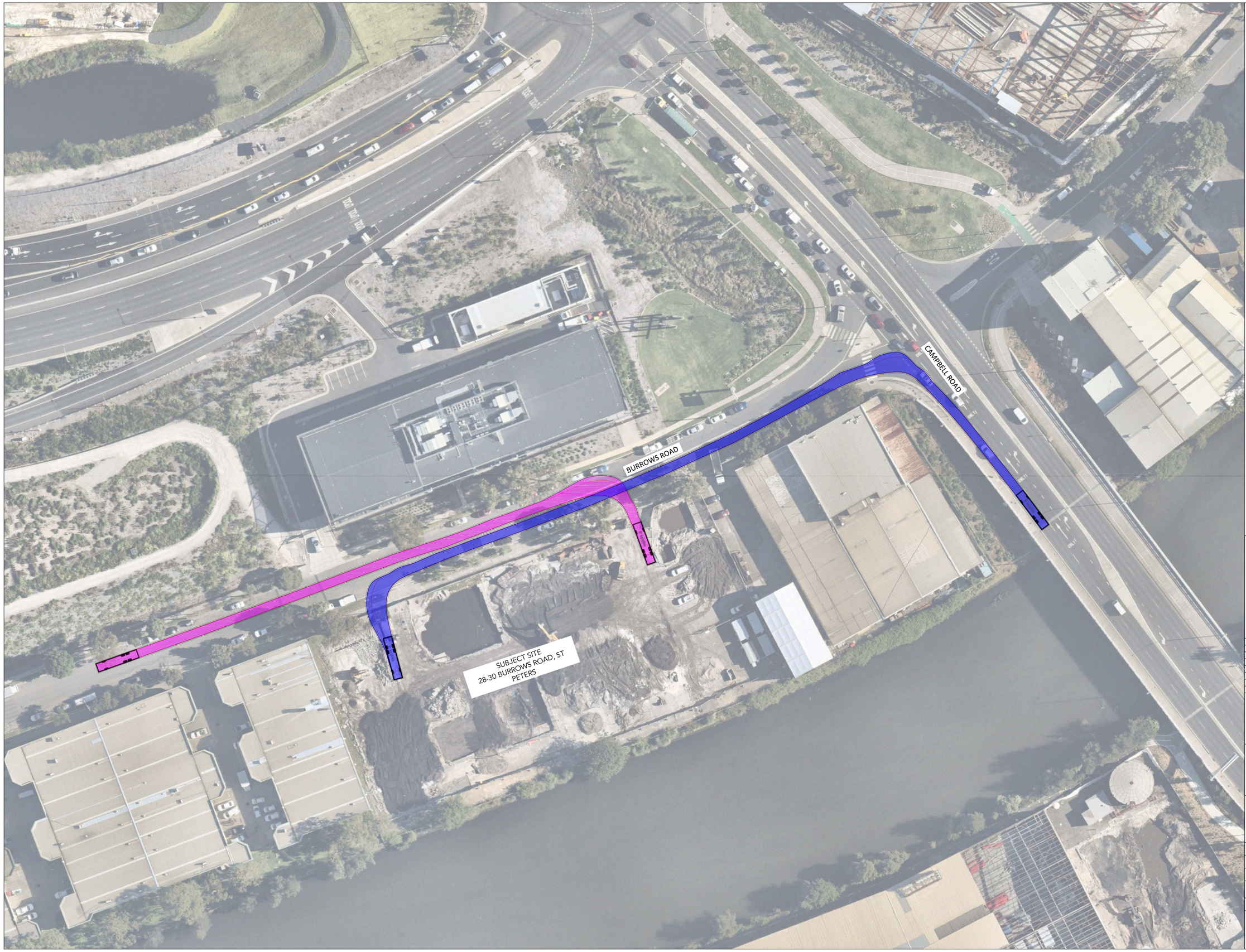
VEHICLE SWEPT PATHS - MRV 8.8 ENTRY AND EXIT

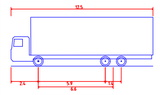
ptc.
Suite 502, 1 James Place
North Sydney NSW 2060
t +61 2 8920 0800
ptcconsultants.co

CLIENT	FDC
DRAWING #	01C-0001
PROJECT #	22-0529
SCALE	1 : 500 @ A1 1 : 1000 @ A3

PRELIMINARY

REV P1





HRV - Heavy Rigid Vehicle

Overall Length	12.500m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.417m
Track Width	2.500m
Lock-to-lock Time	6.00s
Curb to Curb Turning Radius	12.500m

ENTRY SWEPT PATH

EXIT SWEPT PATH

DRAWING KEY

REV	DATE	DESCRIPTION	DRAWN	REVIEWED
P1	09/03/23	FOR INFORMATION	KP	DB

PROJECT

SYDNEY FLIGHT TRAINING CENTRE

DRAWING TITLE

VEHICLE SWEPT PATHS - HRV 12.5 ENTRY AND EXIT

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t +61 2 8920 0800
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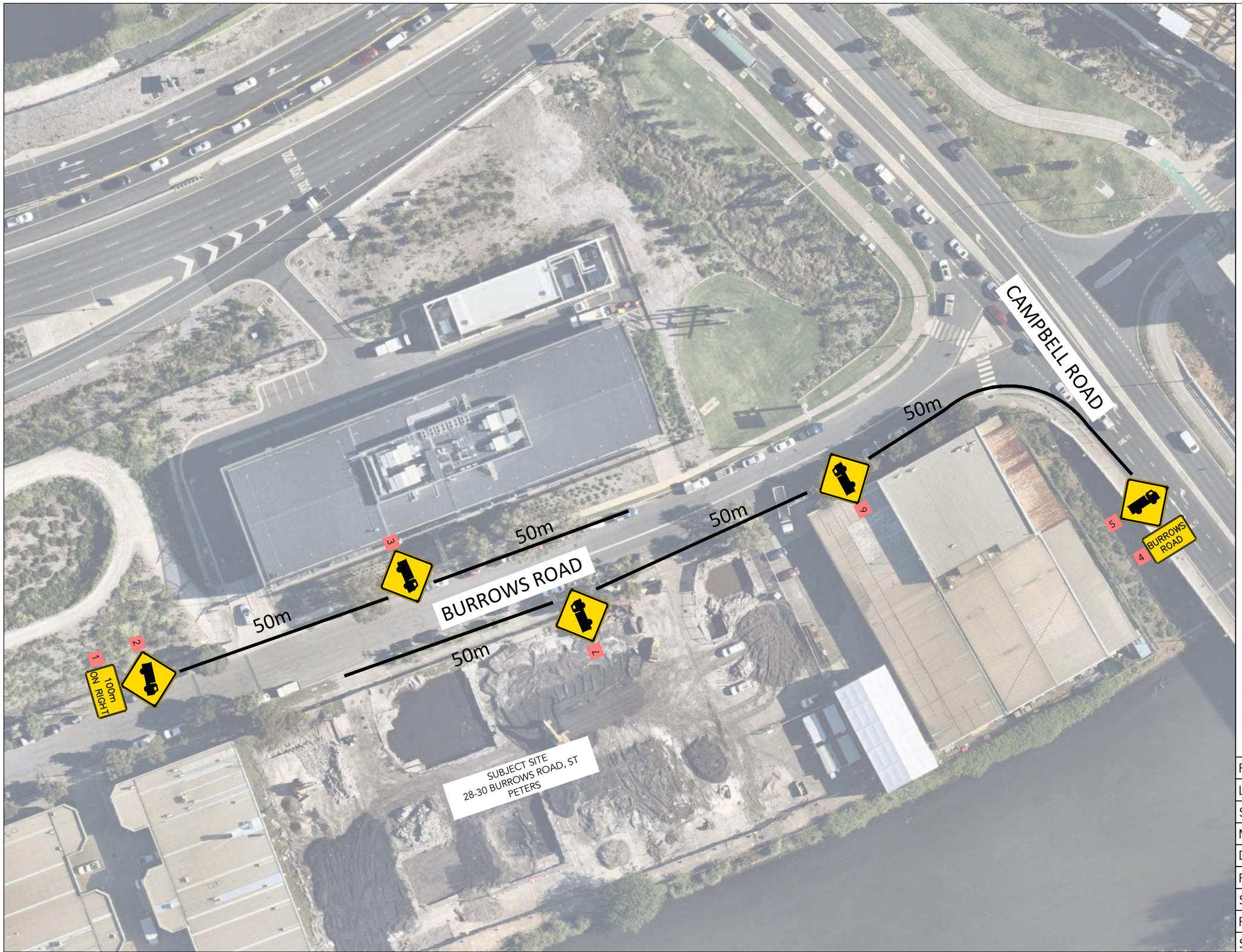
CLIENT	FDC
DRAWING #	01C-0001
PROJECT #	22-0529
SCALE	1 : 500 @ A1 1 : 1000 @ A3

PRELIMINARY

REV P1

Appendix C. Preliminary Traffic Guidance Scheme (TGS)



A3

GENERAL NOTES:

1. All information provided regarding traffic guidance schemes (TGS) is indicative
2. Detailed TGS are to be developed by the appointed traffic control company
3. All TGS revisions or adjustments must be made by a suitably accredited person with the appropriate safework NSW licence
4. This drawing is not to scale and is to be used for reference purposes only
5. All signage is to be in accordance with TCAWS v6.1 (2022) and set up in visible and appropriate locations
6. Traffic Controllers to be used on site when there is regular truck movments. The role of traffic controllers is to hold construction vehicles within the site until it is safe for them to leave the site. They are not permitted to stop public traffic to enable truck movements.

Road Name:	BURROWS ROAD/CAMPBELL RD
Location of Work:	28-30 BURROWS RD, ST PETERS
Suburb:	ST PETERS
Map Reference:	
Duration:	
Road Configuration:	
Speed Limit:	50 KMPH
ROL Approved:	
SZA Approved:	

ptc.
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North Sydney NSW 2060
t +61 2 8920 0800
ptcconsultants.co

REV	DATE	COMMENT / DESCRIPTION	DRAWN	REVIEWED
P1	09.03.2023	FOR INFORMATION	KP	DB
P2	13.03.2023	FOR INFORMATION	KP	DB

PROJECT
SYDNEY FLIGHT TRAINING CENTRE

DRAWING TITLE

Designed by:	KALYANI PATIL TCT1037063 (PWZ)
Requested by:	
Approved by:	DAN BUDAI TCT0016805 (PWZ)
Delegation:	

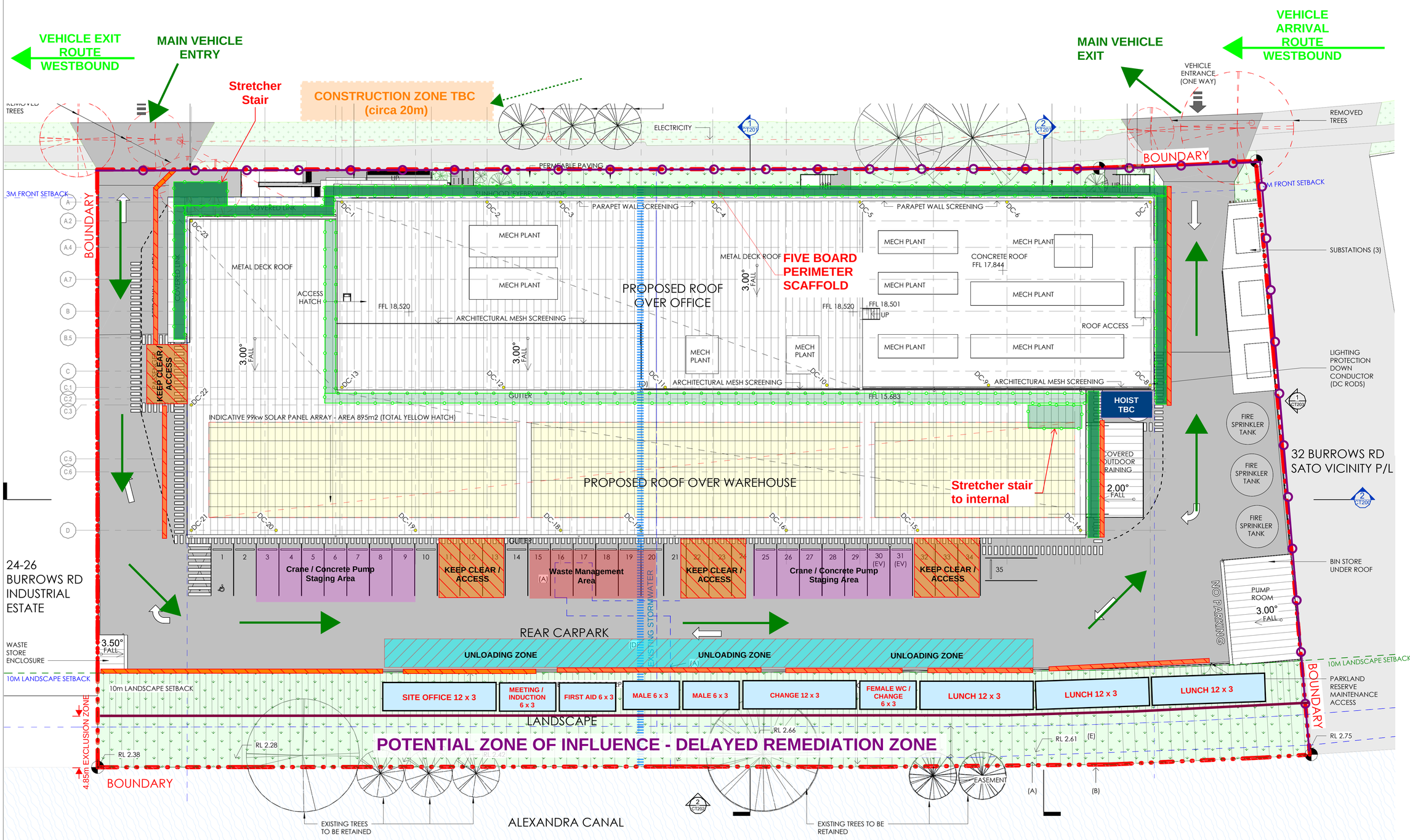
CLIENT	FDC
DRAWING #	PTC-001
PROJECT #	22-0529
SCALE	NOT TO SCALE

PRELIMINARY

REV P1

Appendix D. Staging Plans

SITE LAYOUT PLAN REV 4
- Access & Egress
- Site accommodation & ablutions
- Construction zone



1 SITE PLAN

1 : 200 A300

DISCLAIMER:

NOTE 1: ALLOW +/- 500mm TO THE PROPOSED FINISHED FLOOR LEVEL NOTE 2: BUILDING OVERALL DIMENSION (O/A) MEASURE TO OUTER-MOST FACE OF METAL CLADDING
NOTE 3: THE LOCATION OF PROPERTY ALIGNMENTS IS DETERMINED FROM SURVEY INFORMATION PROVIDED BY SURVEYOR.

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SYDNEY FLIGHT TRAINING CENTRE
28-30 Burrows Road, Sydney, Australia

PRELIMINARY

REVISION	DESCRIPTION	DATE
6	ISSUE FOR CLIENT SIGN-OFF	05.07.22
7	REVISED FIRE SPRINKLER TANKS (3 of)	12.07.22
8	REVISED ROOFTOP PARAPET	12.07.22
9	REVISED NORTHERN FACADE - CURTAIN GLASS WALL SETOUT AMENDED	20.07.22
14	ISSUE FOR CLIENT APPROVAL AS COUNCIL DEVELOPMENT APPLICATION DRAWING SET	07.09.22
15	COUNCIL MEETING REVISED WORK IN PROGRESS DRAWING SET	09.09.22
16	ISSUED FOR CONSULTANT CO-ORDINATION	20.09.22

ARCHITECT: PACE ARCHITECTS figurr
DEVELOPER / LESSOR: LOGOS
CLIENT: CAE QANTAS

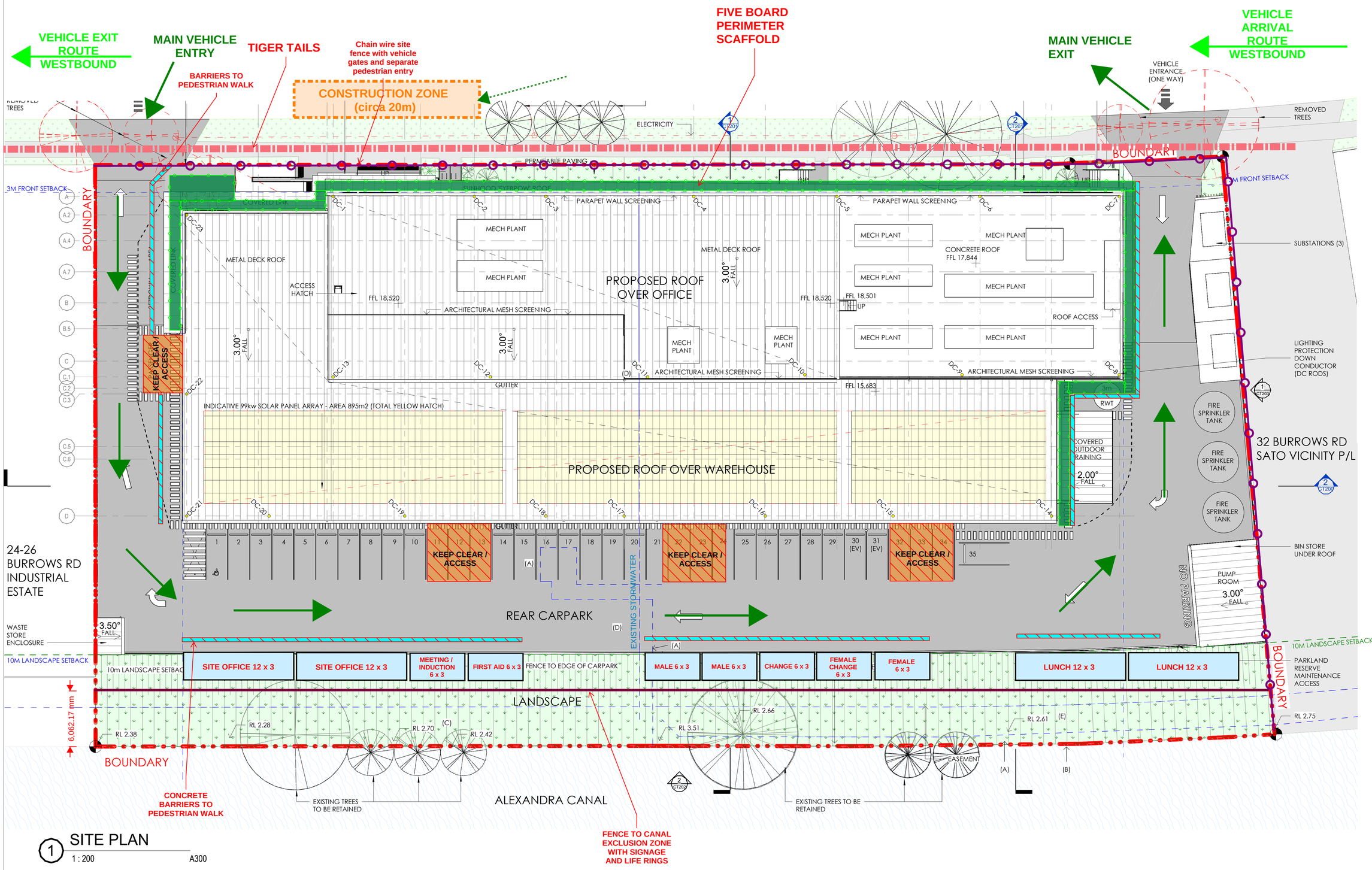
GRAPHIC SCALE: 1:200

purpose PRELIMINARY

SITE PLAN

scale	1 : 200 A1
project no	220507
date	20.09.22
dwn	WL
dwg no	220507 - CT100
issue	16

WHSE PLAN
- Access & Egress
- Site accommodation & ablutions
- WHSE considerations (tiger tails, traffic barriers, sediment controls, construction zone)



1 SITE PLAN
1 : 200 A300

DISCLAIMER:

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SYDNEY FLIGHT TRAINING CENTRE
28-30 Burrows Road, Sydney, Australia

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ARCHITECT: PACE ARCHITECTS figurr
DEVELOPER / LESSOR: LOGOS
CLIENT: CAE QANTAS

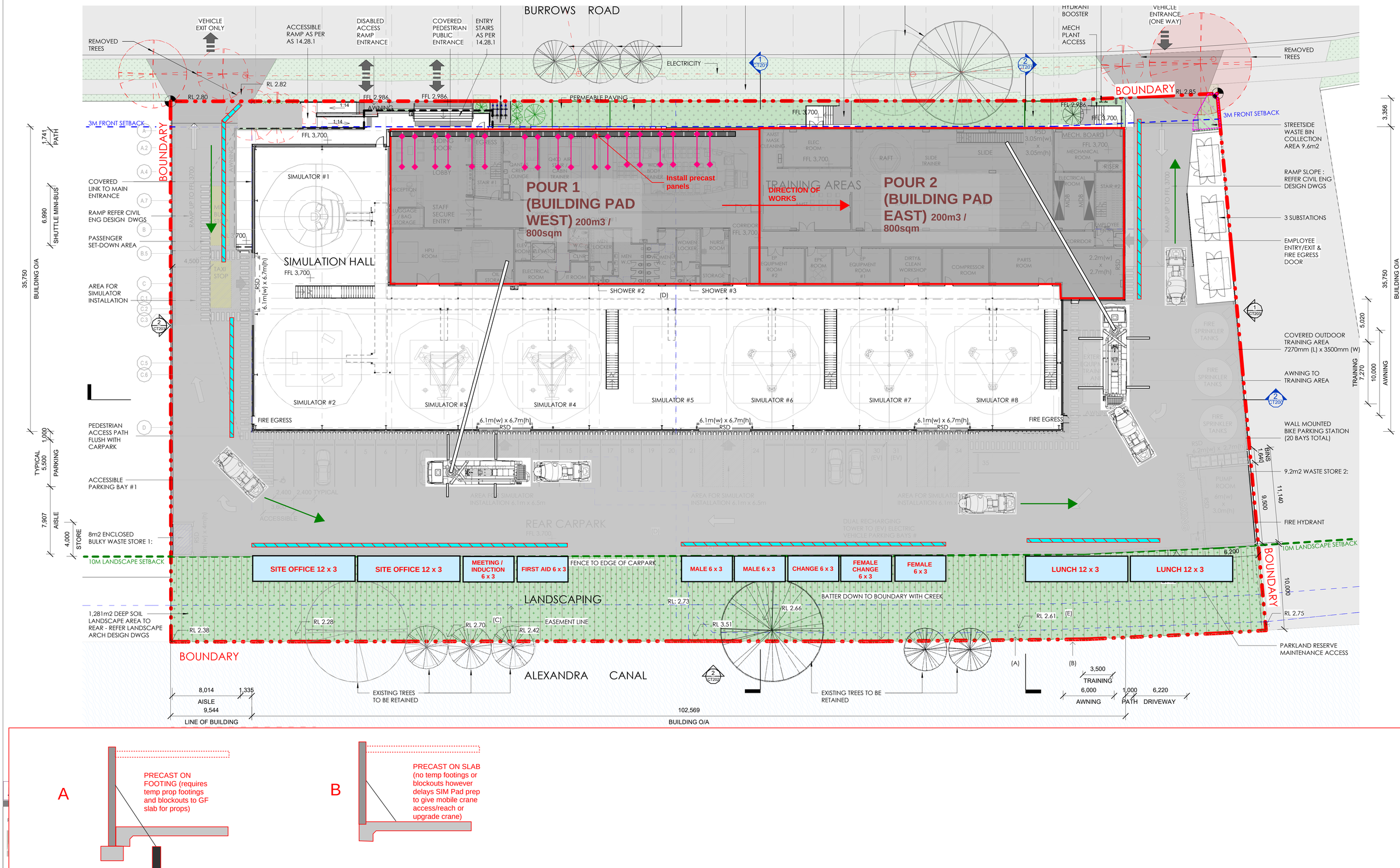
GRAPHIC SCALE: 1:200

purpose PRELIMINARY
SITE PLAN

scale 1 : 200 A1
project no 220507
date 20.09.22
dwn WL
dwg no 220507 - CT100
issue 16

GROUND FLOOR STAGE 1

- FRP Pour 1 (Building Pad West 200m3)
- FRP Pour 2 (Building Pad East 200m3)
- Commence pre-cast panel installation to northern elevation



A

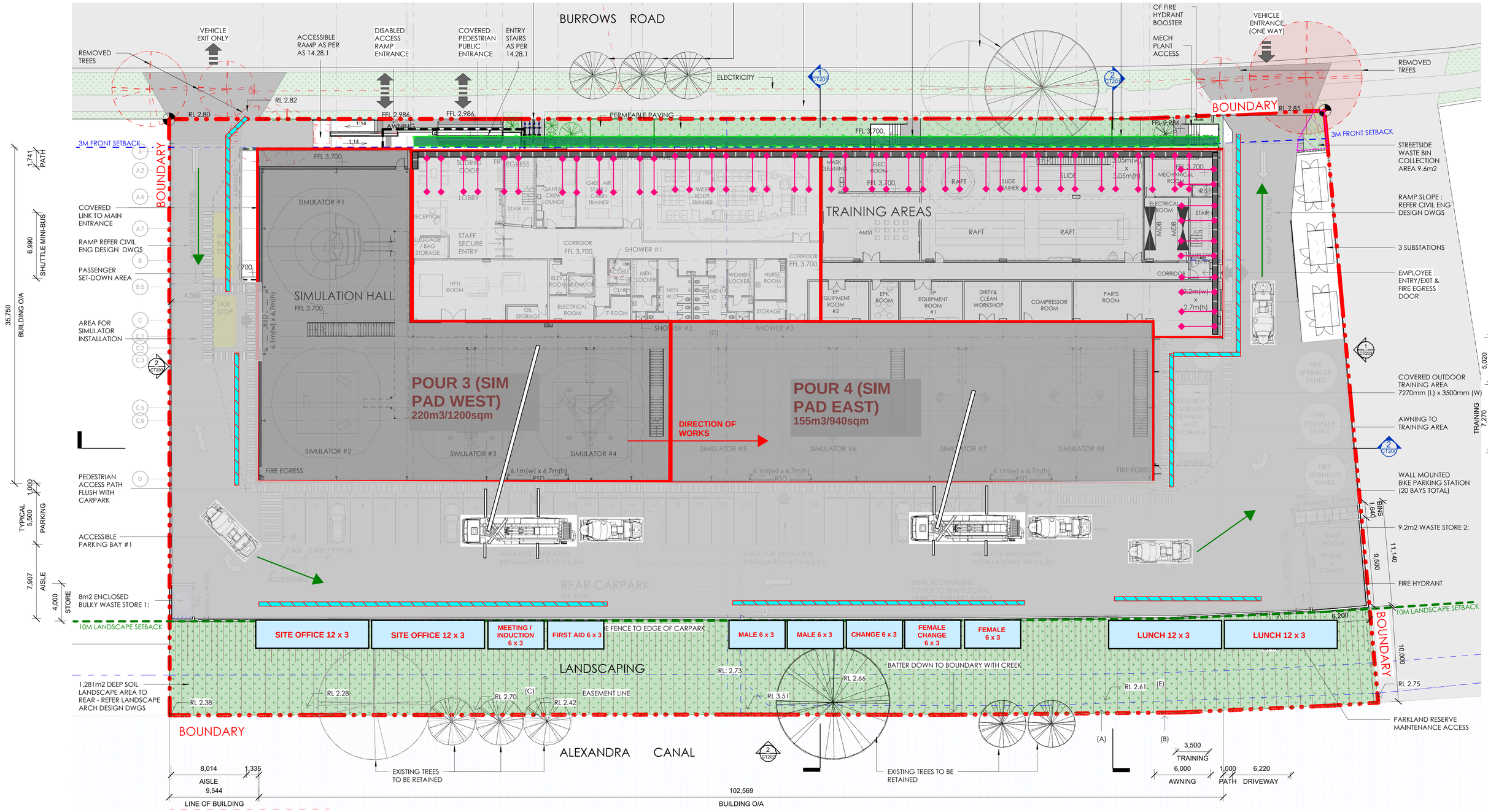
PRECAST ON FOOTING (requires temp prop footings and blockouts to GF slab for props)

B

PRECAST ON SLAB (no temp footings or blockouts however delays SIM Pad prep to give mobile crane access/reach or upgrade crane)

GROUND FLOOR STAGE 2

- FRP Pour 3 (SIM Pad West 220m3)
- FRP Pour 4 (SIM Pad East 155m3)
- Continue pre-cast panel installation to northern and eastern elevation
- Commence perimeter scaffold base out



1 GROUND FLOOR PLAN

1 : 200 A300

(A)-EASEMENT FOR DRAINAGE OF SEWAGE 1, 4 WIDE & VARIABLE WIDTH (DP1188332)
(B)-RESERVE 0.305 WIDE (DP 32332)
(C)-EASEMENT FOR ACCESS 4.265 WIDE (VIDE BK 1925 No.170)
(D)-EASEMENT FOR DRAINAGE 2.44 WIDE (VIDE BK 2596 No.880)
(E)-EASEMENT FOR ACCESS 4.265 WIDE (BK 1938 No.673)

DISCLAIMER:

NOTE 1: ALLOW +/ 500mm TO THE PROPOSED FINISHED FLOOR LEVEL NOTE 2: BUILDING OVERALL DIMENSION (O/A) MEASURE TO OUTER-MOST FACE OF METAL CLADDING
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Member Australian Institute of Architects

SYDNEY FLIGHT TRAINING CENTRE
28-30 Burrows Road, Sydney, Australia

PRELIMINARY

REVISION	DESCRIPTION	DATE
11	BUILDING FOOTPRINT CLARIFIED - CARKPARK LAYOUT ADJUSTED	09.08.22
12	ISSUED FOR CLIENT REVIEW	11.08.22
13	TAXI STOP, EV CHARGING LOCATIONS & WASTE MANAGEMENT AREAS ADDED	25.08.22
14	ISSUE FOR CLIENT APPROVAL AS COUNCIL DEVELOPMENT APPLICATION DRAWING SET	07.09.22
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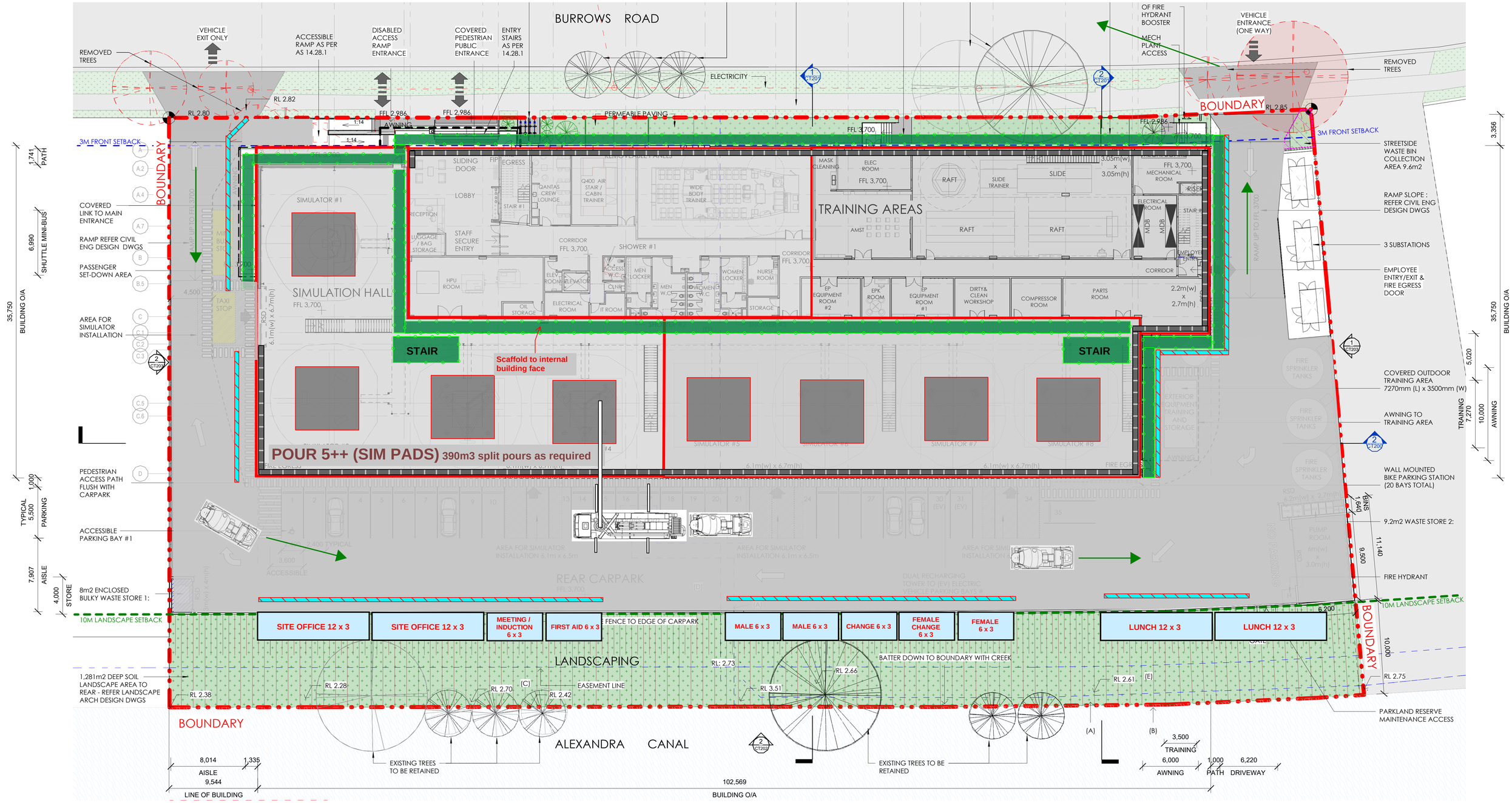
ARCHITECT: PACE ARCHITECTS, figurr
DEVELOPER / LESSOR: LOGOS
CLIENT: CAE, QANTAS

purpose PRELIMINARY

GROUND FLOOR PLAN

scale	1 : 200	A1
project no	220507	
date	20.09.22	
dwn	WL	
dwg no	220507 - CT101	
issue	16	

GROUND FLOOR STAGE 3
- FRP isolated simulator pads (390m3 overall)
- Complete perimeter pre-cast panel installation
- Complete perimeter scaffold base out



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DEVELOPER / LESSOR: LOGOS
CLIENT: CAE QANTAS

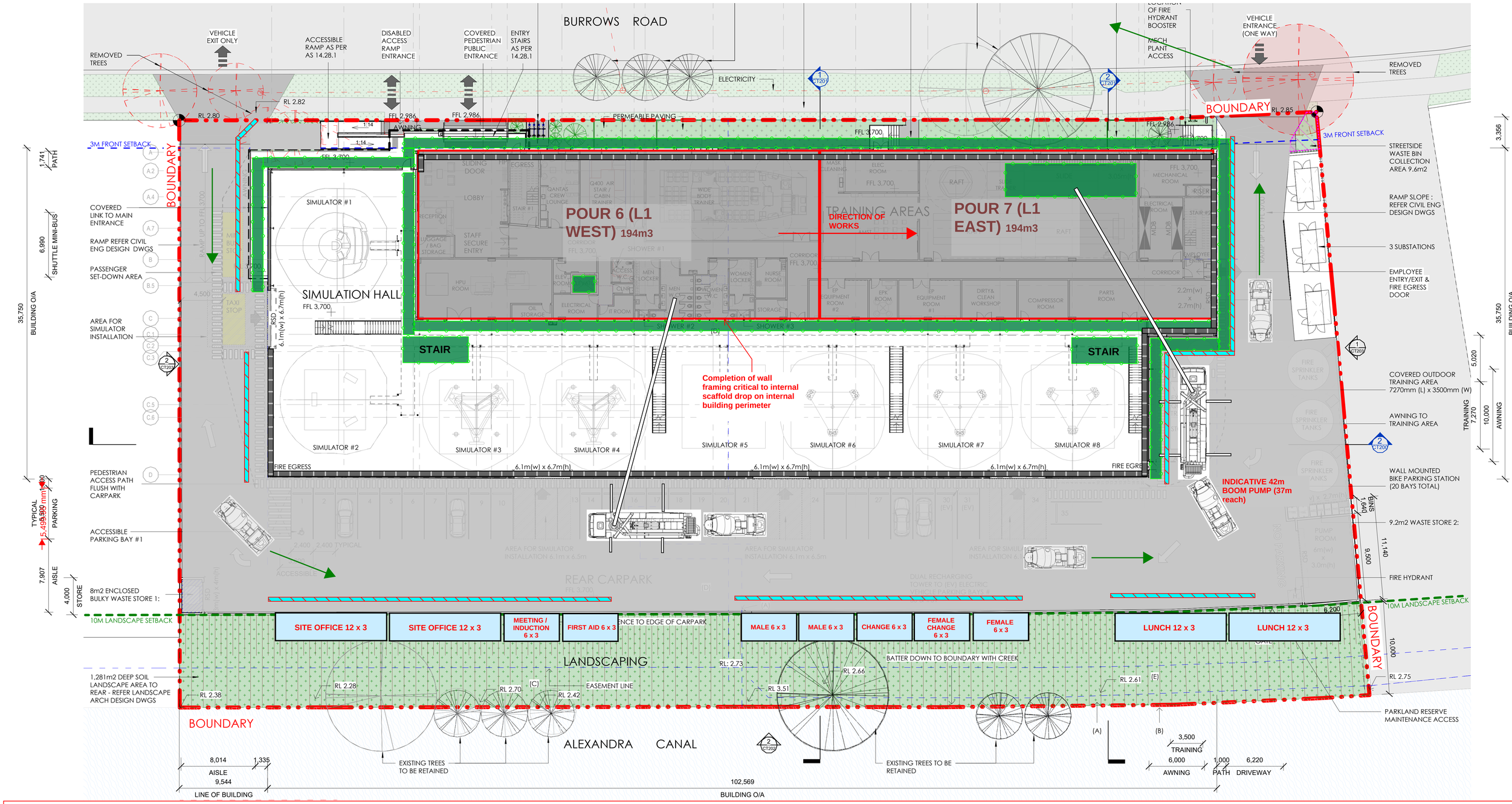
GRAPHIC SCALE: 1:200

purpose PRELIMINARY

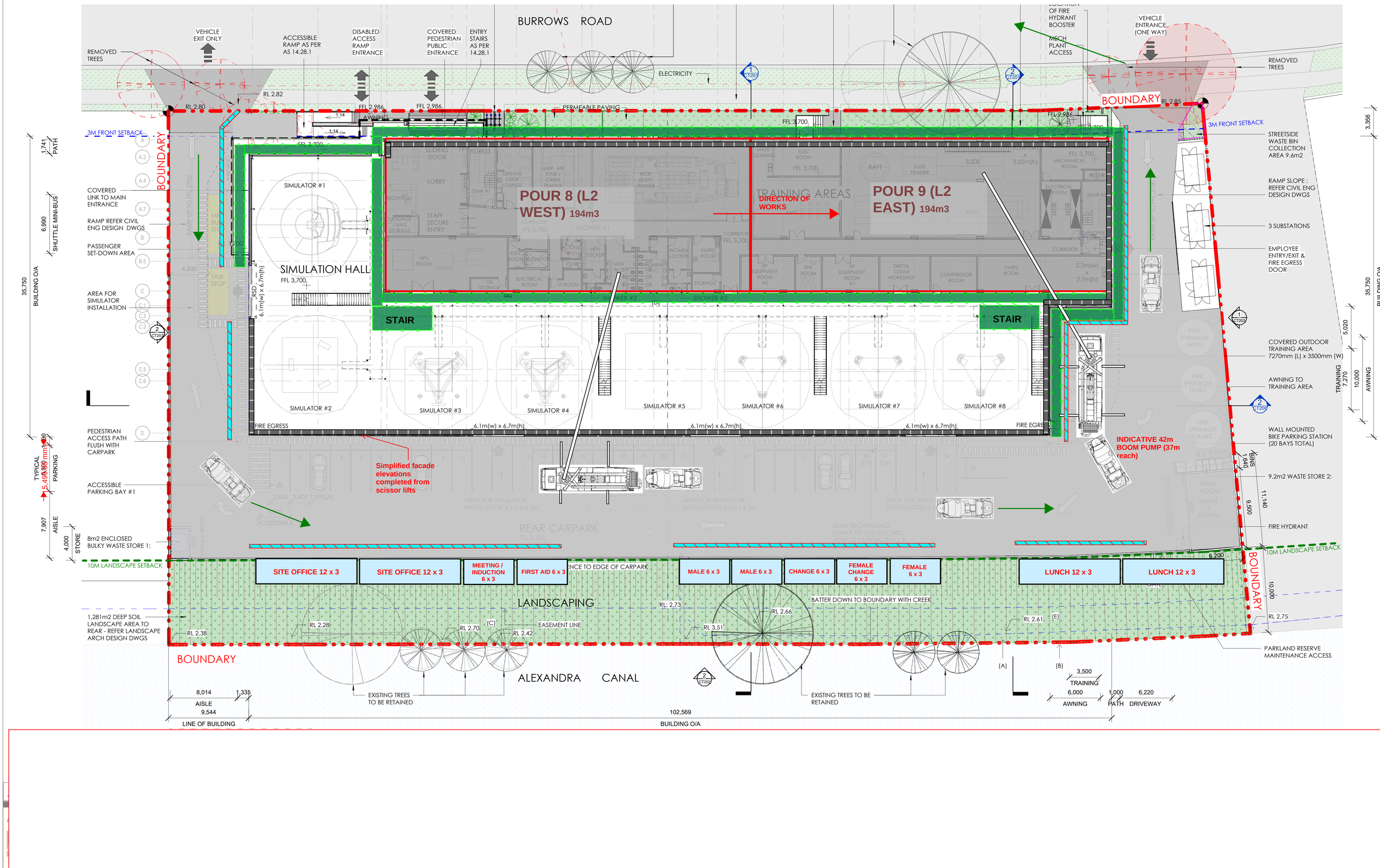
GROUND FLOOR PLAN

scale 1 : 200 A1
project no 220507
date 20.09.22
dwn WL
dwg no 220507 - CT101
issue 16

LEVEL 1 STAGE 4
- FRP Pour 6 (194m3)
- FRP Pour 7 (194m3)
- Commence southern structural steel

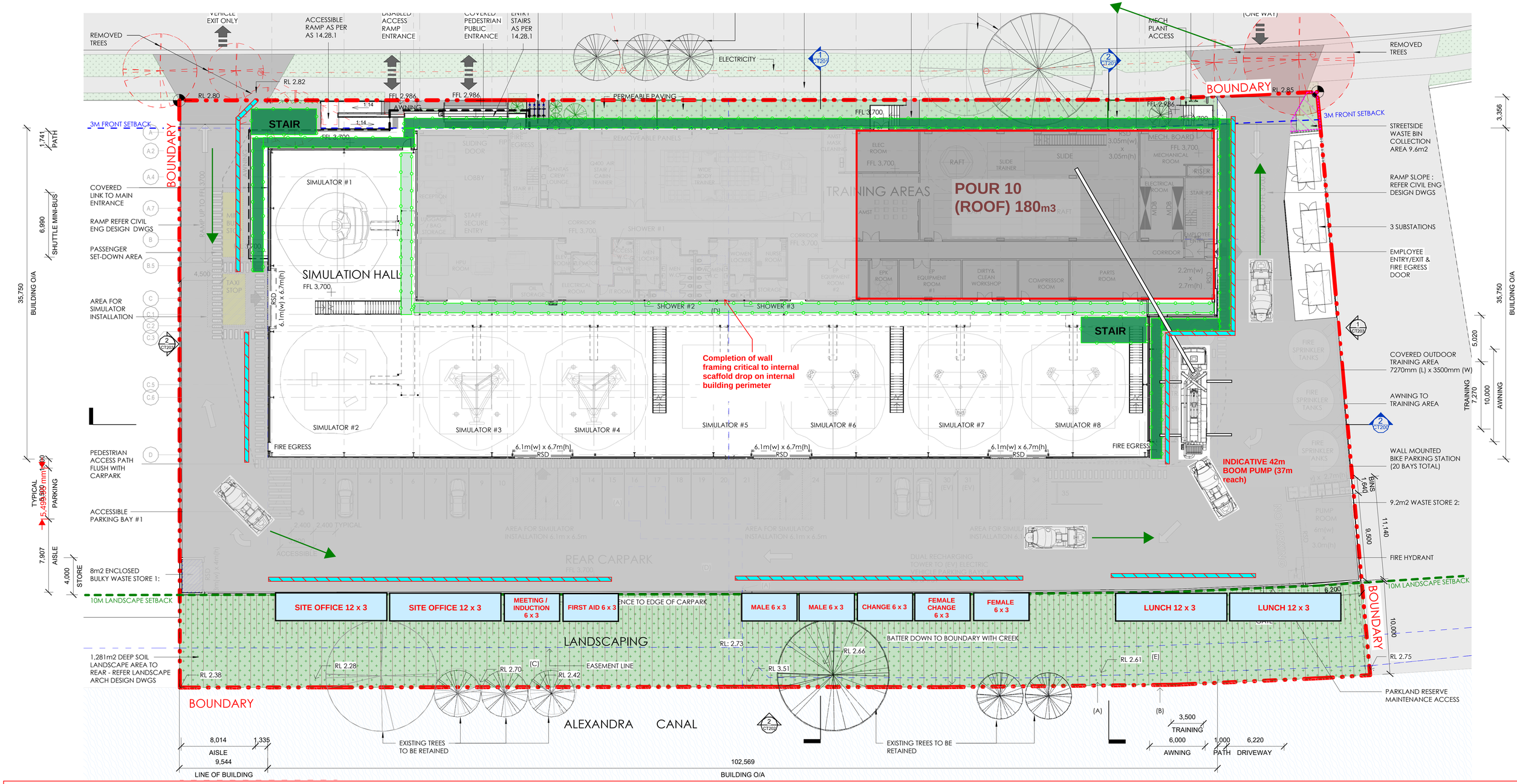


LEVEL 2 STAGE 5
- FRP Pour 8 (194m3)
- FRP Pour 9 (194m3)
- Structural steel ongoing



ROOF LEVEL STAGE 6

- FRP Pour 10 (180 m3)
- Structural steel ongoing
- 50% back propping
- Internal wall framing to perimeter (fall protection)
- Drop internal scaffold & relocate stretcher stair access
- Commence facade



APPENDIX D – Noise & Vibration Management Plan

RENZO TONIN & ASSOCIATES
inspired to achieve

Acoustics
Vibration
Structural Dynamics

28-30 BURROWS ROAD, ST PETERS

Construction Noise and Vibration Management Plan

17 March 2023

FDC Building

TN074-1-03F01 28-30 Burrows Rd Noise and Vibration Management Plan (r3)

35 1982-2017 ACOUSTIC ENGINEERING EXCELLENCE

Sydney Melbourne Brisbane Gold Coast Kuwait Singapore
Renzo Tonin & Associates ABN 29 117 462 861
Level 1/418A Elizabeth St SURRY HILLS NSW 2010 | PO Box 877 STRAWBERRY HILLS NSW 2012
P (02) 8218 0500 F (02) 8218 0501 sydney@renzotonin.com.au www.renzotonin.com.au

Document details

Detail	Reference
Doc reference:	TN074-1-03F01 28-30 Burrows Rd Noise and Vibration Management Plan (r3)
Prepared for:	FDC Building
Address:	22-24 Junction St Forest Lodge, NSW 2037
Attention:	Andrew Ridgen

Document control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
14.03.2023	First issue	0	1	R. Zhafranata	T. Gowen	T. Gowen
17.03.2023	Report revised to address client comments	-	2	R. Zhafranata	T. Gowen	T. Gowen
17.03.2023	Report revised to address client comments	-	3	R. Zhafranata	T. Gowen	T. Gowen

File Path: R:\AssocSydProjects\TN051-TN100\TN074 mt 28-30 Burrows Rd_FDC\1 Docs\03 NVMP\TN074-1-03F01 28-30 Burrows Rd Noise and Vibration Management Plan (r3).docx

Contents

List of tables

List of figures

1 Introduction

1.1 Context

This Construction Noise and Vibration Management Plan (CNVMP) forms part of the Construction Environmental Management Plan (CEMP) required for the construction of a Flight Training Centre at 28-30 Burrows Road, St Peters (the Project).

This CNVMP has been prepared to address the requirements of the State Significant Development Application (SSD-47601708) and all applicable policies, guidelines and standards.

1.2 Background

The Project consists of the construction of a Flight Training Centre comprising:

- A flight centre (including 8 aircraft flight simulators).
- Associated emergency training facilities, along with computer rooms, multimedia centres, briefing and debriefing rooms.
- Associated landscaping, site infrastructure, car parking, loading areas and site access points.

This CNVMP will include a construction noise and vibration impact assessment based on the results presented in the report Sydney Flight Training Centre NVIA[1] (NVIA), which was prepared to support the SSD application. The assessed construction works are summarised in Table 1.1.

Table 1.1: St Peters Flight Training Centre construction works

Construction phase	Description of Work
Site Establishment	• Installation of environment controls • Establishment of construction facilities
Demolition works	• Demolition of existing structures and hardstand
Utility, stormwater, infrastructure and services augmentation works	• Utility modification works • Stormwater civil works • Infrastructure and services augmentation works
Piling works	• Impact piling
Surface preparation works	• Surface preparation works • Excavation and levelling of site
Building construction	• Construction of the main building structure
Building fit-out	• Internal fit-out within the building • Deliveries

Note: Construction activities assessed in TM727-01F01 28-30 Burrows Rd NVIA

[1] Reference: TM727-01F01 28-30 Burrows Rd NVIA, revision 3, dated 21 December 2022

The NVIA assessed noise and vibration impacts on sensitive receivers and structures during construction of the Project, within Section 4 of the report. It identified the potential for noise and vibration impacts during construction which are dependent on the types of construction activity in progress and the proximity of works to sensitive receivers.

The NVIA identified there would be high noise impacts during impact piling. Impact piling methodology was adopted due to the poor ground conditions on the site and the potential soil contamination meant there were limited alternative options for piling. There is also potential for vibration impact on buildings located near the works area. However, FDC building proposed an alternative piling methodology (CFA and CMC piling) which would result in significantly lower noise and vibration impacts to nearby sensitive receivers. This change in piling methodology is further discussed in the CNVMP.

FDC Building was appointed as the construction contractor for the Project.

1.3 Scope of the CNVMP

The scope of this CNVMP is to describe how FDC Building proposes to manage potential noise and vibration impacts during construction of the Project. This CNVMP will form part of the CEMP required by SSD- 47601708 Condition of Approval C2 and has been prepared to satisfy Condition of Approval B19. The CNVMP:

- Describes how the Project will achieve the noise and vibration safeguards and management measures identified in the NVIA and SSD-47601708;
- Identifies noise and vibration mitigation and management measures that can be applied on-site to avoid or minimise noise and vibration impacts and how these would be implemented;
- Establishes a procedure to manage high noise and vibration generating works, including for piling close to neighbouring buildings; and
- Outlines a noise and vibration verification program, including a process to manage and resolve exceedance of noise and vibration limits;
- Describes the community consultation that would be undertaken during construction and a system for managing complaints, should they occur.

Operational noise and vibration impacts do not fall within the scope of this CNVMP and therefore are not included within the processes contained within this NVMP.

2 Purpose, objectives and expertise

2.1 Purpose

The purpose of this CNVMP is to describe how FDC Building proposes to manage potential noise and vibration impacts during construction of the Project.

Construction of any relevant stage of the development will not commence until this CNVMP is approved by the Planning Secretary. The most recent version of this CNVMP approved by the Planning Secretary will be implemented for the duration of construction.

2.2 Objectives

The key objective of the CNVMP is to ensure all environmental safeguards, management measures, environmental protection and license/permit requirements relevant to noise and vibration are described, scheduled and assigned responsibility as outlined in the:

- The Project's SSD Application (SSD-47601708);
- The Project's licenses and approvals (once issued); and
- All relevant legislation and other requirements described in Section 3.1 of this CNVMP.

2.3 Specialist consultants

Renzo Tonin & Associates (RT&A) has been engaged to prepare this CNVMP. RT&A is a member of the Association of Australasian Acoustic Consultants. RT&A has extensive experience in the assessment, mitigation and management of construction noise and vibration (www.renzotonin.com.au).

This provides assurance to relevant stakeholders that RTA and its staff have the required competencies, procedures and extensive experience to undertake noise and vibration assessments in accordance with all relevant policies, guidelines and standards in an efficient and effective manner.

3 Environmental requirements

3.1 Legislation

This CNVMP is prepared in accordance with the:

- Environmental Planning and Assessment Act 1979
- Protection of the Environment Operations Act 1997 *(POEO Act)*
- Environmental Planning and Assessment Amendment (Part 3A Repeal) Act 2011

Refer to the CEMP for further details.

3.2 Guidelines

The main guidelines, specifications, and policy documents relevant to this CNVMP include:

- NSW Interim Construction Noise Guideline (ICNG), Department of Environment and Climate Change 2009;
- NSW Road Noise Policy, Dept. of Environment, Climate Change and Water 2011;
- NSW Environmental criteria for road traffic noise, Environment Protection Authority 1999;
- NSW Noise Policy for Industry (NPfI), Environment Protection Authority 2017;
- NSW Assessing Vibration – a technical guideline (AVTG), Department of Environment and Conservation 2006;
- Australian Standard AS/NZS 2107:2000 Acoustics - Recommended design sound levels and reverberation times for building interiors;
- Australian Standard AS2436-2010 Guide to noise and vibration control on construction, demolition and maintenance Sites;
- British Standard BS 6472-2008, 'Evaluation of human exposure to vibration in buildings (1-80Hz);
- British Standard BS7385: Part 2-1993 'Evaluation and measurement of vibration in buildings'; and
- German Standard DIN4150-2016 Structural vibration Part 3: Effects of vibration on Structures.

3.3 Requirements of SSD Application (SSD-47601708)

The SSD Application requires the CNVMP to include the following requirements (Table 3.1).

Table 3.1: SSD-47601708 requirements for CNVMP

Condition number	SSD Application (SSD-47601708) Requirement	Corresponding sections in this CNVMP
B.18	The development must be constructed to achieve the construction noise management levels detailed in the Interim Construction Noise Guideline (DECC, 2009) (as may be updated or replaced from time to time). All feasible and reasonable noise mitigation measures must be implemented and any activities that could exceed the construction noise management levels must be identified and managed in accordance with the management and mitigation measures in the Construction Noise and Vibration Management Plan required under condition B19 and in Appendix 2.	Section 5.2 and Section 7
B19. (a)	Be prepared by a suitably qualified and experienced noise expert(s)	Section 2.3
B19. (b)	Describe procedures for achieving the noise management levels in the *Interim Construction Noise Guideline* (DECC, 2009) (as may be updated or replaced from time to time)	Section 5, 5.2, 5.4 and 7
B19. (c)	Include strategies that have been developed in consultation with Sydney Water to manage construction vibration on the Alexandra Canal	Section 5.3.4, Section 6.2.3.2 and Section 7
B19. (d)	Include Strategies that have been developed with the community for managing high noise generating works, including piling in close proximity to 24-26 Burrows Road and 32 Burrows Road	Section 7, 7.2
B19. (e)	Describe the community consultation that would be undertaken during construction, including consultation with directly adjoining sites undertaken to develop the strategies in condition B19. (d)	Section 7.5
B19. (f)	Include a complaints management system that would be implemented for the duration of the development.	Section 8.5
B20. (a)	The Applicant must not commence construction of any relevant stage of the development until the Construction Noise and Vibration Management Plan required by condition B19 is approved by the Planning Secretary.	Section 2.1
B20. (b)	The Applicant must implement the most recent version of the Construction Noise and Vibration Management Plan approved by the Planning Secretary for the duration of construction.	Section 2.1
B22. (a)	Vibration caused by construction at any residences or structure outside the site must be limited to: for structural damage, latest version of DIN 4150-3)1992-02) Structural vibration – Effects of vibration on structures (German Institute for Standardisation, 1999)	Section 5.3.2
B22. (b)	Vibration caused by construction at any residences or structure outside the site must be limited to: for human exposure, the acceptable vibration values set out in the Environmental Noise Management Assessing Vibration: a technical guideline (DEC, 2006)(as may be updated or replaced from time to time)	Section 5.3.1
B23.	The limits in condition B22 apply unless otherwise outlined in a Construction Noise and Vibration Management Plan, approved as part of the CEMP required by condition C2 of the SSD Application.	Section 5.3

4 Existing environment

4.1 Sensitive receivers

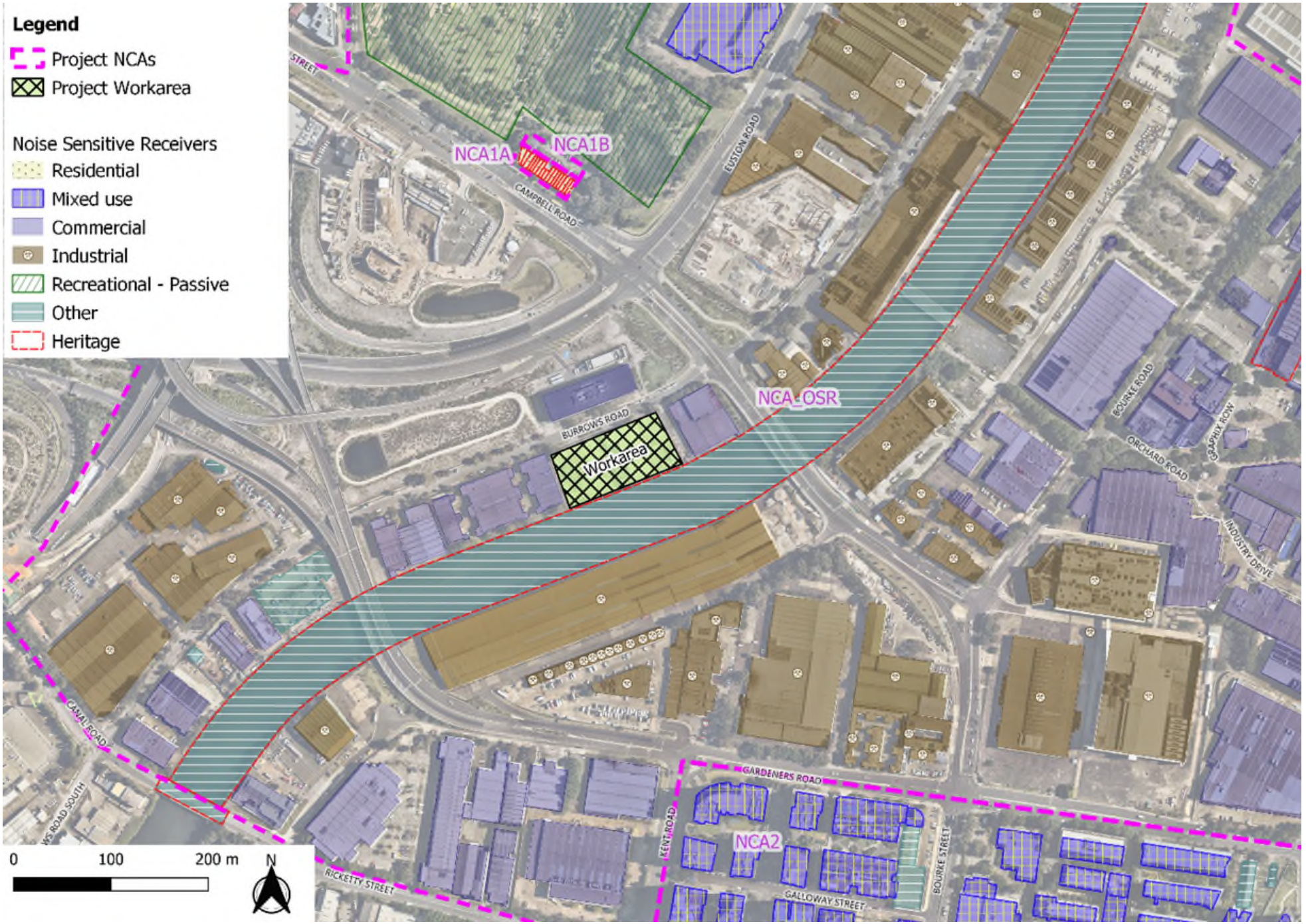
The Project site is located at 28-30 Burrows Road, St Peters in the City of Sydney Local Government Area (LGA). The site is located within the General Industrial zone (IN1) and is surrounded by commercial and industrial receivers to the north, east, west and Alexandra Canal to the south.

The nearest receivers are outlined below:

- To the west, at 24-26 Burrows Road are commercial/ industrial receivers located less than 10 metres from the works area. There are offices associated with each of the units, including
    - Unit 13 Specialist Tunnel Excavation (supply bulk rock excavation services)
    - Unit 14 H Advanced Welco P/L (welding supply store)
    - Unit 15 CoxGomyl Australia P/L (provide facade access solutions)
    - Unit 16 Al & Co (Interior and Graphic creative design studio).
- To the east, there are commercial/ industrial receivers adjacent to the site's boundary at 32-34 Burrows Road (SATO Vicinity Pty Ltd), approx. 30 m from the works area.
- To the north, directly opposite the site at 33 Burrows Road is the Westconnex Transurban MCC Main Office.
- Along the southern boundary of the Project site is the heritage listed Alexandra Canal. There is a commercial/ industrial building on the south side of the canal.
- The nearest residences are located approximately 250 metres to the north of the site on Campbell Road. There are residences located approximately 320 metres to the south-east in multistorey residential apartment complexes in Mascot, with the nearest residences on the corner of Gardeners Road and Kent Road. These receivers are up to 12 storey high residential towers with line-of-sight from the upper floor to the development site.

Existing land uses are identified in Figure 4-1.

Figure 4-1:Existing land uses and NCAs



4.2 Noise Catchment Areas (NCAs)

The NVIA grouped residential receivers into Noise Catchment Areas (NCAs) based upon areas with similar acoustic environments. This has been done to assist with the assessment and allocate the appropriate project noise management levels to each receiver. NCA1 has been subdivided into NCA1A and NCA1B for residences on Campbell Road as the acoustic environment changes between the front the rear of these properties, where is NCA1A fronts Campbell Road and NCA1B is the rear yard area.

The identified NCAs for the Project are shown in Figure 4-1.

4.3 Ambient noise

4.3.1 Unattended noise monitoring

Ambient noise monitoring was completed at four monitoring locations as part of the NVIA between 15 and 28 June 2022 (Logger 1, 2 and 3) and 19 November 2021 and 12 December 2021 (Loggers 4). Noise measurements have been carried out at both the nearest and potentially most affected locations surrounding the Project. This has included residential receiver locations on Campbell Road, in addition to receivers located on the multi-storey apartment complexes on Gardeners Road. These monitoring locations were adopted to determine the variation in background and ambient noise level at all potentially impacted nearby receivers.

A summary of the unattended noise logging results is provided in Table 4.1, which is sourced from the NVIA. The noise monitoring locations are shown in Figure 4-2. The Rating Background Level (RBL) is the overall single-figure background noise level measured in each relevant assessment period (during or outside the normal working hours – see Section 5.1). The term and methodology to obtain RBLs is described in detail within the Noise Policy for Industry (NPfI).

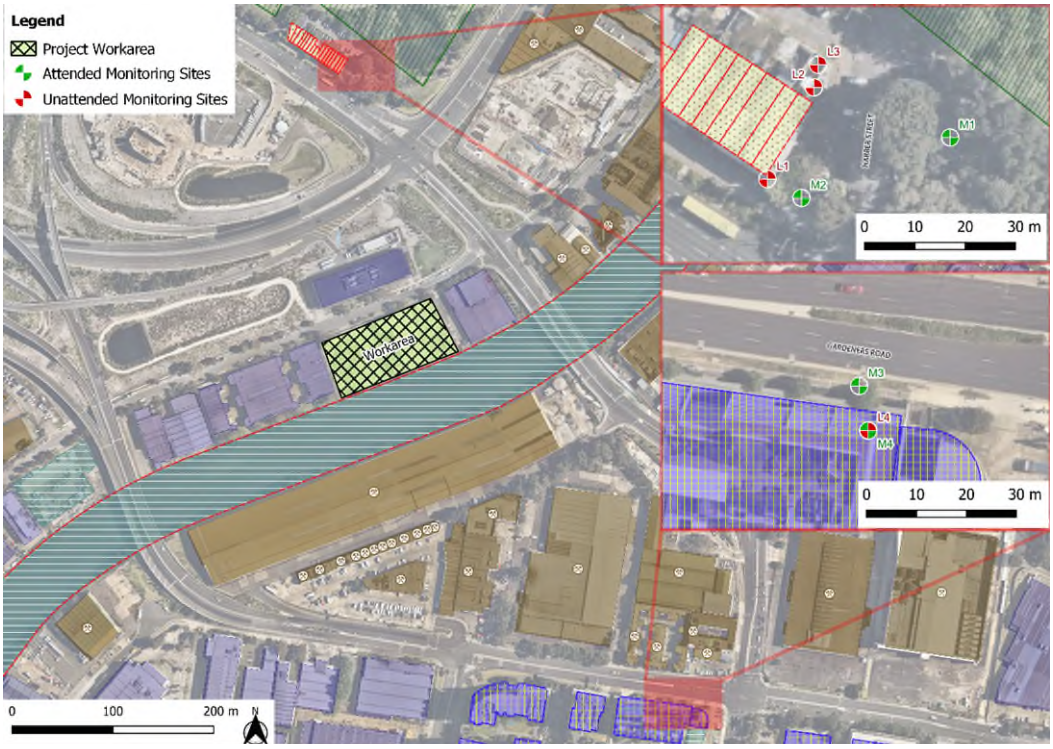
Table 4.1: Summary of baseline noise monitoring data from NVIA

Applicable NCA		NCA1A	NCA1B	NCA1B	NCA2
Monitor ID (REF)		Logger 1	Logger 2	Logger 3	Logger 4
Monitoring Address		34 Campbell Road, Alexandria (Front yard)	34 Campbell Road, Alexandria (Rear yard, 3.5m high)	34 Campbell Road, Alexandria (Rear yard, 1.5m high)	659 Gardeners Road, Mascot
Observations regarding noise environment		The ambient noise level was contributed to by road traffic on Campbell Road, distant traffic movements along Euston Road and aircraft noise. Background noise controlled by natural sources (birds etc.) and distant traffic noise from Euston Road.			Day: Controlled by constant road traffic on Gardeners Road and Bourke Road. Occasional aircraft fly over, and distant aircraft noise. Night: Controlled by intermittent road traffic on Gardeners Road, Bourke Road and Campbell Road with contributions from nearby industrial activities and mechanical plant.
	Day[1]	59	53	49	56
	Evening[2]	57	52	47	51

Applicable NCA		NCA1A	NCA1B	NCA1B	NCA2
Rating Background Level (RBL)	Night[3]	50	46	41	47
	Shoulder[4]	53	49	45	49

Notes:
1. DAY is the period from 7am to 6pm (Monday to Saturday) and 8am to 6pm (Sundays and Public Holidays)
2. EVENING is the period from 6pm to 10pm
3. NIGHT is the period from 10pm to 7am (Monday to Saturday) and 10pm to 8am (Sundays and Public Holidays)
4. Morning shoulder: 5am to am (Monday to Saturday) and 5am to 8am (Sundays & Public Holidays)

Figure 4-2: Noise monitoring locations



4.3.2 Attended noise monitoring

Additionally, attended short-term noise monitoring was undertaken to confirm and characterise the existing ambient noise environment at the receiver locations. The locations of the attended noise monitoring are presented in Figure 4-2. The attended measurements generally found that existing noise levels are typically dominated by transportation noise sources, particularly road traffic.

5 Noise and vibration criteria for NSW

5.1 Construction hours

5.1.1 Normal working hours

In accordance with condition B16. of SSD-47601708, construction working hours are from Monday to Friday between 7.00 am to 6.00 pm and Saturday between 8.00 am to 1.00 pm.

5.1.2 Work outside normal working hours

Construction works outside normal working hours identified in Section 5.1.1 above may be undertaken in the following circumstances, consistent with condition B.17:

- Works that are inaudible at the nearest sensitive receivers or
- Works agreed to in writing by the Planning Secretary; or
- For the delivery of materials required outside these hours by the NSW Police Force or other authorities for safety reasons; or
- Where it is required in an emergency to avoid the loss of lives, property or to prevent environmental harm.

5.2 Construction noise objectives

As required by condition B18. of SSD-47601708, the development must be constructed to achieve the construction noise management levels detailed in the NSW Interim Construction Noise Guideline [2] (ICNG). The ICNG provides guidelines for the assessment and management of airborne construction noise. The ICNG focuses on applying a range of work practices to minimise construction noise impacts rather than focusing on achieving numeric noise levels.

The main objectives of the ICNG are to:

- Identify and minimise noise from construction works;
- Focus on applying all 'feasible' and 'reasonable' work practices to minimise construction noise impacts;
- Encourage construction during normal working hours only, unless approval is given for works that cannot be undertaken during these hours;
- Reduce time spent dealing with complaints at the project implementation stage; and
- Provide flexibility in selecting site-specific feasible and reasonable work practices to minimise noise impacts.

5.2.1 Residential receivers

Table 5.1 below, which was sourced from the ICNG, shows how noise management levels (NMLs) at residential receivers are determined and how they are to be applied. The RBL (see Section 4.3) is used when determining the NML.

Table 5.1: Airborne Noise Management Levels (NMLs) at Residential Receivers

Time of Day	Noise Management Level (NML) $L_{Aeq\ (15min)}$	How to Apply
Normal working hours: • Monday to Friday 7 am to 6 pm • Saturday 8 am to 1 pm	Noise affected RBL + 10 dB(A)	The noise affected level represents the point above which there may be some community reaction to noise. Where the predicted or measured $L_{Aeq\ (15\ min)}$ 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 residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75dB(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, **FDC Building** would carefully consider other ways to reduce noise to below this level. If no quieter work method is feasible or reasonable and the works proceed, the proponent would provide respite periods and communicate with the impacted residents.
Outside normal working hours	Noise affected RBL + 5 dB(A)	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 above the noise affected level, additional noise mitigation measures should be applied in accordance with RMS CNVG.

Some residential receivers may have been provided (by past projects or independently designed-and-built) with at-property treatments which allow windows to be fixed or kept closed. In these cases, the noise benefit achieved by the property treatment can be considered in the assessment of airborne construction noise impacts at these individual receivers and the external noise management levels can be conservatively increased by 10dB. Higher adjustments may be adopted, if a qualified acoustic consultant has determined that windows and facades of individual buildings provide a higher level of sound attenuation than 20dB and if it can be demonstrated or reasonably assumed that the windows are fixed or kept closed.

FDC Building may determine if specific receivers have benefitted from at-property treatments. The CNVMP would be updated to include any modifications to the external noise management levels. The Planning Secretary must approve any modifications to the CNVMP.

5.2.1.1 Sleep disturbance

The ICNG recommends that where construction works are planned to extend over more than two consecutive nights, maximum noise levels and the extent and frequency of maximum noise level events exceeding the RBL should be considered.

In line with the ICNG, further guidance is taken from the NSW *Road Noise Policy (Department of Climate Change and Water, 2011) (RNP),* as this document has superseded the NSW *Environmental Criteria for Road Traffic Noise* (ECRTN) (Environment Protection Authority 1999). The potential for both sleep disturbance and awakenings should be considered in the assessment.

To assess the likelihood of sleep disturbance, an initial screening level of $L_{Amax} < L_{A90(15min)} + 15$ dB(A) is used. This is an external noise level, while receivers will be located inside when there is potential for sleep disturbance impacts. In situations, where this results in an internal screening levels of less than 45 dB(A) (internal), a minimum internal screening level of 45 dB(A) is set.

When considering awakening reactions, the RNP includes a review of internal sleep arousal research and concluded that:

- LAmax (the maximum A-weighted noise level) internal noise levels below 50–55 dB(A) are unlikely to awaken people from sleep (corresponding to approximately 60-65 dB(A) external noise level with an open window)
- One or two noise events per night, with maximum internal noise levels of 65–70 dB(A) (corresponding to approximately 75–80 dB(A) external noise level assuming an open window), are not likely to affect health and wellbeing substantially.

Typically when considering internal noise impacts using a conservative 10 dB(A) reduction from external noise levels to internal noise levels is assumed considering an open window in line with the ICNG, which is not always the case and could be greater especially in the case that the receivers have a closed windows/facade. Sealed facades or facades with windows closed can provide external to internal noise reductions much greater than 10 dB(A). Noise reductions greater than 20–25 dB(A) are achievable where facades consist of standard to thick glazing and heavy facade construction (eg. brick construction).

Where there are noise events found to exceed the initial screening level, further analysis is then made to identify:

- The likely number, nature, distribution and frequency of events above the screening level that might occur during the night assessment period
- Whether events exceed an 'awakening reaction' level of 55 dB(A) L_{Amax} (internal) (that equates to an external NML of L_{Amax} 75 dB(A), assuming closed windows).

Sleep disturbance screening and awakening criteria is provided in Table 5.2 below.

5.2.1.2 Adopted Project noise management levels for residential receivers

Adopted from the NVIA, Table 5.2 shows the NMLs for residential receivers for each of the NCAs shown and described in Section 4.1.

Table 5.2: NMLs for residential receivers from NVIA

NCA	Receiver type	Noise management level $L_{Aeq(15min)}$[1]					Sleep disturbance screening level, L_{Amax}[2]		Awakening reaction screening level, L_{Amax}[2]
		Day (Standard)[4]	Day (OOHW)[5]	Evening[6]	Night[7]	Shoulder[8]	Night[7]	Shoulder[8]	Night/shoulder
NCA1A	Residential	69	64	62	55	58	65	68	75
NCA1B	Residential	59	54	52	46	50	56	60	75
NCA2	Residential	66	61	56	52	54	62	64	75

Notes:

1. Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5m above ground level. If the property boundary is more than 30m 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.
2. Noise management level applies at the facade of the dwelling.
3. Construction hours for the Project are detailed in Section 5.1.1.
4. Day (standard) is the period from 7am to 6pm (Monday to Saturday) and 8am to 6pm (Sundays and Public Holidays)
5. Day (OOHW) is the period from 1pm to 6pm (Saturdays) and 8am to 6pm (Sundays and Public Holidays)
6. Evening is the period from 6pm to 10pm
7. Night is the period from 10pm to 7am (Monday to Saturday) and 10pm to 8am (Sundays and Public Holidays)
8. Morning shoulder: 5am to 7am (Monday to Saturday) and 5am to 8am (Sundays and Public Holidays)

5.2.2 Other sensitive receivers

The ICNG provides NMLs for commercial and industrial premises and 'other sensitive' land uses (ICNG, Table 3). The NMLs for other noise sensitive receivers not listed in the ICNG that are applicable to the Project, such as hotels and libraries, are derived from AS/NZS 2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors and the AAAC Guideline for Child Care Centre Acoustic Assessment. The management levels from AS2107 are upper range levels to account for the variable and short-term nature of construction noise.

The NMLs for other sensitive receivers (non-residential) are summarised in Table 5.3.

Table 5.3: NMLs for other sensitive receivers (non-residential)

Land Use	NML $L_{Aeq(15min)}$	Where NML applies	Referenced from:	Assumed facade loss (conservative)	External equivalent NML - $L_{Aeq(15min)}$
Cinema space, theatre, auditorium	35 dB(A)	Internal noise level	AS2107 'maximum'	20 dB(A)	55 dB(A)
Hotel (Sleeping areas: Hotels near major roads)	40 dB(A)	Internal noise level	AS2107 'maximum'	20 dB(A)	60 dB(A)
Classrooms at schools and other educational institutions	45 dB(A)	Internal noise level	ICNG	10 dB(A)	55 dB(A)
Places of worship	45 dB(A)	Internal noise level	ICNG	10 dB(A)	55 dB(A)
Community centres – Municipal Buildings	50 dB(A)	Internal noise level	AS2107 'maximum'	10 dB(A)	60 dB(A)
Restaurant, bar (Bars and lounges/ Restaurant)	50 dB(A)	Internal noise level	AS2107 'maximum'	20 dB(A)	70 dB(A)
Passive recreation (e.g. area used for reading, meditation)	60 dB(A)	External noise level	ICNG	-	60 dB(A)
Active recreation (e.g. sports fields)	65 dB(A)	External noise level	ICNG	-	65 dB(A)
Commercial premises (including offices and retail outlets)	70 dB(A)	External noise level	ICNG	-	70 dB(A)
Industrial premises	75 dB(A)	External noise level	ICNG	-	75 dB(A)

5.2.3 Annoying noise

The Interim Construction Noise Guideline identifies 'particularly annoying' activities that require the addition of 5 dB(A) to the predicted level before comparing to the construction Noise Management Level. Annoying activities identified in the ICNG may include:

- use of 'beeper' style reversing or movement alarms, particularly at night-time;
- use of power saws, such as used for cutting timber, rail lines, masonry, road pavement or steel work;
- grinding metal, concrete or masonry;
- rock drilling;
- line drilling;
- vibratory rolling;
- rail tamping and regulating;
- bitumen milling or profiling;
- jackhammering, rock hammering or rock breaking; and
- impact piling.

Where monitoring has confirmed that activities described above do not possess annoying characteristics in accordance with the ICNG (e.g. tonality or impulsive), the above addition of 5 dB(A) will not apply (see Noise and Vibration Monitoring Program Section 8.3).

5.3 Construction vibration objectives

5.3.1 Disturbance to building occupants

As required by condition B22(b) of SSD-47601708, vibration, with the potential to disturb human occupants of buildings at any residence or structure outside the site must be limited to DECC's Assessing Vibration: a technical guideline [6](AVTG). This document provides criteria which are based on the British Standard BS 6472-2008 Evaluation of human exposure to vibration in buildings (1-80Hz).

Intermittent vibration criteria for human comfort, such as from drilling, compacting or other sources which operate intermittently, but which would produce continuous vibration if operated continuously, is presented in Table 5.4. This type of vibration is assessed using vibration dose values (VDV) and is identified as the most likely source of vibration impacts on the Project.

Table 5.4: Vibration dose value criteria for intermittent vibration

Building type	Assessment period[1]	Vibration dose values ($m/s^{1.75}$)	
		Preferred	Maximum
Critical working areas (eg operating theatres or laboratories)[2]	Daytime or night-time	0.10	0.20
Residential	Daytime	0.20	0.40
	Night-time	0.13	0.26
Offices, schools, educational institutions, places of worship	Daytime or night-time	0.40	0.80
Workshops	Daytime or night-time	0.80	1.60

Notes: 1. Daytime is 7.00 am to 10.00 pm and night-time is 10.00pm to 7.00 am

2. Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. There may be cases where sensitive equipment or delicate tasks require more stringent criteria than the human comfort criteria specify above. Source: BS 6472-2008

Continuous vibration from uninterrupted sources is assessed using weighted rms acceleration values presented in Table 5.5. Project activities are generally not anticipated to result in continuous vibration impacts.

Impulsive vibration can be defined as up to three instances of sudden impact per monitoring period, such as dropping heavy items. Impulsive vibration is assessed using acceleration values presented in Table 5.5.

Table 5.5: Preferred and Maximum Weighted Root Mean Square Values for Continuous and Impulsive Vibration Acceleration (m/ s2) 1-80Hz

Location	Assessment period[1]	Preferred values		Maximum values	
		Z-axis	X- and Y-axis	Z-axis	X- and Y-axis
Continuous vibration (rms acceleration, m/s^2)					
Critical working areas (eg operating theatres or laboratories)[2]	Daytime or night-time	0.0050	0.036	0.010	0.0072
Residential	Daytime	0.010	0.0071	0.020	0.014
	Night-time	0.007	0.005	0.014	0.010
Offices, schools, educational institutions, places of worship	Daytime or night-time	0.020	0.014	0.040	0.028
Workshops	Daytime or night-time	0.04	0.029	0.080	0.058
Impulsive vibration (rms acceleration, m/s^2)					
Critical working areas (eg operating theatres or laboratories)[2]	Daytime or night-time	0.0050	0.0036	0.010	0.0072
Residential	Daytime	0.30	0.21	0.60	0.42
	Night-time	0.10	0.071	0.20	0.14
Offices, schools, educational institutions and places of worship	Daytime or night-time	0.64	0.46	1.28	0.92
Workshops	Daytime or night-time	0.64	0.46	1.28	0.92

Notes: 1. Daytime is 7.00 am to 10.00 pm and night-time is 10.00pm to 7.00 am

2. Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. There may be cases where sensitive equipment or delicate tasks require more stringent criteria than the human comfort criteria specify above. Source: BS 6472-2008

5.3.2 Structural damage to buildings

Condition B22(a) of SSD-47601708 requires vibration caused by construction at any residence or structure outside the site must be limited for structural damage to the German Standard DIN 4150: Part 3-2016 Structural vibration – Effects of vibration on structures [9].

This CNVMP recommends that potential structural damage of buildings as a result of vibration is typically managed by ensuring vibration induced into the structure does not exceed certain limits and standards, such as British Standard BS7385 Part 2-1993 Evaluation and measurement for vibration in buildings Part 2 [8] for industrial and heavy commercial buildings and for residential or light commercial type buildings. For heritage structures identified through a building condition report as 'unsound', the German Standard DIN4150-3 would be used. Currently there is no existing Australian Standard for assessment of structural building damage caused by vibration energy.

The cosmetic damage levels set by BS7385 are considered 'safe limits' up to which no damage due to vibration effects has been observed for certain particular building types. Table 5.6 sets out the recommended vibration limits from BS7385 for transient vibration to ensure minimal risk of cosmetic damage to residential, commercial and industrial buildings and is frequency dependent and specific to particular categories of structure.

Table 5.6: BS 7385 Transient vibration values for minimal risk of damage

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

5.3.3 Vibration screening criteria

The limits presented in Table 5.6 above relate predominantly to transient vibration which does not give rise to resonant responses in structures, and to low-rise buildings. Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, then the guide values in Table 5.6 may need to be reduced by up to 50 percent. This is especially applicable at the lower frequencies where lower guide values apply.

On this basis, consistent a conservative vibration screening criteria per receiver type is given below:

- Reinforced or framed structures (Line 1): 25.0 mm/s
- Unreinforced or light framed structures (Line 2): 7.5 mm/s

At locations where the predicted and/or measured vibration levels are greater than shown above (peak component particle velocity), a more detailed analysis of the building structure, vibration source, dominant frequencies and dynamic characteristics of the structure would be required to determine the applicable safe vibration level. The analysis would take into consideration the transient vibration guide values for minimal risk of cosmetic damage set out in Table 5.6.

5.3.4 Damage to buried services

Section 5.3 of DIN 4150-3:2016 also sets out guideline values for vibration velocity to be used when evaluating the effects of vibration on buried pipework. These values, which apply at the wall of the pipe, are reproduced and presented in Table 5.7 below.

Table 5.7:: DIN 4150-3:1999 Guideline values for vibration velocity to be used when evaluating the effects of short-term vibration on buried pipework

Line	Pipe Material	Guideline values for vibration velocity measured on the pipe, mm/s
1	Steel (including welded pipes)	100
2	Vitrified clay, concrete, reinforced concrete, prestressed concrete, metal (with or without flange)	80
3	Masonry, plastics	50

For long-term vibration the guideline levels presented in Table 5.7 should be halved.

Recommended vibration goals for electrical cables and telecommunication services such as fibre optic cables range from between 50 mm/s and 100 mm/s. It is noted however that although the cables may sustain these vibration levels, the services they are connected to, such as transformers and switch blocks, may not.

It is recommended that should such equipment be encountered during the construction process an individual vibration assessment should be carried out. This may include a specific vibration impact statement addressing impact on the utility and consultation with the utility provider to confirm specific vibration requirements.

5.3.5 Heritage items

The German Standard DIN 4150 [9] provides a conservative criterion for vibration limits for different buildings and has been used to identify the vibration criteria for heritage structures. The German standard values for peak particle velocity (PPV) (mm/s) measured at the foundation of the building are summarised in Table 5.8.

Table 5.8: DIN 4150-3 guideline values for short-term vibration on structures

Group	Type of structure	Guideline values vibration velocity (mm/s)				
		Foundations, all directions at a frequency of:			Topmost floor, horizontal	Floor slabs, vertical
		1 to 10Hz	10 to 50Hz	50 to 100Hz	All frequencies	All frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 30	40 to 50	40	20
2	Residential buildings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20	15	20
3	Structures that because of their particular sensitivity to vibration, cannot be classified into Group 1 or 2 and are of great intrinsic value e.g. heritage listed buildings	3	3 to 8	3 to 8	8	20

As noted in British Standard BS 7385, heritage buildings and structures should not be assumed to be more sensitive to vibration, unless structurally unsound. A building or structure condition survey should be used to confirm whether any heritage item potentially impacted by vibration is sound or unsound. In the absence of a condition report, or where the report finds the building or structure to be 'unsound'. The German Standard DIN4150 Group 3 guideline values shall be used to manage impacts for heritage buildings/structures. Where the heritage building or structure is confirmed as 'sound', vibration limits applicable to the type of building or structure can be applied, as per Section 5.3.2 and 5.3.4.

Alexandra Canal

An interim survey and vibration monitoring plan[2] has been prepared to manage any construction impacts to the Alexandra Canal. Pending on the outcome of a Sydney Water Major Works application, the monitoring plan recommended a conservative vibration limit of 3 mm/s peak particle velocity for the structure. Given that plant operating within the confines of the site are likely to produce vibration levels above 3 mm/s, a more appropriate vibration limit for the structure of 8 mm/s should be considered. Furthermore, ongoing survey monitoring has verified no impact on the structure during the completion of demolition and remediation works completed under a Complying Development Certificate and SEPP65 approvals respectively.

The canal is fully supported and partially buried. A more reasonable vibration limit is the DIN4150 guideline value for buried services (masonry). As outlined in Section 5.3.4, for long-term vibration the guideline values should be halved, resulting in a vibration limit of 25 mm/s PPV. Note that application of this limit is subject to a condition report confirming that the canal is sound, as per Section 5.3.5 above.

A 4.85m exclusion zone is currently in place for any plant and equipment adjacent to the canal until Sydney Water provide further advice. Any change to the vibration criteria would be determined in consultation with Sydney Water.

The condition of the canal varies along the extent of the Project boundary and different opportunities to rectify any cosmetic damage to the canal are available.

5.4 Construction-related road traffic noise

When trucks and other vehicles are operating within the boundary of a construction site, road vehicle noise contributions are included in the overall predicted $L_{Aeq(15minute)}$ construction site noise emissions. When construction-related traffic moves onto the public road network, a different noise assessment methodology is appropriate, as vehicle movements would be regarded as 'additional road traffic' rather than as part of the construction site.

The community may associate heavy vehicle movements with the Project works, when vehicles are travelling on roads located immediately adjacent to construction sites. However, once the heavy vehicles move further from construction sites onto major collector or arterial roads, the noise may be perceived as being part of the general road traffic.

The Project will be using sub-arterial / arterial roads and not local roads. Therefore, for existing residences affected by additional traffic on existing sub-arterial / arterial roads generated by land use developments, the following RNP road traffic noise criteria would apply.

[2] Reference: Vibration and Deflection Monitoring Plan for Proposed Demolition and Construction 28-30 Burrows Road, St Peters NSW, P2721_01 rev1 Monitoring Plan, dated 26 October 2022

Table 5.9: RNP road traffic noise criteria, dB(A)

Road Category	Type of Project/Land Use	Assessment criteria, dB(A)	
		Day 7am – 10pm	Night 10pm – 7am
Freeway/arterial/sub-arterial roads	3. Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq,(15\ hour)}$ 60 (external)	$L_{Aeq,(9\ hour)}$ 55 (external)

Further to the above, the RNP states the following for land use developments generating additional traffic:

> *"For existing residences and other sensitive land uses affected by* **additional traffic on existing roads generated by land use development***, any increase in the total traffic noise level should be limited to 2 dB above that of the corresponding 'no build option'."*

The RNP states that in assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person.

6 Construction noise and vibration assessment

6.1 Construction activities

The proposed construction activities to be undertaken by FDC Building are shown in Table 6.1.

Table 6.1: Proposed construction activities

Proposed construction activities	Equivalent NVIA/DNVA activity	Construction hours
Minor demolition	Demolition works	Normal working hours[1]
Bulk cut to fill and VEMN importation and compaction	Surface preparation works	Normal working hours
CFA and CMC piling	CMC piling	Normal working hours
Detail excavation and in-ground services	Surface preparation works	Normal working hours
Slab on ground and suspended slabs / precast facade panels	Building construction	Normal working hours
Structural steel	Building construction	Normal working hours
Roofing and light weight facade	Building construction	Normal working hours
External works including rimming and grading and installation of concrete external pavements	Building construction	Normal working hours
Landscaping	Surface preparation works	Normal working hours
Stormwater diversion and other public domain works such as service connections, new driveway crossovers, footpaths, and landscape	Utility, stormwater, infrastructure and services augmentation works	Normal working + OOHW[2] (TBC)

Notes:

1. Normal working hours is defined in Section 5.1.1
2. 'OOHW' means out of hours work, i.e. work outside normal working hours. OOHW permitted where Section 5.1.2 requirements are met.

The proposed construction activities are generally consistent with the activities considered in the NVIA. However, FDC Building is proposing an alternative piling methodology (CFA and CMC piling, as opposed to impact piling) which is expected to result in significantly less noise and vibration impacts than those stated in the NVIA (Section 1.2).

6.2 Construction noise and vibration impacts summary (NVIA)

6.2.1 Construction noise

Section 4.3 of the NVIA presented and discussed the noise impacts associated with the proposed works.

During normal working hours, noise levels are generally predicted to comply with the NMLs for nearby affected residential receivers. However, where high noise impact generating plant and equipment is in use such as rock breakers, noise levels are predicted to be up to 8 dB(A) above the NMLs. This would only occur where there is direct line of sight to residences on Campbell Road. For a large portion of the site, the WestConnex Transurban MCC Main Office provides shielding to these residences. Therefore, impacts would typically be less than the worst-case scenario presented. For residences on Gardeners Road, noise levels are predicted to comply with the NMLs.

The commercial and industrial receivers surrounding the site are generally predicted to experience construction noise above the relevant NMLs for high noise generating works. Impacts would be greatest during utility and piling works. Mitigation and management measures shall be implemented to manage high noise generating works, including piling works close to 24-26 Burrows Road and 32 Burrows Road, as required by Condition B19(d) of SSD-47601708.

Construction work outside normal working hours is not programmed. There may be a need for some activities (e.g. stormwater diversion and other public domain works such as service connections, new driveway crossovers, footpaths, and landscape) to be undertaken outside normal working hours. Work outside normal working hours is only permitted where the requirements of condition B.17 can be met, as outlined in Section 5.1.2. Should there be out of hours work required that have not been assessed in the NVIA, an additional assessment would be undertaken to ensure works are mitigated and managed in accordance with this CNVMP.

Generally, across the proposed demolition, concrete pours associated with surface preparation, building construction and building fitout works, where the construction works take place at the worst case locations within the construction area, the works are predicted to exceed the relevant NML. However, where the works are managed so as to occur in acoustically shielded locations, the impacts can generally be managed so as to achieve the NMLs at nearby residential receivers.

For the proposed CFA and CMC piling works, a detailed noise and vibration assessment[3] (DNVA) has assessed the noise impacts associated with the alternative piling methodology. Predicted noise levels from CFA and CMC piling works are below the NMLs at all nearby sensitive receivers, except for 24-26 Burrows Road when the piling work area is closest to the receiver.

Detailed predicted noise levels from the NVIA and DNVA are summarised in APPENDIX B. Reasonable and feasible mitigation measures for the proposed works are summarised in Section 7.

6.2.2 Construction traffic

Section 4.2.3 of the NVIA discussed the construction traffic associated with the project. The Project is located on Burrows Road and would be accessed via Campbell Road or Canal Road. The NVIA has assessed the construction noise traffic on public road would not cause any exceedance of the RNP noise goals. Nevertheless, additional noise mitigation measures will be implemented to aid in providing additional noise reduction benefits.

6.2.3 Construction vibration

Section 4.4.2 of the NVIA presented and discussed the vibration impacts associated with the proposed works. Section 3.3 of the DNVA presented and discussed the vibration impacts associated with the CFA and CMC piling works.

[3] Reference: TN074-02-1-02F01 28-30 Burrows Rd NVA, revision 1, dated 22 December 2022

For surface works activities, vibration intensive works including smooth drum vibratory roller are required. The minimum working distance for cosmetic damage to the nearest buildings, which are reinforced framed buildings, is five metres. If these buildings/ structures are within five metres to the work area, vibration levels may exceed the vibration objectives for cosmetic damage (Section 5.3.3).

Affected structures/properties are further identified in APPENDIX C. Where practicable, alternative less vibration intensive plant should be used (e.g. smaller vibratory rollers, operation of a vibratory roller in static mode or low vibration mode).

Vibration monitoring will be required where vibration intensive plant is required to operate within site specific minimum working distances (Section 7.4.2). Attended vibration measurements for human annoyance are proposed to be carried in response to vibration complaints (Section 7.4.1).

6.2.3.1 Adjacent commercial buildings

A detailed investigation into the driven piling methodology was undertaken in the DNVA and an alternative piling methodology was recommended. CFA and CMC piling method was recommended and has been adopted as the preferred piling methodology for the Project. the DNVA found there are no structures within the minimum working distance for cosmetic damage and human annoyance. Vibration monitoring shall be undertaken during the CFA and CMC piling works to verify the vibration levels at adjacent commercial buildings.

For the surface works activities, vibration intensive works including a smooth drum vibratory roller are required. The minimum working distance for cosmetic damage to the nearest buildings, which are reinforced framed buildings is five metres. If these buildings/ structures are within five metres to the work area, vibration levels may exceed the vibration objectives for cosmetic damage (Section 5.3.3).

Affected structures/properties are further identified in APPENDIX C. Where practicable, alternative less vibration intensive plant should be considered (e.g. smaller vibratory rollers, operation of a vibratory roller in static mode or low vibration mode). Vibration monitoring shall be undertaken where vibration intensive plant is required to operate within site specific minimum working distances (Section 7.4.2). Attended vibration measurements for human annoyance are proposed to be carried in response to vibration complaints (Section 7.4.1).

All reasonable and feasible mitigation measures for the proposed works are summarised in Section 7.

6.2.3.2 Alexandra Canal

The Alexandra Canal is located directly south of the site. This is a water-related infrastructure asset owned by Sydney Water.

The minimum working distance for a vibratory roller is between 10 to 15 metres for an unsound heritage structure. Alternative construction methodology is recommended to reduce the likely vibration impact on the structure, as discussed in Section 7.

Vibration monitoring shall be undertaken during these works to verify the vibration levels on the structure. In accordance with Condition B19 (c), additional vibration mitigation and management measures shall be implemented to manage the vibration impacts on the Alexandra Canal. Based on FDC Building vibration monitoring results, a more appropriate vibration criteria shall be determined in consultation with Sydney Water.

For the CFA and CMC piling works, the structure is outside the minimum working distance for cosmetic damage. Vibration monitoring shall be undertaken during the CFA and CMC piling works to verify the vibration levels on the structure.

6.3 Additional noise and vibration assessments (CNVIA)

If construction activities are expected to generate higher noise or vibration impacts than what have already been addressed in the NVIA and DNVA, or where OOHW are required, additional Construction Noise and Vibration Impact Assessments (CNVIA) will be prepared by an appropriately qualified and experienced acoustic consultant. The CNVIA will identify noise and vibration impact predictions and applicable reasonable and feasible mitigation and management measures.

7 Environmental control measures

7.1 Noise and vibration safeguards and management measures

In accordance with Condition B19 (b) and (d), the following noise and vibration safeguards and management measures shall be considered for achieving corresponding NMLs and managing high noise generating works.

Table 7.1: Project noise and vibration safeguards and management measures

Action required	Applies to	Details	Estimated benefit
At-source mitigation measures			
Equipment selection	Airborne noise Vibration	Use quieter and less noise/vibration emitting construction methods where feasible and reasonable. Where loud plant and/or equipment are being used in construction works, where feasible and reasonable the selection of alternative quieter plant and/or equipment should be considered for tasks.	Variable. Minimise noise/vibration impact and reduce risk of annoyance.
Equipment noise and vibration levels	Airborne noise Vibration	Plant and equipment must be properly maintained. Provide special attention to the use and maintenance of 'noise control' or 'silencing' kits fitted to machines to ensure they perform as intended. Additional detail provided in Section 7.3.	Variable. Minimise noise/vibration impact and reduce risk of annoyance.
Rental plant and equipment	Airborne noise Vibration	The noise levels of plant and equipment items are to be considered in rental decisions, with quieter and less noise/vibration emitting construction methods where feasible and reasonable. Plant and equipment noise levels should be at or below levels provided in Section 7.3.	Variable. Minimise noise/vibration impact and reduce risk of annoyance.
Use and siting of plant	Airborne noise Vibration	• Simultaneous operation of noisy plant within discernible range of a sensitive receiver is to be avoided. • The offset distance between noisy plant and adjacent sensitive receivers is to be maximised. • Plant used intermittently to be throttled down or shut down. • Noise-emitting plant to be directed away from sensitive receivers. • Any equipment not in use for extended periods during construction work must be switched off.	Up to 20 dB reduction + reduce vibration
Non-tonal and ambient sensitive reversing alarms	Airborne noise	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work. Consider the use of ambient sensitive alarms that adjust output relative to the ambient noise level.	5-10 dB reduction

Action required	Applies to	Details	Estimated benefit
Minimise disturbance arising from delivery of goods	Airborne noise	Loading and unloading of materials/deliveries is to occur as far as possible from sensitive receivers. Select site access points and roads as far as possible away from sensitive receivers. Dedicated loading/unloading areas to be shielded if close to sensitive receivers if possible. Delivery vehicles to be fitted with straps rather than chains for unloading, wherever possible.	Variable. Reduce noise/ vibration impact + risk of annoyance.
Silencers on mobile plant	Airborne noise	Where possible reduce noise from mobile plant through additional fittings including: - Residential grade mufflers - Air Parking brake engagement is silenced. Ensure plant including the silencer is well maintained. Additional detail provided in Section 7.3.	0-20 dB reduction Reduce annoyance + sleep disturbance.
Prefabrication of materials off-site	Airborne noise	Where practicable, pre-fabricate and/or prepare materials off-site to reduce noise with special audible characteristics occurring on site. Materials can then be delivered to site for installation.	5-20 dB reduction Reduce noise/vibration impact + risk of annoyance
Engine compression brakes	Airborne noise	Limit the use of engine compression brakes in residential areas. Ensure vehicles are fitted with a maintained original equipment manufacturer exhaust silencer or a silencer that complies with the National Transport Commission's 'In-service test procedure' and standard.	5-20 dB reduction
Path mitigation measures			
Subdivision of high noise/vibration generating work area	Airborne noise Vibration	Where practicable, high noise and vibration generating works should be undertaken in segmented work areas to manage the potential noise and vibration impacts to nearby sensitive receivers.	Reduce noise/vibration impact and reduce risk of annoyance
Construction hoarding as noise barrier	Airborne noise	Any construction hoarding shall be installed on each worksite shall be constructed as a noise barrier, where practicable to provide shielding to the nearest affected receivers.	Receiver **with** line of site of the works area: 5-10 dB reduction Receiver **without** line of site of the works area: 0-5 dB reduction
Site sheds	Airborne noise	Site sheds to be strategically located to provide shielding to nearby residences.	Receiver **with** line of site of the works area: 5-10 dB reduction
Laydown and stockpiling	Airborne noise	Locate laydown and staging areas within the construction area as far from residences as practicably possible.	Variable. Minimise noise impact and reduce risk of annoyance.
Shield stationary noise sources such as pumps, compressors etc	Airborne noise	Stationary noise sources should be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained. Appendix F of AS 2436: 1981 lists materials suitable for shielding.	5-10 dB reduction

Action required	Applies to	Details	Estimated benefit
Management measures			
Construction Environmental Management Plan update	Airborne noise Vibration	The CEMP including at minimum relevant section for construction noise and vibration management must be prepared prior to the commencement of construction and regularly updated to account for changes in noise and vibration management issues and strategies.	-
Implement stakeholder consultation measures	Airborne noise	Periodic notification (monthly letterbox drop and website notification) detailing all upcoming construction activities delivered to sensitive receivers at least 5 days prior to commencement of relevant works. In addition to Periodic Notification, the following strategies may be adopted to notify the community of upcoming works: • Letter drop	Keeps stakeholders informed of the likely impact. Community may identify solution to assist in managing impacts.
Site inductions	Airborne noise Vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: • All relevant project specific and standard noise and vibration mitigation measures • Permissible hours of work • Any limitations on noise generating activities with special audible characteristics • Location of nearest sensitive receivers • Construction employee parking areas • Designated loading/unloading areas and procedures • Site opening/closing times (including deliveries) • Environmental incident procedures.	Keeps construction workforce informed of actions required to minimise noise and vibration impact.
Construction hours and scheduling	Airborne noise Vibration	Where feasible and reasonable, construction should be carried out during the standard daytime working hours. Work generating high noise levels and vibration intensive plant identified within minimum working distances for human response should be scheduled during less sensitive time periods, such as after 8 am and before 6 pm. If the work cannot be undertaken during the day, it should be completed before 11 pm.	Minimise noise and vibration impact and reduce risk of annoyance.
Behavioural practices	Airborne noise	No swearing or unnecessary shouting or loud stereos/radios on site. No dropping of materials from height, throwing of metal items and slamming of doors. No excessive revving of plant and vehicle engines. Controlled release of compressed air.	0-20 dB reduction Reduce annoyance
Heavy vehicle routes	Airborne noise	Construction heavy vehicles and delivery vehicles should be scheduled during normal working hours where feasible and reasonable.	Minimises noise impacts
Noise monitoring	Airborne noise	Noise monitoring would be carried out in response to noise complaints, to assist in managing noise impacts.	Minimises noise impacts

Action required	Applies to	Details	Estimated benefit
Complaints management	Airborne noise Vibration	See Section 8.5 for further details. In addition to the noise mitigation measures outlined above, a management procedure will need to be put in place to deal with noise complaints that may arise from construction activities. Each complaint will need to be investigated and appropriate noise amelioration measures put in place to mitigate future occurrences, where the noise in question is in excess of allowable limits.	Minimise noise impact and reduce risk of annoyance.

7.2 Selection of quieter/less vibration intensive equipment

In accordance with Condition B19 (b), (c) and (d), it is noted that the assessed piling methodology in the NVIA was impact piling. However, FDC Building has proposed CFA and CMC piling methodology to undertake the piling works, which would result in significantly less noise and vibration impacts to nearby sensitive receivers.

In addition to the above, the following should be considered when vibration intensive plant is required to operate within the minimum working distances (see Section 7.4) for nearby structures:

- The use of smaller plant and hydraulic hammers;
- Hammering at 50% capacity in short bursts to prevent build-up of resonant frequencies;
- The use of low vibration techniques such as rotary grinders or chemical rock splitting.

7.3 Minimising noise impacts

7.3.1 Maximum noise levels for plant and equipment

The Sound Power Level represents the total noise output of operating plant and equipment. The Sound Power Level is used in computer noise models to predict Sound Pressure Levels at nearby receivers. When undertaking site compliance measurements, it is normally the Sound Pressure Level that is measured at a specified distance (typically 7m) from the plant or equipment.

Plant and equipment used for the Project should have Sound Power Levels which are no higher than the corresponding values shown in Table 7.2.

Table 7.2: Maximum Allowable Sound Power Levels for Construction Equipment from NVIA and DNVA

Plant item	Individual source/ activity sound power level (Lw re. 1pW), $L_{Aeq,15min}$, dB(A)	Individual source/ activity sound power level (Lw re. 1pW), L_{Amax}, dB(A)	Site establishment works	Demolition works	Utility and services works	Piling	Surface preparation works	Building construction	Building fit-out
Bobcat	102	110	-	-	-	-	-	✓	✓
CFA and CMC piling	106	112	-	-	-	✓	-	-	-
Concrete pump	103	106	-	-	✓	-	✓	✓	-
Concrete saw	1191	119	-	-	✓	-	-	-	-
Concrete truck	108	120	-	-	✓	-	✓	✓	-
Concrete vibrator	99	99	-	-	-	-	-	✓	-
Delivery trucks	108	120	-	-	-	-	-	✓	✓
Elevated Work Platform (EWP)	106	110	✓	-	✓	-	-	-	-
Franna crane	99	115	✓	✓	✓	-	✓	-	-
Hand tools	107	111	✓	✓	✓	-	✓	✓	✓
Hand tools (non-powered)	98	111	-	-	-	-	-	✓	✓
Mobile crane	105	115	-	-	-	-	-	✓	-
Roller (padfoot)	109	112	-	-	-	-	✓	-	-
Scissor lift	99	105	-	-	-	-	-	-	✓
Small truck	104	115	✓	-	-	-	-	-	-
Tracked excavator with bucket	103	115	✓	✓	✓	-	✓	-	-
Tracked excavator with rock breaker attachment	1221	126	-	✓	-	-	-	-	-
Truck	108	120	-	✓	-	-	✓	-	-
Truck with Hiab	96	117	✓	✓	✓	-	-	-	-
Vacuum truck	108	112	-	-	✓	-	-	-	-

Note:

1. In accordance with the ICNG, a 5 dBA 'penalty' is applied for activities identified as particularly annoying, such as rock hammer, impact piling and concrete saw.

Construction plant and equipment used on site must be, in addition to other requirements:

- Fitted with properly maintained noise suppression devices in accordance with the manufacturer's specifications;
- Maintained in an efficient condition;
- Operated in a proper and efficient manner.

Plant and equipment with sound power levels higher than those in Table 7.2 will require feasible and reasonable mitigation and/or management measures to ensure the overall site noise emissions remain

consistent with the NVIA and DNVA. Plant and equipment will be subject to regular noise level checks to verify compliance (see Section 8.3).

7.3.2 High noise impact works

The NVIA identified that some residential receivers nearest to the construction work areas may be 'highly noise affected' [i.e. exposed to noise levels that exceed 75 dB(A)] by high noise generating works, namely from piling works using impact driven piles. FDC Building has proposed CFA and CMC piling methodology to undertake the piling works, which would result in significantly less noise impact. The DNVA found that the revised methodology resulted in no highly noise affected residential receivers.

The surrounding commercial and industrial receivers nearest to the proposal are predicted to experience construction noise that significantly exceeds the NMLs. In particular, the commercial tenancies to the 24-26 Burrows Road, to the east at the 32 Burrows Road, and across the road to the north at 33 Burrows Road.

As such, for construction activities with high noise generating plant and equipment, such as hydraulic hammers and CFA and CMC piling (when close to the receiver boundary), consultation with affected receivers should be conducted to determine all feasible and reasonable mitigation measures. The following types of management measure could be considered to manage impacts:

- High noise impact activities carried out in continuous blocks of up to three hours. Respite provided between each block of high noise impact activities for at least one hour. No high noise impact activities carried out during this one hour respite period
- Negotiated periods of high noise impact works, with respite periods throughout the day considering sensitive time periods for the affected businesses. Typically respite periods should be at least 1 hour long. During these periods no high noise impact activities should be carried out.

7.4 Minimising vibration impacts

7.4.1 Human comfort

Many building occupants assume that building damage is occurring when they feel vibration or observe rattling of loose objects, however the level of vibration at which people perceive vibration or at which loose objects may rattle is far lower than vibration levels that can cause damage to structures. At properties near the construction works, nearby receivers may be able to feel vibration when vibration-generating equipment is being utilised. For this reason, it is appropriate to identify properties where there is a probability of adverse comment so that impacts can be managed.

Recommended minimum working distances for typical vibration intensive construction equipment for human comfort (response) are shown in Table 7.3. These recommended distances relate to continuous vibration and are presented as a guide only. For most construction activities, vibration emissions are intermittent in nature and for this reason, higher vibration levels occurring over shorter time periods are allowed (see Section 5.3.1).

Table 7.3: Recommended minimum working distances (m) - human comfort (response)

Vibration significant plant item	Critical area	Residence (Day)	Residence (Night)	Office	Workshop
Place compactor/Wacker packer	20	10	15	5	5
Truck-mounted drill rig / bored piling	30	20	20	10	10
Light hydraulic hammer (up to 5t)	25	20	20	15	10
10-15t excavator with hydraulic hammer attachment	30	20	25	15	10
Smooth drum roller (13t) - High vibration	105	55	75	30	15
Smooth drum roller (13t) - Low vibration	75	40	55	20	10
CFA and CMC piling rig	30	20	25	10	10
Piling rig (driven)[1]	*380*	*230*	*-[1]*	*140*	*80*

Notes: 1. Based upon Junttan PM26 impact piling rig in use. Driven piling method has been replaced with CFA and CMC piling method.

There are no residential properties that are likely to be exposed to vibration above the screening limit for human annoyance. Adjacent commercial receivers may be exposed to vibration above the screening limit for human annoyance during hammering works and vibratory roller works. Attended vibration measurements for human annoyance are proposed to be carried out as required. The proximity of neighbouring vibration-sensitive receivers will be communicated to subcontractors highlighting the relevant vibration restrictions and criteria for the area. This information will also be communicated during pre-tender meetings, start-up meetings and site inductions of personnel.

7.4.2 Buildings and structures

Recommended minimum working distances to reduce the risk of cosmetic damage to buildings or structures from typical vibration intensive construction equipment are presented in Table 7.4 following. These are aimed at reducing the risk of cosmetic damage (as per BS 7385:1993 and DIN 4150-3:2016) and are based on the vibration screening criteria set in Section 5.3.3.

Unlike noise, vibration cannot be readily predicted. The minimum working distances below are indicative and will vary depending on the plant item, building types and foundations and local geotechnical conditions. Vibration monitoring would be carried out to confirm the site-specific minimum working distances for this Project.

Table 7.4: Minimum working distances (m) - cosmetic damage[1]

Plant item	Minimum working distance (m)[5]		
	Reinforced or framed structures (e.g. commercial buildings)[2]	Unreinforced or light framed structures (e.g. residential buildings)[2]	Sensitive structures (e.g. heritage structures)[3,4]
Place compactor/Wacker packer	5	5	5
Truck-mounted drill rig / bored piling	5	5	10
Light hydraulic hammer (up to 5t)	5	5	10
10-15t excavator with hydraulic hammer attachment	5	5	10
Smooth drum roller (13t) - High vibration	5	5	15
Smooth drum roller (13t) - Low vibration	5	5	10
CFA and CMC piling rig	5	5	5
Piling rig (driven)[5]	*20*	*50*	*70*

Notes
2. Minimum working distances are in 5m increments only to account for the intrinsic uncertainty of this screening method.
3. Minimum working distance based on vibration screening criterion which reduced the cosmetic damage levels set by BS7385 (see Table 5 10) by 50% due to potential dynamic magnification.
4. A building condition inspection should determine whether a heritage item is structurally unsound.
5. Heritage specialist will be consulted to determine appropriate vibration criteria and associated MWDs, vibration monitoring locations and monitor setup.
6. Based upon Junttan PM26 impact piling rig in use. Driven piling method has been replaced with CFA and CMC piling method.

The Alexandra Canal structure and the commercial building at 24-26 Burrows Road are within the recommended minimum working distances presented in Table 7.4. Potentially affected structures are further identified in APPENDIX C.

FDC Building noted that the Project requires excavation of new storm water system approximately 2m off the boundary wall. There are also CMC piles approximately 1m off the boundary. Work methodologies shall be selected to minimise the vibration impacts on affected receivers such as shoring boxes and self-compacting backfill. FDC Building has also adopted CFA and CMC piling methodology as a mitigation measure to significantly reduce the vibration impacts on nearby receivers.

Pre- and post-construction surveys should be undertaken to document the condition of affected structures before and after construction works. The inspections will document the existing condition of the property and typically note the location of all visible cracks and/or defects observed by the inspector. The post construction survey will record any changes to the property at construction completion.

In addition, vibration monitoring is recommended to determine site specific minimum working distances that will prevent cosmetic and structural damage. If the monitoring identifies that vibration is likely to exceed the screening criteria for cosmetic damage, further analysis would be undertaken, including consideration of a different construction method with lower source vibration levels and/or implement additional mitigation measures to prevent damage. This notably applies to heritage items. Monitoring requirements are further described in Section 8.3.

7.5 Consultation with affected receivers

As required by condition B19. (e) of SSD-47601708, FDC Building has commenced and will continue to undertake consultation with potentially affected receivers, including business and residential receivers. The consultation is focused on specific mitigation and management measures applicable to the Project works. These measures may provide respite during high noise impact works, or limiting times of vibration intensive works to less sensitive time periods (where practicable). Details of completed consultation is recorded in the Community Liaison Plan. A summary of the consultation program is provided below:

- Notification with noise affected receivers identified in the NVIA and the DNVA to advise of the project key dates and likely impacts over the course of the project.
- Consultation with neighbouring business on sensitive time periods to get consensus on suitable respite periods for high noise generating works.
- Residents and businesses identified in APPENDIX C will receive the following:
    - Property condition survey has been undertaken on buildings identified in the NVIA/DNVA
    - Community updates will continue as work progresses and the expected vibration impacts, by letter drop or in person.

8 Compliance management

8.1 Roles and responsibilities

The FDC Building Project Team's organisational structure and overall roles and responsibilities are outlined in the CEMP. Specific responsibilities for the implementation of environmental controls are detailed in the CEMP.

8.2 Training

All employees, contractors, sub-contractors and utility staff working on site will undergo site induction training that includes construction noise and vibration management issues. The induction training will address elements related to noise and vibration management including:

- Existence and requirements of this sub-plan
- Relevant legislation
- Approved construction hours
- The process for seeking approval for OOHW
- Location of noise sensitive areas
- Complaints reporting
- General noise and vibration management measures
- Specific responsibilities to minimise impacts on the community and built environment from noise and vibration associated with the works.

Further details regarding staff induction and training are outlined in Section 8 of the CEMP.

8.3 Noise and vibration monitoring program

8.3.1 Existing environment

As noted in Section 4.3, ambient noise monitoring was completed at four monitoring locations as part of the NVIA between 15 and 28 June 2022 (Logger 1, 2 and 3) and 19 November 2021 and 12 December 2021 (Loggers 4). Noise measurements have been carried out at both the nearest and potentially most affected locations surrounding the Project. This has included residential receiver locations on Campbell Road, in addition to receivers located on the multi-storey apartment complexes on Gardeners Road. These monitoring locations were adopted to determine the variation in background and ambient noise level at all potentially impacted nearby receivers.

8.3.2 Noise monitoring

8.3.2.1 Noise monitoring locations

Noise monitoring will be undertaken in response to complaints.

Noise monitoring should, where practicable, be in positions with unobstructed views of general site activities, whilst shielded as much as possible from non-construction site noise (e.g. road traffic, rail noise and other surrounding noise). In accordance with Australian Standard AS1055 [10], outdoor noise monitoring is to be undertaken at least 3.5m from any reflecting structure other than the ground. The preferred measurement height is 1.2-1.5m above the ground. Where the noise monitors are placed within 3.5 metres of building facades, walls or cliffs, then a reflection correction of up to -2.5dB(A) shall be applied to remove the effect of increased noise due to sound reflections from such structures.

Measurements inside buildings should be at least 1m from the walls or other major reflecting surfaces, 1.2 m to 1.5m above the floor, and about 1.5m from windows.

8.3.2.2 Monitoring frequency and method

All environmental noise monitoring equipment used must be at least Type 2 instruments as described in AS IEC 61672.1 Electroacoustic - Sound Level Meters - Specifications. Noise measurement will be taken with the following meter settings:

- Time Constant: Fast (i.e. 125 milliseconds),
- Frequency Weightings: A-weighting,
- Minimum range of noise metrics to be recorded (A-weighted noise levels): L_{90}, L_{eq}, and L_{max}.

Meteorological conditions such as wind velocity, wind direction and rainfall shall also be either monitored on site or recorded from the nearest weather station to the project site, during the noise monitoring period. Measurements of noise should be disregarded when rain or wind affects the measured noise levels as described in the AS 1055.

Monitoring frequency and methods are outlined in Table 3.

Table 8.1: Noise monitoring frequency and method

Type of monitoring	Timing/ Frequency	Duration/ sample interval
Noise monitoring	• In response to a noise related complaint(s) (determined on a case-by-case basis)	15-minute

Notes: 1. Constant noise source (e.g. generator, fan)

2. Variable or inconstant noise source (e.g. front-end loader in spoil bin)

8.3.2.3 Noise goals

The noise monitoring results will be compared to the predicted noise levels in the NVIA / DNVA / CNVIA and assessed against the noise goals outlined in Section 5.2 of this CNVMP, as required.

If an exceedance is identified, investigation will be undertaken to understand the cause of the exceedance and relevant reasonable and feasible mitigation measures will be implemented.

8.3.3 Vibration monitoring

8.3.3.1 Site specific minimum working distances

Site specific minimum working distances for vibration significant plant items will be measured on site where plant and equipment are likely to operate close to or within the recommended minimum working distances for cosmetic damage (Table 7.4).

8.3.3.2 Building damage vibration monitoring

The identification of a suitable vibration monitoring location will consider the following:

- vibration monitoring equipment shall be placed outside at the footings or foundations of the building of interest closest to the vibrating plant;
- the surface should be solid and rigid to best represent the vibration entering the structure of the building under investigation;
- the vibration sensor or transducer shall not be mounted on loose tiles, loose gravel or other resilient surfaces;
- the vibration sensor or transducer shall be directly mounted to the vibrating surface using either adhesive, double sided tape or a magnetic mounting plate onto a steel washer, plate or bracket which shall be either fastened or glued to the surface of interest; and
- where a suitable mounting surface is unavailable, then a metal ground spike shall be driven into solid ground adjacent to the building of interest, and the vibration sensor or transducer shall be mounted on that.

Vibration monitoring are identified in Section 7.4.2 and APPENDIX C. Attended or unattended vibration monitoring locations may vary throughout the life of the Project. Additional monitoring locations would be determined on a case-by-case basis in a CNVIA or in response to complaints.

8.3.4 Alexandra Canal vibration monitoring

The vibration monitoring plan[2] prepared specifically to manage the vibration impacts on the Alexandra Canal has proposed two monitoring locations during the construction works, as shown in Figure 8-1.

Figure 8-1: Proposed vibration monitoring locations for the Alexandra Canal

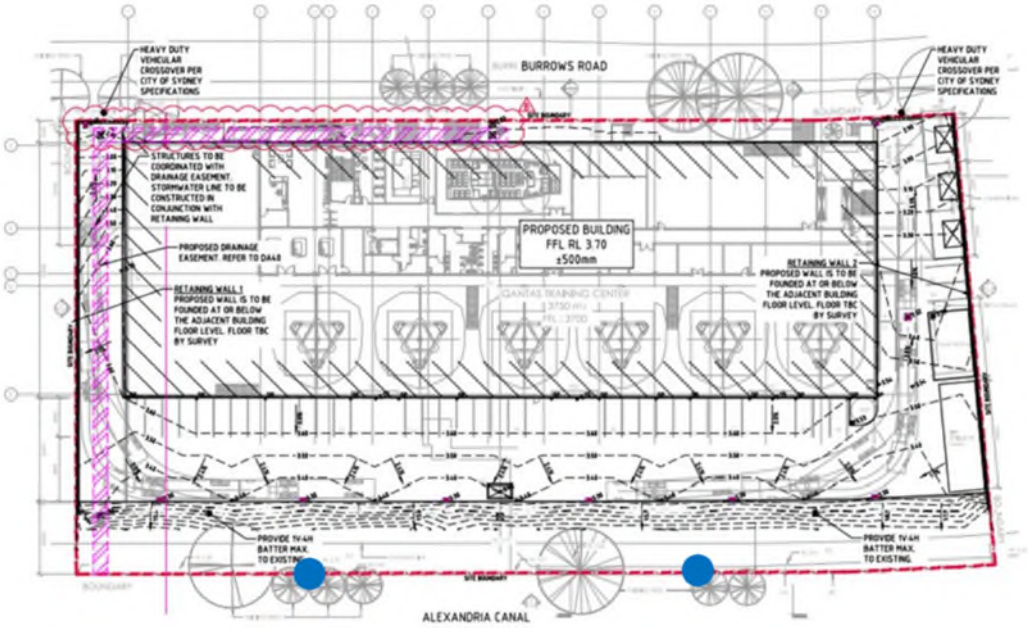


Figure 2: Vibration monitoring locations

Vibration Monitoring Location

8.3.4.1 Human exposure vibration monitoring

Attended vibration monitoring to confirm human exposure to vibration are identified in Section 7.4.1. Additional monitoring locations would be determined on a case-by-case basis in a CNVIA or in response to a complaint. The monitoring will be undertaken in the most affected habitable room of the sensitive receiver building and will be conducted in conjunction with ground-borne noise measurements where applicable. The room selected for vibration monitoring should be well shielded from extraneous vibration intrusions, such as heavy vehicle road traffic, condenser units or pumps.

There may be instances where the resident does not allow access to monitor in the most suitable habitable room. In these instances, FDC Building will endeavour to monitor at the next most suitable available room or location, noting this in the monitoring form.

8.3.4.2 Monitoring frequency and method

The minimum range of vibration metrics to be recorded is the following:

- Root-Mean-Square acceleration (RMS acceleration), or
- Root-Mean-Square velocity (RMS velocity), or
- Peak Particle Velocity (PPV).

Monitoring frequency and methods are outlined in Table 3.

Table 8.2: Vibration monitoring frequency and method

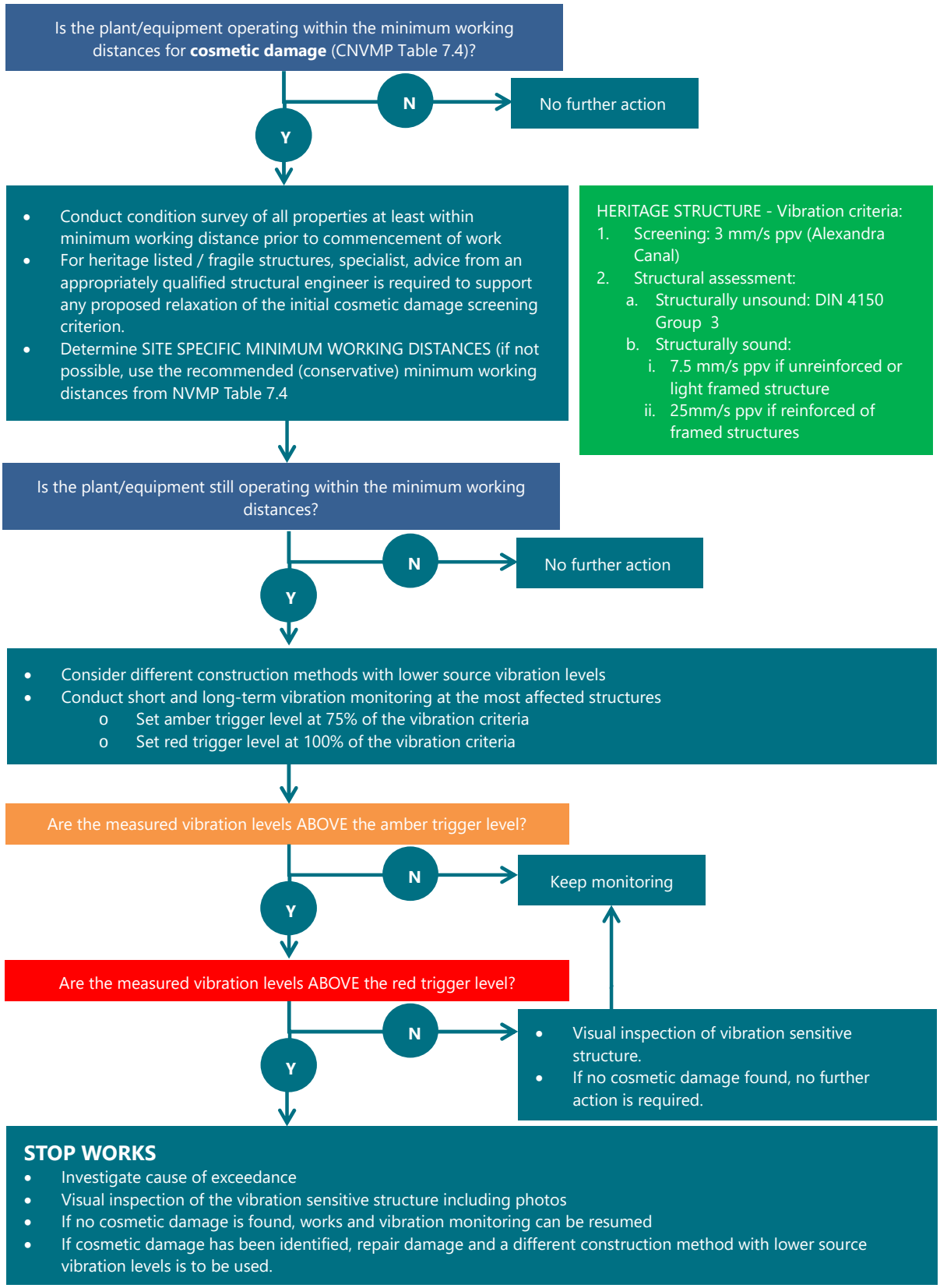
Type of monitoring	Timing/ Frequency	Duration/ sample interval
Site specific minimum working distances	• At the commencement of vibration generating activities that have the potential to impact on heritage items and the vibration sensitive locations are found to fall within recommended minimum working distances established for vibration intensive plant	Representative sample of vibration being generated
Building damage	• At the commencement of vibration generating activities that have the potential to impact on heritage items and the vibration sensitive locations are found to fall within the site specific minimum working distances established for vibration intensive plant	Representative sample of vibration being generated
Human exposure vibration monitoring	• At the first opportunity following commencement of works • Where appropriate in response to vibration related complaint(s) (determined on a case-by- case basis)	15-minute or Representative sample of vibration being generated (as required)

8.3.4.3 Vibration management

The vibration monitoring results will be compared to the vibration goals outlined in Section 5.3 of the CNVMP, as required. If an exceedance is identified, a management response will be triggered. Details on this management response is detailed in Figure 8-2 and Figure 8-3.

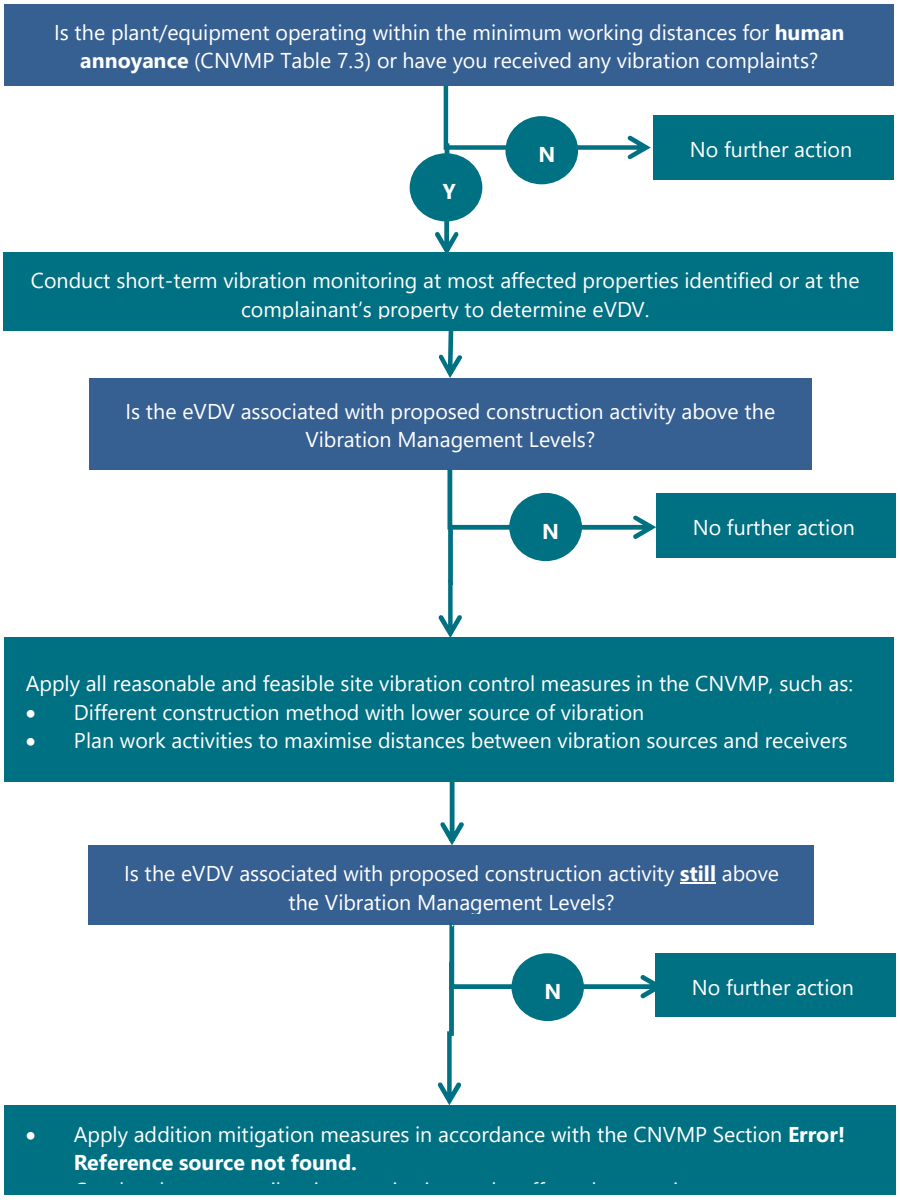
Vibration monitoring for building damage would be undertaken as outlined in Figure 8-2. Vibration monitoring results will be assessed and reported against the British Standard 7385 [8] and German Standard DIN 4150 [9], as presented in Section 5.3.2 of this NVMP. The approach that will be adopted for the Project to assess and manage potential vibration impact, including on heritage structures is outlined in Section 5.3.5.

Figure 8-2: Project vibration monitoring (cosmetic damage to structures) flow chart



Where human comfort is a concern, vibration monitoring would be undertaken as outlined in Figure 8-3. Vibration monitoring results would be assessed and reported against the values set out in Tables 2.2 and 2.4 of the EPA's Assessing Vibration – a technical guideline, as presented in Section 5.3.1 above.

Figure 8-3: Project vibration monitoring (human exposure) flow chart



8.3.5 Calibration, quality assurance and documentation

Attended noise monitoring equipment used will be at least Type 1 instruments and calibrated in accordance with manufacturer specifications or relevant Australian Standards. Records of equipment laboratory calibration will be maintained by FDC Building throughout the delivery of the Project. The calibration of the monitoring equipment will be checked in the field before and after the noise measurement period.

All vibration instruments will be calibrated in accordance with manufacturers specifications or relevant Australian Standards. Records of monitoring equipment calibration will be maintained by FDC Building throughout the delivery of the Project.

All monitoring records will be retained throughout FDC Building's delivery of the Project. Monitoring records will record:

- Date and time of measurements,
- Name of person(s) undertaking the measurements,
- Weather conditions during measurements,
- Type and model number of monitoring equipment,
- Calibration dates of monitoring equipment,
- For noise, results of field calibration checks,
- Time of day, length of measurement and measurement time intervals,
- Monitoring location details (including a sketched map of area and/or photographs clearly identifying the monitoring location),
- Number of measurements at each location
- Construction activities under investigation, including load conditions of plant,
- Possible extraneous noise (e.g. road traffic, aircraft, insects) or vibration influences from other sources (e.g. domestic vibrations, other mechanical plant, traffic etc.).

8.3.6 Data analysis and management response

Results obtained as per the construction monitoring program will be compared against noise and vibration objectives and predictions. If an exceedance is observed a review will be initiated to determine the significance of the exceedance(s) and possible causes.

The review will assess:

- Activities occurring during the exceedance;
- Noise and vibration management and mitigation measures in place (Table 7.1);
- Specific mitigation and management measures;
- Other aspects that may have influenced the measurement result (e.g. meteorological conditions, extraneous noise/ vibration source).

If the exceedance is determined to be attributable to Project works, the event will be treated as an environmental incident and managed in accordance with the requirements of the CEMP. Corrective and preventative actions will be identified and implemented as part of that process.

8.4 Worksite inspections

Weekly and other routine inspections by the FDC Building Environment Team will occur throughout construction. Detail on the nature and frequency of these inspections and activities are documented in the CEMP.

8.5 Complaints

In accordance with Condition B19 (f), the following complaints management system will be implemented for the duration of the development.

Complaints will be recorded and managed as detailed in the CEMP and the Communications Strategy.

8.6 Auditing

Audits (both internal and external) will be undertaken to assess the effectiveness of environmental controls, compliance with this NVMP and other relevant approvals and guidelines.

Audit requirements are detailed in the CEMP.

9 Review and improvement

9.1 Continuous improvement

Continuous improvement of this CNVMP will be achieved by the ongoing evaluation of environmental management performance against environmental policies, guidelines and objectives for the purpose of identifying opportunities for improvement. The continuous improvement process will be designed to:

- Identify areas for improved environmental management and performance;
- Determine the cause or causes of non-conformances and deficiencies;
- Verify the effectiveness of the corrective and preventative actions;
- Document any changes in procedures resulting from process improvement.

9.2 Update and amendment

The processes described in the CEMP may result in the need to update or revise this CNVMP. This will occur as needed, in accordance with the process outlined in the CEMP.

A copy of the updated plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure. .

References

[1] NSW Environment Protection Authority, Noise Policy for Industry (NPfI), 2017

[2] NSW Department of Environment and Climate Change, Interim Construction Noise Guideline (ICNG), 2009

[3] NSW Environment Protection Authority, Environmental criteria for road traffic noise, 1999

[4] NSW Department of Environment, Climate Change and Water, Road Noise Policy, 2011

[5] NSW Roads and Maritime, Construction Noise and Vibration Guideline, 2016

[6] NSW Department of Environment and Conservation, Assessing Vibration – a technical guideline (AVTG), 2006

[7] British Standard BS 6472-2008, Evaluation of human exposure to vibration in buildings (1-80Hz)

[8] British Standard 7385: Part 2-1993 Evaluation and measurement of vibration in buildings

[9] German Standard DIN4150-2016 Structural vibration Part 3: Effects of vibration on Structures

[10] Australian Standard AS/NZS 1055-2018 Acoustics - Description and Measurement of Environmental Noise

[11] AS IEC 61672.1-2004 Electroacoustic - Sound Level Meters - Specifications

APPENDIX A Glossary/ abbreviations

Term/ abbreviation	Definition/ expanded Text
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Attenuation	The reduction in the level of sound or vibration.
CEMP	Construction Environmental Management Plan
CNVG	Construction Noise and Vibration Guideline (Roads and Maritime 2016)
CoA	Condition of Approval
CSSI	Critical State Significant Infrastructure
dBA	Decibels using the A-weighted scale measured according to the frequency of the human ear.
DP&E	NSW Department of Planning and Environment
EIS	Environmental Impact Statement
EMM	Environmental Management Measure
EPA	NSW Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
Feasible and reasonable	Consideration of best practice taking into account the benefit of proposed measures and their technological and associated operational application in the NSW and Australian context. Feasible relates to engineering considerations and what is practical to build. Reasonable relates to the application of judgement in arriving at a decision, taking into account mitigation benefits and cost of mitigation versus benefits provided, community views and nature and extent of potential improvements..
Highly noise intensive works	Works which are defined as annoying under the ICNG being: a) use of power saws, such as used for cutting timber, rail lines, masonry, road pavement or steel work; b) grinding metal, concrete or masonry; c) rock drilling; d) line drilling; e) vibratory rolling; f) bitumen milling or profiling; g) jackhammering, rock hammering or rock breaking; and h) impact piling.
ICNG	*Interim Construction Noise Guideline (DECC, 2009)*
INP	*NSW Industrial Noise Policy (EPA 2000)*
$L_{Aeq\ (15min)}$	The A-weighted equivalent continuous (energy average) A-weighted sound pressure level of the construction works under consideration over a 15-minute period and excludes other noise sources such as from industry, road, rail and the community.
$L_{A\ (max)}$	the A-weighted maximum noise level only from the construction works under consideration, measured using the fast time weighting on a sound level meter.
NCA	Noise catchment areas
NML	Noise Management Level
NVMP	Noise and Vibration CEMP Sub-plan (this document)
OEH	Office of Environment and Heritage
OOHW	Out-of-hours works
OSR	Other Sensitive Receivers

Term/ abbreviation	Definition/ expanded Text
RBL	The Rating Background Level for each period is the medium value of the ABL values for the period over all of the days measured. There is therefore an RBL value for each period (day, evening and night)
Roads and Maritime	Roads and Maritime Services
Sensitive receiver	Includes residences, educational institutions (including preschools, schools, universities, TAFE colleges), health care facilities (including nursing homes, hospitals), religious facilities (including churches), child care centres, passive recreation areas (including outdoor grounds used for teaching), commercial premises (including film and television studios, research facilities, entertainment spaces, temporary accommodation such as caravan parks and camping grounds, restaurants, office premises, and retail spaces), and others as identified by the Planning Secretary.
SWP	Sound Power Level
SPL	Sound Pressure Level
SSI	State Significant Infrastructure
TfNSW	Transport for NSW (formerly Roads and Maritime Services, RMS)

APPENDIX B Noise impact summary (NVIA and DNVA)

B.1 NVIA predicted noise levels

Table 4-5: Predicted standard hours $L_{Aeq(15min)}$ noise levels for construction plant and activities, dB(A)

Receiver			NML	Predicted construction noise level, $L_{Aeq,15min}$													
NCA	NCA ID	Address		Site establishment		Demolition		Utilities		Piling		Surface preparation		Building construction		Building fitout	
				Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
NCA01A	R1_1	34 Campbell Road, Alexandria	69	52	35	66	49	63	46	**76**	57	54	37	55	36	39	39
NCA01B	R1_2	34 Campbell Road, Alexandria	59	44	31	58	45	55	42	**67**	54	46	33	46	33	33	33
NCA01B	R1_3	34 Campbell Road, Alexandria	59	53	36	**67**	50	**64**	47	**76**	58	55	38	55	37	41	41
NCA01A	R2	20 Campbell Road, Alexandria	69	51	34	65	48	62	45	**70**	56	53	36	49	35	39	39
NCA01A	R3	4 Campbell Road, Alexandria	69	51	34	65	48	62	45	65	56	53	36	44	35	37	37
NCA02	R4_1	671 Gardeners Road, Mascot	66	50	44	64	58	61	55	**73**	**70**	52	46	52	49	51	51
NCA02	R4_2	671 Gardeners Road, Mascot	66	49	43	63	57	60	54	**72**	**70**	51	45	51	49	50	50
Active recreation	R5	Sydney Park	65	51	36	65	50	62	47	**75**	57	53	38	54	36	44	44
Commercial	R6_1	33 Burrows Road, St Peters	70	70	58	**84**	**72**	**81**	69	**94**	**82**	**72**	60	**73**	61	54	54
Commercial	R6_2	33 Burrows Road, St Peters	70	70	59	**84**	**73**	**81**	70	**93**	**84**	**72**	61	**72**	63	48	48
Commercial	R6_3	33 Burrows Road, St Peters	70	**72**	63	**86**	**77**	**83**	**74**	**96**	**87**	**74**	65	**75**	66	47	47
Commercial	R7_1	32 Burrows Road, St Peters	70	**81**	62	**95**	**76**	**92**	**73**	**99**	**86**	**83**	64	**78**	65	65	65
Commercial	R7_2	32 Burrows Road, St Peters	70	**80**	62	**94**	**76**	**91**	**73**	**98**	**87**	**82**	64	**77**	66	66	66
Commercial	R8_1	24-26 Burrows Road, St Peters	70	**86**	63	**100**	**77**	**97**	**74**	**104**	**86**	**88**	65	**83**	65	50	50
Commercial	R8_2	24-26 Burrows Road, St Peters	70	**87**	62	**101**	**76**	**98**	**73**	**103**	**86**	**89**	64	**82**	65	66	66
Industrial	R9	67 Bourke Road, Alexandria	75	55	35	69	49	66	46	**77**	58	57	37	56	37	56	56
Industrial	R10_1	697 Gardeners Road, Alexandria	75	65	58	**79**	72	**76**	69	**85**	**81**	67	60	64	60	64	64
Industrial	R10_2	697 Gardeners Road, Alexandria	75	66	59	**80**	73	**77**	70	**87**	**82**	68	61	66	61	66	66
Industrial	R10_3	697 Gardeners Road, Alexandria	75	65	50	**79**	64	**76**	61	**86**	74	67	52	65	53	62	62
Industrial	R10_4	697 Gardeners Road, Alexandria	75	61	36	75	50	72	47	**81**	59	63	38	60	38	59	59

Notes:

1. **Bold** indicates exceedance of NML

B.2 DNVA predicted noise levels

Table 3.2: Predicted noise levels at the closest noise sensitive receivers

NCA	Address	Type of receiver	ICNG NMLS				Predicted levels $L_{Aeq,15min}$, dB(A)							
							Impact piling works				CMC piling works			
			Day(S)	Day(O)	Evening	Night	NW I	NE I	SW I	SE I	NW CMC	NE CMC	SW CMC	SE CMC
NCA1A	34 Campbell Road, Alexandria	Residential	69	64	62	55	58-75	75	63-74	68-74	34	50	38	43
NCA2	671 Gardeners Road, Mascot	Residential	66	61	56	52	64-71	65-71	63-71	63-71	39	40	38	38
OSR	24-26 Burrows Road, St Peters	Commercial	70	70	70	70	98-101	87-88	99-103	88	76	63	78	63
OSR	32 Burrows Road, St Peters	Commercial	70	70	70	70	84-86	93-94	84-85	90-91	61	69	60	66
OSR	33 Burrows Road, St Peters	Commercial	70	70	70	70	94	94	89-90	90	69	70	65	65

Notes: D(S): standard construction hours from 7 am to 6 pm Monday to Friday and from 8 am to 1 pm Saturday

D(O): out-of-hours day period from 1pm to 6pm Saturday, 8 am to 6 pm Sunday and Public holidays – OOHW P1

E: evening period from 6 pm to 10 pm Monday to Sunday – OOHW P1

N: night-time period from 10 pm to 7 am Monday to Friday, from 10 pm am to 8 am Saturday, Sunday and Public holidays – OOHW P2

APPENDIX C Vibration impact (NVIA and DNVA)

C.1 NVIA vibration impacts

- In the event of a sustained complaint, noise monitoring may be carried out to examine noise impacts.
  - Reasonable and feasible noise reduction measures must be investigated, where necessary.
  - Typically, short term (attended) noise monitoring would be undertaken to investigate a complaint as opposed to ongoing noise logging as this will enable a faster response time.
  - In the event that short term (attended) noise measurements cannot produce a suitable outcome, long term noise monitoring will be considered. Typically, long term monitoring is useful primarily as a means to check if start/finish times or respite periods have been adhered to. Given this limitation, they are not typically proposed in the first instance.

As part of further design development, when a contractor is appointed and the specific construction methodology is known and the likely construction equipment are also known, the potential construction impacts are to be reviewed to determine that they are consistent with those presented in this SSDA NVIA and that the associated mitigation and management measures are appropriate.

4.4 Construction vibration assessment

4.4.1 Vibration sources

The pattern of vibration radiation is very different to the pattern of airborne noise radiation and is very site specific as final vibration levels are dependent on many factors including the actual plant used, its operation and the intervening geology between the activity and the receiver. Potential vibration generated to receivers is dependent on separation distances, the intervening soil and rock strata, dominant frequencies of vibration, and the receiver structure.

The recommended minimum working distances for vibration intensive plant are presented in Table 4-14 and Table 4-15. Site specific minimum working distances for vibration intensive plant items must be measured on site where plant and equipment are likely to operate close to or within the minimum working distances for cosmetic damage, as detailed in Table 4-14.

Unlike noise, vibration cannot be readily predicted. There are many variables from site to site, such as soil type and conditions, sub surface rock, building types and foundations, and actual plant on site.

The data relied upon in this assessment (tabulated below) is taken from a database of vibration levels measured at various sites or obtained from other sources (such as BS5228-2:2009). They are not specific to this proposal as final vibration levels are dependent on many factors including the actual plant used, its operation and the intervening geology between the activity and the receiver.

As such, potential vibration impacts are to be further reviewed during the construction design, planning stages to determine if the final selected plant and equipment could be located within the minimum working distances and/or result in vibration levels about the applicable vibration limits. Where then identified, and feasible and reasonable mitigation and management would be implemented to achieve the applicable vibration limits.

Table 4-14: Minimum working distances (m) for cosmetic damage (continuous vibration)

Plant item	Minimum working distance (m)[5]		
	Reinforced or framed structures (e.g. commercial buildings)[1,3]	Unreinforced or light framed structures (e.g. residential buildings)[1,3]	Sensitive structures (e.g. heritage structures)[2,4]
Place compactor/Wacker packer	5	5	5
Truck-mounted drill rig / bored piling	5	5	10
Light hydraulic hammer (up to 5t)	5	5	10
10-15t excavator with hydraulic hammer attachment	5	5	10
Smooth drum roller (13t) - High vibration	5	5	15
Smooth drum roller (13t) - Low vibration	5	5	10
Piling rig (driven)[6]	20	50	70

Notes
1. Criteria referenced from British Standard 7385: Part 2 'Evaluation and measurement of vibration in buildings'.
2. Criteria referenced from DIN 4150 Part 3, Structural Damage - Safe Limits for Short-term Building Vibration.
3. Initial screening test criteria reduced by 50% due to potential dynamic magnification in accordance with BS7385.
4. A site inspection should determine whether a heritage structure is structurally unsound.
5. Minimum working distances are in 5m increments only to account for the intrinsic uncertainty of this screening method.
6. Based upon Junttan PM26 impact piling rig in use.

Table 4-15: Minimum working distances (m) for human annoyance (continuous vibration)

Plant item	Minimum working distances (m)				
	Critical areas[2,3] 0.28 mm/s	Residences		Offices[2] 1.1 mm/s	Workshops[2] 2.2 mm/s
		Day[1] 0.56mm/s	Night[1] 0.40 mm/s		
Place compactor/Wacker packer	20	10	15	5	5
Truck-mounted drill rig / bored piling	30	20	20	10	10
Light hydraulic hammer (up to 5t)	25	20	20	15	10
10-15t Excavator with hydraulic hammer attachment	30	20	25	15	10
Smooth drum roller (13t) - High vibration	105	55	75	30	15
Smooth drum roller (13t) - Low vibration	75	40	55	20	10
Piling rig (driven)[4]	380	230	-[5]	140	80

Notes:
1. Daytime is 7:00am to 10:00pm and night-time is 10:00pm to 7:00am
2. Appliable when in use
3. Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. There may be cases where sensitive equipment or delicate tasks require more stringent criteria than the human comfort criteria specify above. Stipulation of such criteria is outside the scope of their policy and other guidance documents (e.g. relevant standards) should be referred to. Source: BS 6472-1992
4. Based upon Junttan PM26 impact piling rig in use.
5. Not proposed during the night period

4.4.2 Vibration assessment

4.4.2.1 Cosmetic damage

4.4.2.1.1 Adjacent commercial buildings

For impact piling, the minimum working distance for cosmetic damage for a reinforced framed building is 20 metres. Based on a desktop review of the site, it is anticipated that all surrounding commercial buildings adjacent to the site would be classified as reinforced structures. For the piling works, the nearest building is located to the west at 24-26 Burrows Road and is approximately 10 metres from the building footprint and so would be located within the minimum working distance.

For the demolition and surface works activities where a hydraulic hammer and drum roller would be required, the minimum working distance for cosmetic damage for reinforced framed buildings is five metres. The existing hardstand for the Project site would be demolished during the demolition phase of works. This would mean that the demolition works could need to occur within the minimum working distance for 24-26 Burrows Road. As such, vibration mitigation and management measures may be required for these works as outlined in Section 4.4.3.

4.4.2.1.2 Alexandra Canal

The Alexandra Canal is located directly south of the site. This is a water-related infrastructure asset owned by Sydney Water.

As part of the SEARs, Sydney Water identified that the proponent should ensure that satisfactory steps/measures are taken to protect existing stormwater assets including the Alexandra Canal, which would include this canal. Additionally, this canal is a listed heritage item. As such, care should be taken to appropriately manage potential construction vibration impacts on the canal structure.

The existing hardstand would be demolished and is directly adjacent to the Alexandra Canal. The use of hydraulic hammers during the breakout of the hardstand would therefore be within the minimum working distance for an unsound heritage structure of 10 metres.. In addition, the minimum working distance for a drum roller is between 10 to 15 metres for an unsound heritage structure. Vibration mitigation and management measures may be required for these works as outlined in Section 4.4.3.Driven piles will be required to construct the foundations for the building. Based on the proposed footprint of the Project building, the Alexandra Canal is approximately 25 to 30 metres from the footing impact piling locations. This distance is less than the minimum working distance for an unsound heritage structure for impact piling works.

It is understood that impact piling is required as the soil under the proposal site is potentially contaminated with asbestos and other harmful substances. Other piling methodologies such as bored piles would create potentially harmful spoil waste that would need to be disposed of, potentially put working and surrounding receivers at risk. Given that impact piling is required, the determination of a suitable vibration limit for the Alexandra Canal, along with suitable management measures where this

limit cannot be practicably achieved, should be determined in consultation with Sydney Water to appropriately manage potential construction vibration impacts on the canal structure.

It should be noted that as this structure is not a building, and is fully supported, and so the applicable vibration limits for building structures as detailed in BS 7385 and DIN 4150 may not be appropriate for suitable management of vibration impacts as different opportunities to rectify cosmetic damage are potentially available. Additionally, the condition of the canal varies along the extent of the Project boundary. Considering these points, it is recommended that a structural engineering report is undertaken of the canal to confirm the structural integrity of the building, confirm if the item is 'structurally sound', and to determine appropriate vibration criteria that could be used to manage vibration impacts.

It is recommended that these items, along with the suitable standards for cosmetic damage impacts are considered in consultation with Sydney Water when determining appropriate vibration criteria that could be used to manage vibration impacts.

Following the determination of suitable vibration limits, where site specific measurements show that works are likely to occur within the minimum working distances for cosmetic damage, recommendations for the mitigation and management of vibration have been provided in Section 4.4.3.

4.4.2.2 Human annoyance

The nearest residence is approximately 250 metres from the proposal. The minimum working distance for impact piling is 230 metres. Based on this distance, there are no residences within the minimum working distance for human comfort.

The adjacent commercial receivers to the proposal on Burrows Road, along with the WestConnex Transurban MCC Main Office are within the minimum working of up to 140m metres for impact piling to commercial receivers.

Given that it is likely the human comfort levels will likely be exceeded at the nearby commercial receivers during the bulk of the demolition and piling phases of work, potential human annoyance impacts should be reviewed and appropriate feasible and reasonable management measures implemented when vibration intensive works are proposed to take place within the minimum working distances.

As previously discussed, the potential to conduct these high vibration works (demolition with rock breakers and impact piling) during outside standard hours to reduce impacts to the nearby commercial receivers should be further investigated.

4.4.3 Vibration management measures

The following vibration management measures are provided to minimise vibration impact from construction activities to the nearest receivers:

C.2 DNVA vibration impacts

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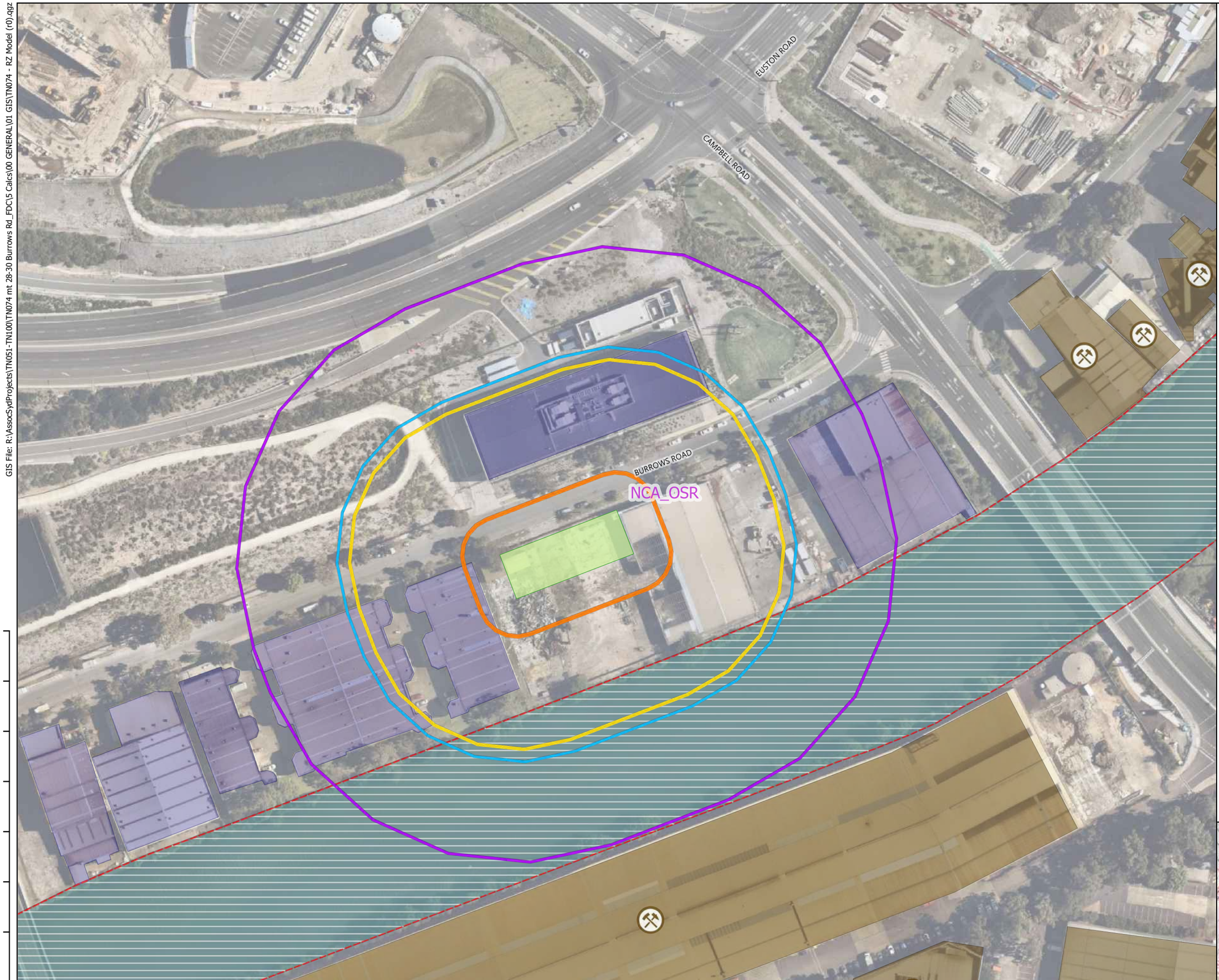

LEGEND

Noise sensitive receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NW Impact Piling Area

MWD for cosmetic damage and human annoyance for impact piling

- Reinforced structures (25mm/s ppv)
- Unsound heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)
- Human annoyance - Commercial

REV	BY	DATE	DESCRIPTION	APPROVER
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1:1,500

FULL SIZE A3

A3 Original

Co-ordinate System: MGA Zone 56

NOTE: Do not scale from this drawing.

CLIENT

FDC

ACOUSTIC CONSULTANT

RENZO TONIN & ASSOCIATES

inspired to achieve

28-30 Burrows Road

Impact Piling Vibration Assessment

Land-Use file revision_date: r0_08/12/22

Plot Date: 21/12/22 - 20:40 Layout: TN074 Gen Template (r0)

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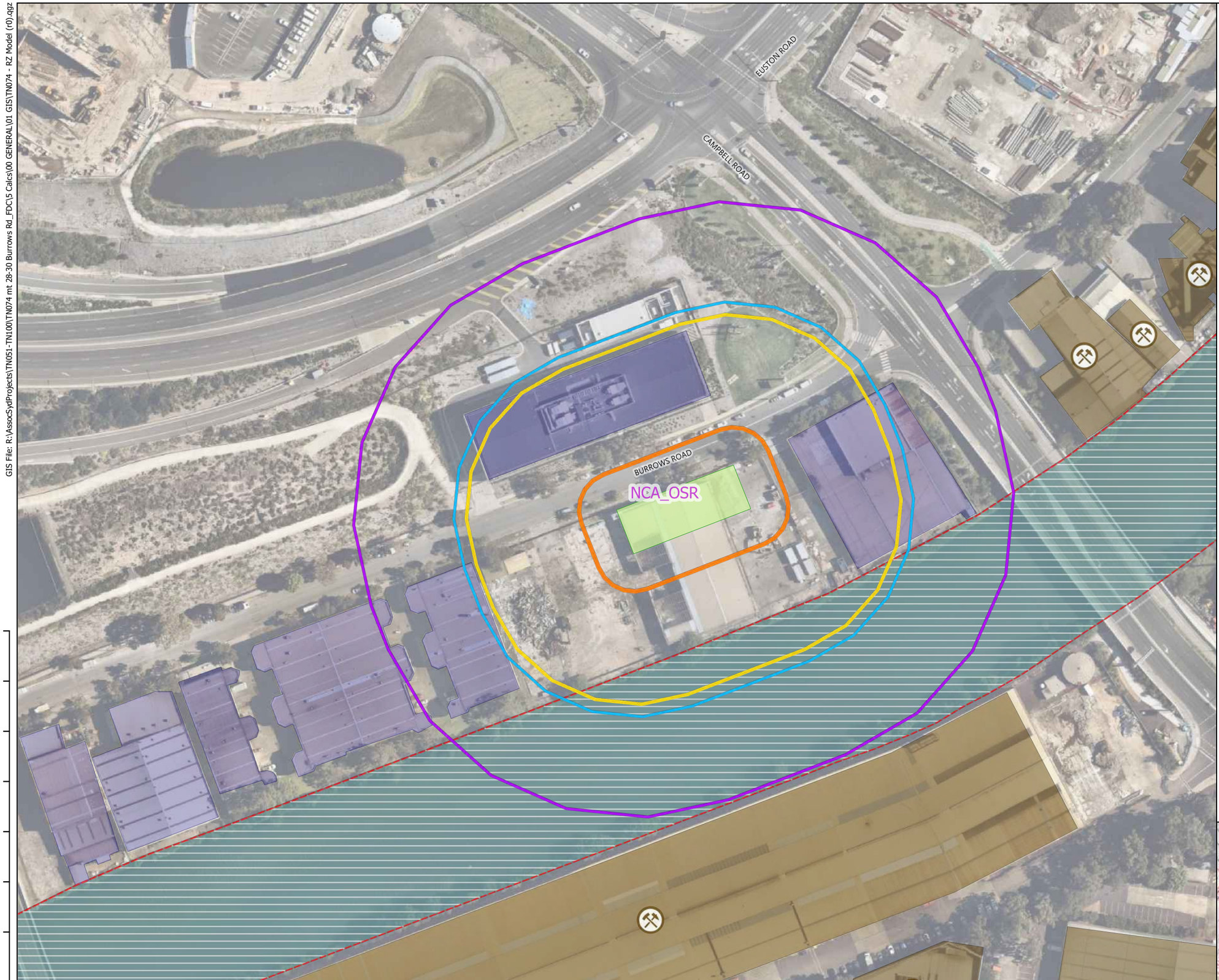

LEGEND

Noise sensitive receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NE Impact Piling Area

MWD for cosmetic damage and human annoyance for impact piling

- Reinforced structures (25mm/s ppv)
- Unsound heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)
- Human annoyance - Commercial

REV	BY	DATE	DESCRIPTION	APPROVER
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..	..	..	..	..
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r0	RZ	21/12/22	Prepare figures	TG

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1:1,500

FULL SIZE A3

A3 Original

Co-ordinate System: MGA Zone 56

NOTE: Do not scale from this drawing.

CLIENT

FDC

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28-30 Burrows Road

Impact Piling Vibration Assessment

Land-Use file revision_date: r0_08/12/22

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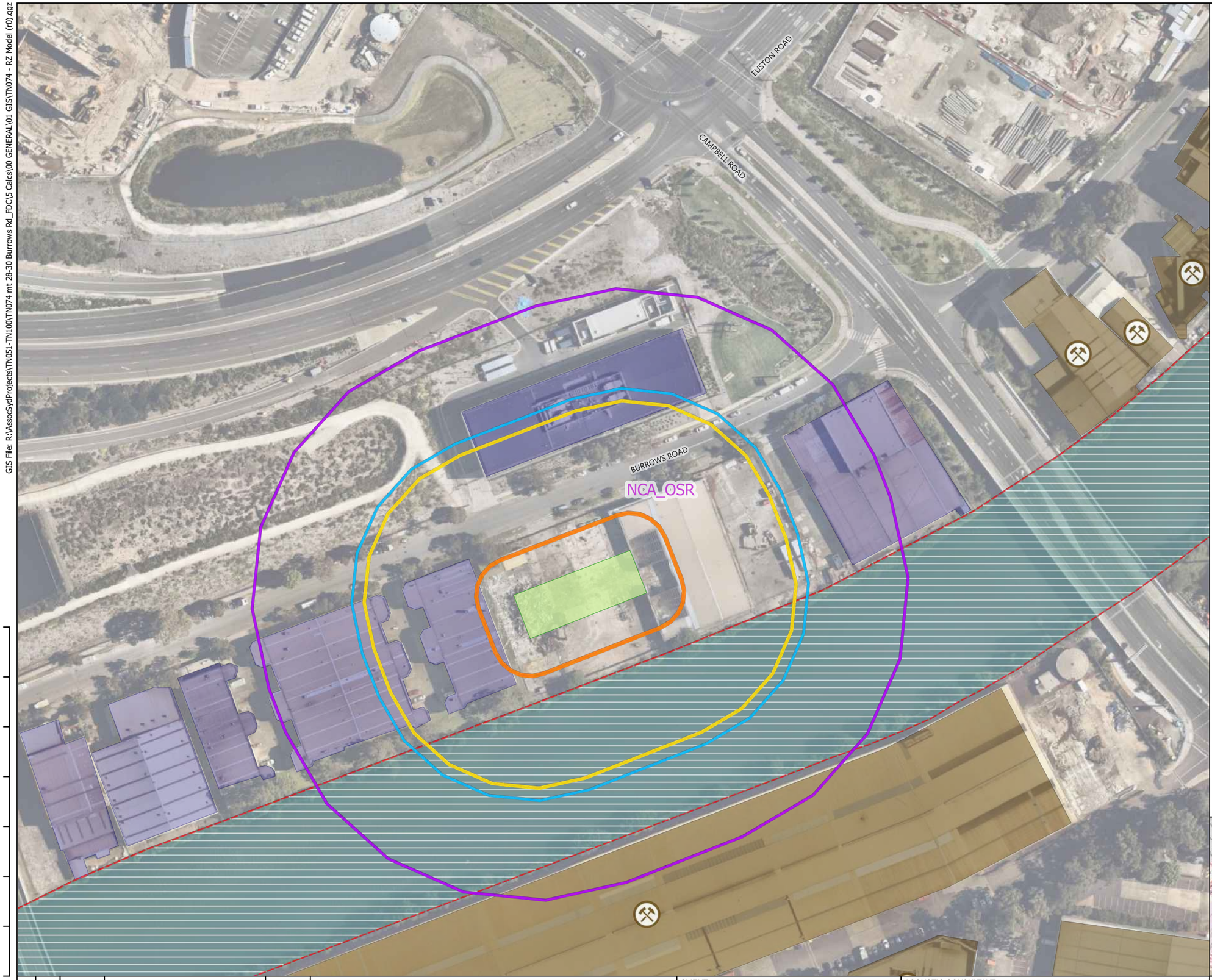

LEGEND

Noise sensitive receivers

- Residential
- Mixed use
- Commercial
- Industrial
- Hotel/Motel/Hostel
- Medical facility
- Place of Worship
- Community centre
- Recording studio
- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

SW Impact Piling Area

MWD for cosmetic damage and human annoyance for impact piling

- Reinforced structures (25mm/s ppv)
- Unsound heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)
- Human annoyance - Commercial

REV	BY	DATE	DESCRIPTION	APPROVER
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r0	RZ	21/12/22	Prepare figures	TG

A3 Original

Co-ordinate System: MGA Zone 56

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1:1,500

FULL SIZE A3

NOTE: Do not scale from this drawing.

CLIENT

FDC

ACOUSTIC CONSULTANT

RENZO TONIN & ASSOCIATES

inspired to achieve

28-30 Burrows Road

Impact Piling Vibration Assessment

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Plot Date: 21/12/22 - 20:40 Layout: TN074 Gen Template (r0)

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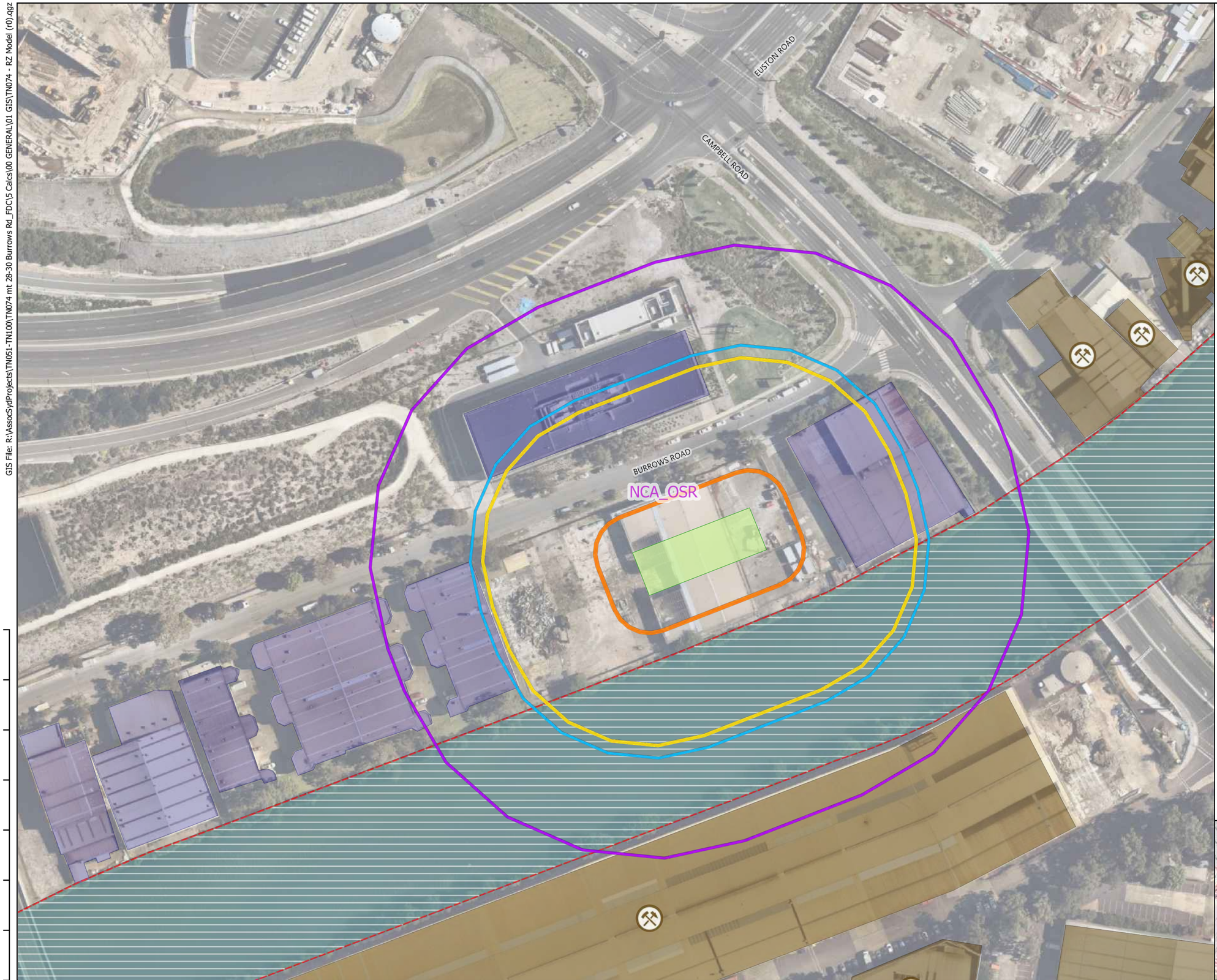

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- Heritage

SE Impact Piling Area

MWD for cosmetic damage and human annoyance for impact piling

- Reinforced structures (25mm/s ppv)
- Unsound heritage structures (2.5mm/s ppv)
- Human annoyance - Residential (day)
- Human annoyance - Commercial

REV	BY	DATE	DESCRIPTION	APPROVER
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1:1,500

FULL SIZE A3

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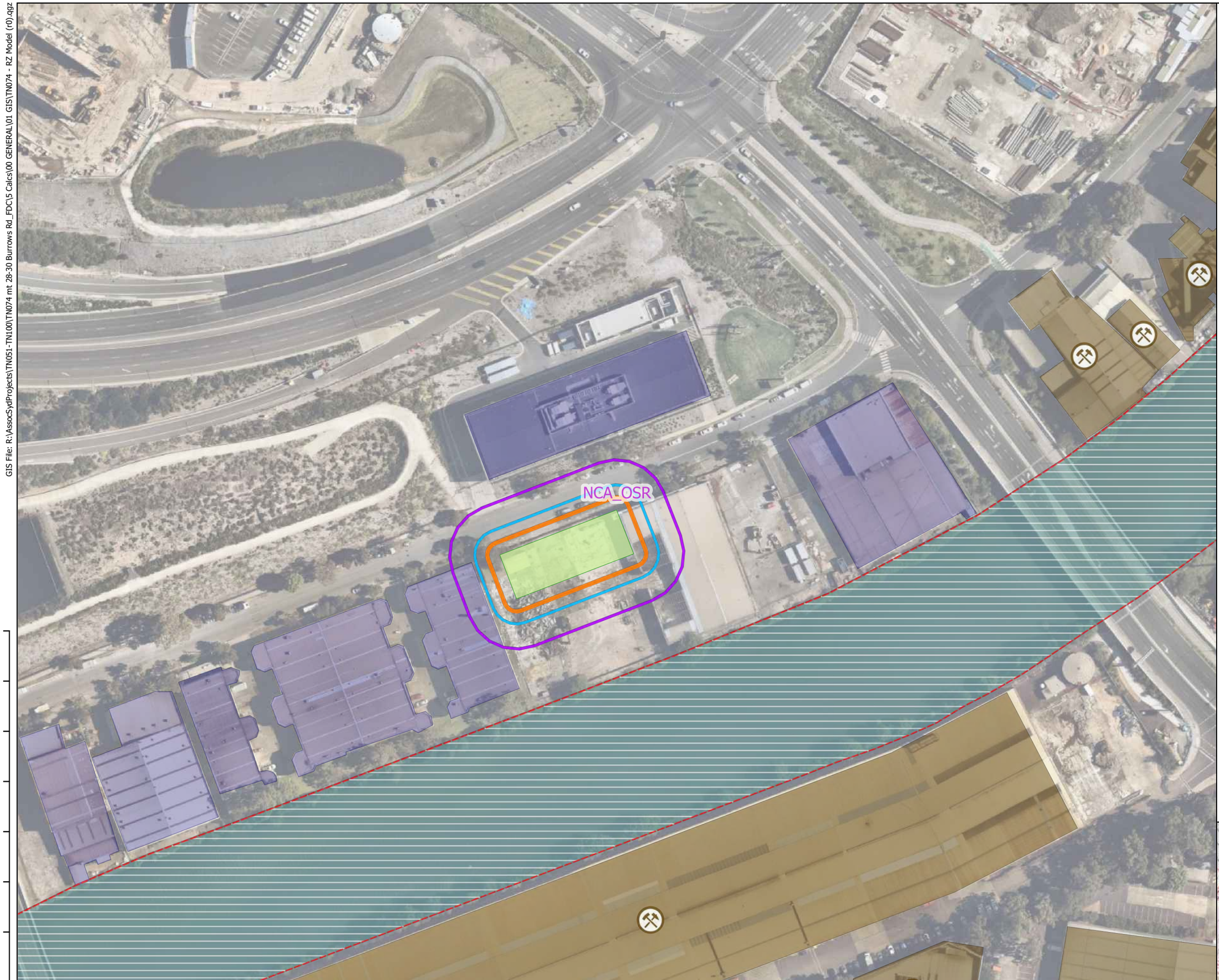

LEGEND

Noise sensitive receivers

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- Place of Worship
- Community centre
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- Library/Museum
- Childcare
- Educational
- Theatre/Auditorium
- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
- Recreational - Active
- Other
- Heritage

NW CMC Piling Area

MWD for cosmetic damage and human annoyance for CMC piling

- Reinforced structures (25mm/s PPV)
- Human annoyance - Residential (day)
- Human annoyance - Commercial

REV	BY	DATE	DESCRIPTION	APPROVER
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0 30 60 90 m

1:1,500

FULL SIZE A3

A3 Original

Co-ordinate System: MGA Zone 56

NOTE: Do not scale from this drawing.

CLIENT

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CMC Piling Vibration Assessment

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GIS File: R:\AssocSydProjects\TN051-TN100\TN074 mt 28-30 Burrows Rd_FDC\5 Calcs\00 GENERAL\01 GIS\TN074 - RZ Model (r0).qgz

LEGEND

Noise sensitive receivers

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- Cinema
- Laboratory
- Flight simulator
- Horse Stable
- Recreational - Passive
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- Heritage

NE CMC Piling Area

MWD for cosmetic damage and human annoyance for CMC piling

- Reinforced structures (25mm/s PPV)
- Human annoyance - Residential (day)
- Human annoyance - Commercial

REV	BY	DATE	DESCRIPTION	APPROVER
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0 30 60 90 m

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FULL SIZE A3

A3 Original

Co-ordinate System: MGA Zone 56

NOTE: Do not scale from this drawing.

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28-30 Burrows Road

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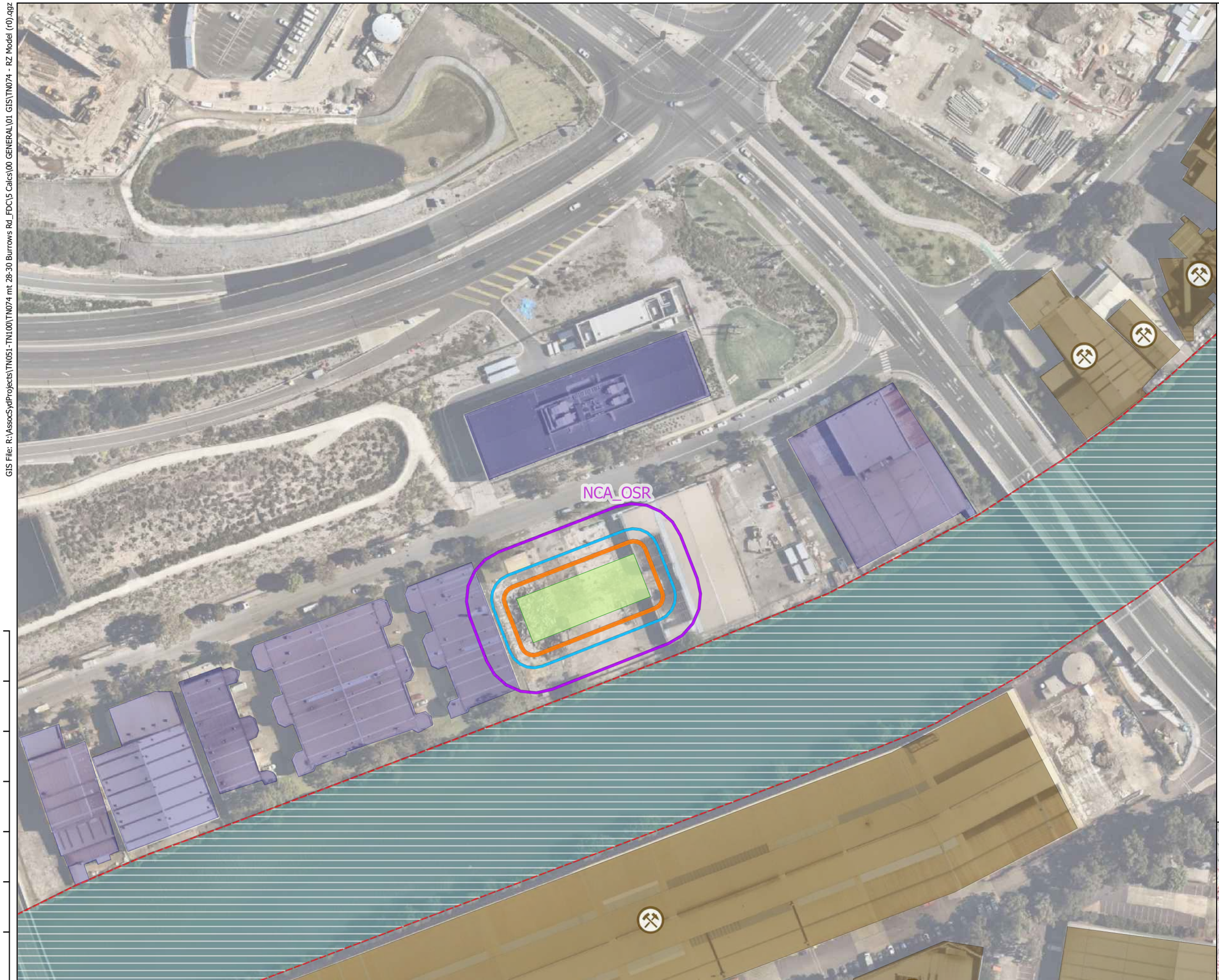

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REV	BY	DATE	DESCRIPTION	APPROVER
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r0	RZ	20/12/22	Prepare figures	TG

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1:1,500

FULL SIZE A3

A3 Original

Co-ordinate System: MGA Zone 56

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28-30 Burrows Road

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r0	RZ	20/12/22	Prepare figures	TG

0 30 60 90 m

1:1,500

FULL SIZE A3

A3 Original

Co-ordinate System: MGA Zone 56

NOTE: Do not scale from this drawing.

CLIENT

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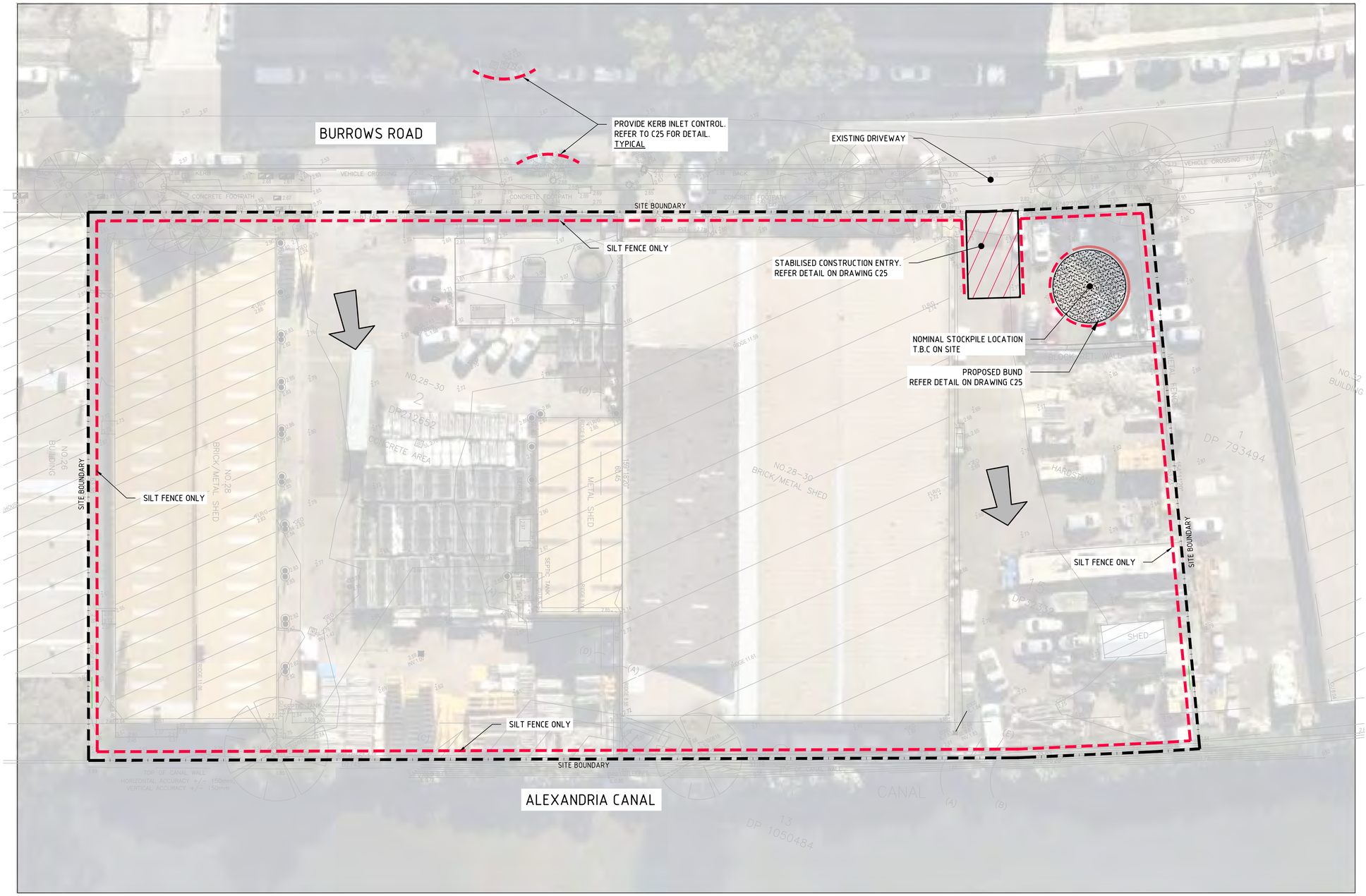
28-30 Burrows Road

CMC Piling Vibration Assessment

APPENDIX E – EROSION & SEDIMENT CONTROL PLAN



EROSION & SEDIMENT CONTROL PLAN
SCALE 1:250

EROSION CONTROL NOTES:

ALL CONTROL WORK INCLUDING DIVERSION BANKS AND CATCH DRAINS, V-DRAINS AND SILT FENCES SHALL BE COMPLETED DIRECTLY FOLLOWING THE COMPLETION OF THE EARTHWORKS.

1. SILT FENCES AND SILT FENCE RETURNS SHALL BE ERECTED CONVEX TO THE CONTOUR TO POND WATER.
2. HAY BALE BARRIERS AND GEOFABRIC FENCES ARE TO BE CONSTRUCTED TO TOE OF BATTER, PRIOR TO COMMENCEMENT OF EARTHWORKS, IMMEDIATELY AFTER CLEARING OF VEGETATION AND BEFORE REMOVAL OF TOP SOIL.
3. ALL TEMPORARY EARTH BERMS, DIVERSION AND SILT DAM EMBANKMENTS ARE TO BE MACHINE COMPACTED, SEEDED AND MULCHED FOR TEMPORARY VEGETATION COVER AS SOON AS THEY HAVE BEEN FORMED.
4. CLEAR WATER IS TO BE DIVERTED AWAY FROM DISTURBED GROUND AND INTO THE DRAINAGE SYSTEM.
5. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND PROVIDING ON GOING ADJUSTMENT TO EROSION CONTROL MEASURES AS REQUIRED DURING CONSTRUCTION.
6. ALL SEDIMENT TRAPPING STRUCTURES AND DEVICES ARE TO BE INSPECTED AFTER STORMS FOR STRUCTURAL DAMAGE OR CLOGGING, TRAPPED MATERIAL IS TO BE REMOVED TO A SAFE, APPROVED LOCATION.
7. ALL FINAL EROSION PREVENTION MEASURES INCLUDING THE ESTABLISHMENT OF GRASSING ARE TO BE MAINTAINED UNTIL THE END OF THE DEFECTS LIABILITY PERIOD.
8. ALL EARTHWORKS AREAS SHALL BE ROLLED ON A REGULAR BASIS TO SEAL THE EARTHWORKS.
9. ALL FILL AREAS ARE TO BE LEFT WITH A BUND AT THE TOP OF THE SLOPE AT THE END OF EACH DAYS EARTHWORKS. THE HEIGHT OF THE BUND SHALL BE A MINIMUM OF 200mm.
10. ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND HYDROMULCHED WITHIN 10 DAYS OF COMPLETION OF FORMATION.
11. AFTER REVEGETATION OF THE SITE IS COMPLETE AND THE SITE IS STABLE IN THE OPINION OF A SUITABLY QUALIFIED PERSON ALL TEMPORARY WORK SUCH AS SILT FENCE, DIVERSION DRAINS ETC SHALL BE REMOVED.
12. ALL TOPSOIL STOCKPILES ARE TO BE SUITABLY COVERED TO THE SATISFACTION OF THE SITE MANAGER TO PREVENT WIND AND WATER EROSION.
13. ANY AREA THAT IS NOT APPROVED BY THE CONTRACT ADMINISTRATOR FOR CLEARING OR DISTURBANCE BY THE CONTRACTOR'S ACTIVITIES SHALL BE CLEARLY MARKED AND SIGN POSTED, FENCED OFF OR OTHERWISE APPROPRIATELY PROTECTED AGAINST ANY SUCH DISTURBANCE.
14. ALL STOCKPILE SITES SHALL BE SITUATED IN AREAS APPROVED FOR SUCH USE BY THE SITE MANAGER. A 6m BUFFER ZONE SHALL EXIST BETWEEN STOCKPILE SITES AND ANY STREAM OR FLOW PATH. ALL STOCKPILES SHALL BE ADEQUATELY PROTECTED FROM EROSION AND CONTAMINATION OF THE SURROUNDING AREA BY USE OF THE MEASURES APPROVED IN THE EROSION AND SEDIMENTATION CONTROL PLAN.
15. ACCESS AND EXIT AREAS SHALL INCLUDE SHAKE-DOWN OR OTHER METHODS APPROVED BY THE SITE MANAGER FOR THE REMOVAL OF SOIL MATERIALS FORM MOTOR VEHICLES.
16. THE CONTRACTOR IS TO ENSURE RUNOFF FROM ALL AREAS WHERE THE NATURAL SURFACE IS DISTURBED BY CONSTRUCTION, INCLUDING ACCESS ROADS, DEPOT AND STOCKPILE SITES, SHALL BE FREE OF POLLUTANTS BEFORE IT IS EITHER DISPERSED TO STABLE AREAS OR DIRECTED TO NATURAL WATERCOURSES.
17. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN SLOPES, CROWNS AND DRAINS ON ALL EXCAVATIONS AND EMBANKMENTS TO ENSURE SATISFACTORY DRAINAGE AT ALL TIMES WATER SHALL NOT BE ALLOWED TO POND ON THE WORKS UNLESS SUCH PONDING IS PART OF AN APPROVED ESCP / SWMP.

LEGEND:

PROVIDE 1m RETURNS TO SILT FENCE AT 30m MAX. INTERVALS.
TYPICAL (N.S.O.P.)

- DENOTES SILT FENCE WITH CATCH DRAIN
- DENOTES SILT FENCE ONLY
- DENOTES CONSTRUCTION ENTRY
- DENOTES OVERLAND FLOW PATH

RUSLE CALCULATION:

TOTAL CATCHMENT AREA = 0.7957 ha
DISTURBED CATCHMENT AREA = 0.7957 ha

A = R x K x LS x P x C

1. 2-yr, 6-hr ARI (S) = 7.07;
2. RAINFALL EROSIVITY FACTOR (R)
   R = $164.74(1.1177)^{S}\ S^{0.6444}$ = 1275.92;
3. SOIL ERODIBILITY FACTOR (K) = 0.075;
4. LENGTH/GRADIENT FACTOR (LS) = 1.0;
5. EROSION CONTROL PRACTICE FACTOR (P) = 1.3;
6. COVER FACTOR (C) = 1.0

SOIL LOSS (A) = 124.40m^3/ha/yr
= 98.99m^3/yr

PER BLUE BOOK GUIDELINES SECTION 6.3.2.d, FOR SITES WITH AVERAGE ANNUAL SOIL LOSS (A) < 150m^3/yr, A SEDIMENT RETENTION BASIN MAY BE CONSIDERED UNNECESSARY.

2m 0 5 10 15 20 25m
SCALE 1:250 AT A1 SIZE SHEET

FOR INFORMATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR INFORMATION	19.10.22	A

ARCHITECT: PACE ARCHITECTS
CLIENT: FDC

PROJECT
QANTAS TRAINING CENTER
28-30 BURROWS ROAD, ST PETERS
NSW, 2044

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
DW	RN	OCT '22	MW	A1	AS SHOWN	C014585.01-C 20

CONSULT AUSTRALIA

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Level 4, 8 Windmill Street, Millers Point NSW 2000
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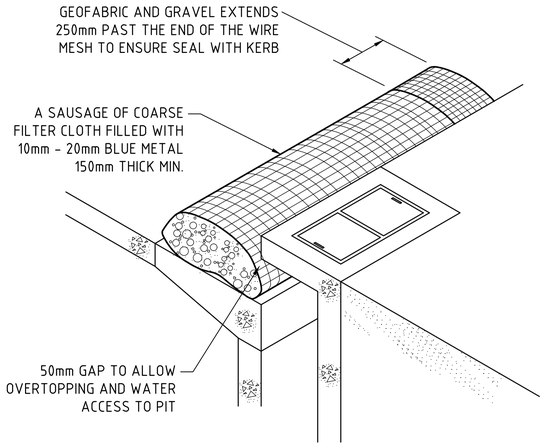
e: mail@costinroe.com.au w: costinroe.com.au
COSTIN ROE CONSULTING
CIVIL & STRUCTURAL ENGINEERS

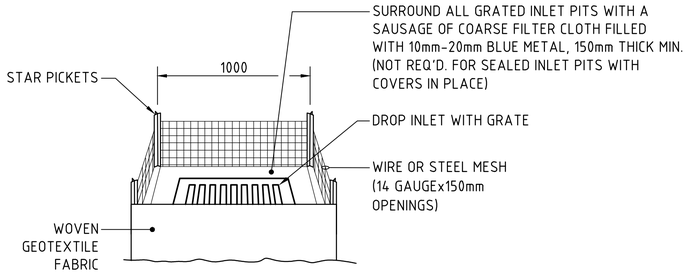
DRAWING TITLE
EROSION & SEDIMENT CONTROL PLAN

DRAWING No C014585.01-C 20
ISSUE A



KERB INLET CONTROL

N.T.S

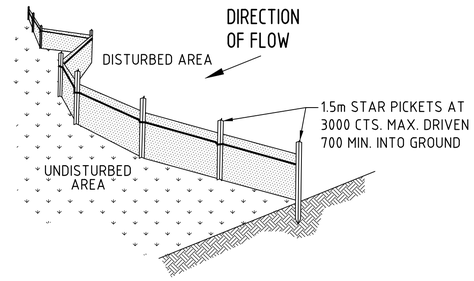


GRATED INLET PIT FILTER DETAIL

N.T.S

NOTE :

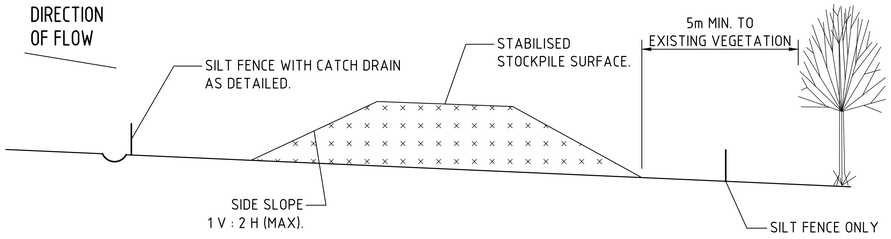
ADOPT ABOVE DETAILS AROUND ALL PITS WITHIN AREA ENCOMPASSED BY SILT FENCE & TO PITS ON THE ROAD ADJACENT TO SITE BOUNDARY.



TYPICAL SILT FENCE DETAIL

N.T.S

NOTE: PROVIDE 1m RETURNS AT 30m INTERVALS. TYPICAL

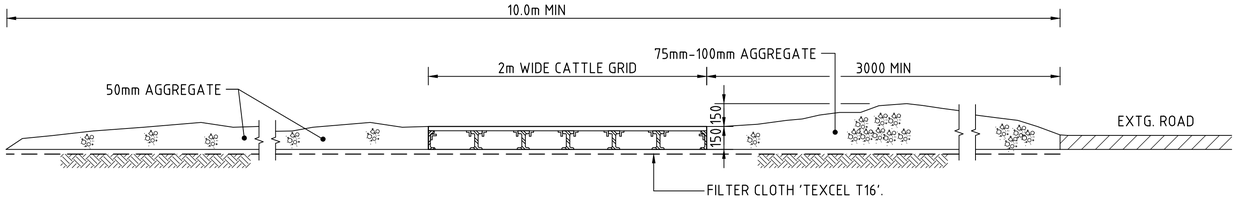


TYPICAL STOCKPILE DETAIL

N.T.S

STOCKPILE NOTES

1. PLACE ALL STOCKPILES IN LOCATIONS MORE THAN 5m FROM EXISTING VEGETATION, ROADS & HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT ELONGATED MOUNDS. SIDE SLOPE TO BE 1 V: 2 H MAX.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2m IN HEIGHT.
4. WHERE STOCKPILES ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE USING WOOD CHIP MULCH - 16 TONNE/Ha.
5. CONSTRUCT SILT FENCE WITH CATCH DRAIN ON UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES & SILT FENCE ONLY 1 TO 2m DOWNSLOPE AS SHOWN.



SECTION 1:20 (1 / C20) : STABILISED CONSTRUCTION ENTRANCE 'TRUCK SHAKER'

NOTES:

ALL EROSION & SEDIMENT CONTROL MEASURES TO BE INSPECTED & MAINTAINED DAILY BY SITE MANAGER.

MINIMISE DISTURBED AREAS.

ROADS & FOOTPATHS TO BE SWEPT DAILY.

1.2m TURF TO BE PLACED BEHIND KERBS.

DUST MINIMISATION CONTROL BY WATERING TO BE IMPLEMENTED BY SITE MANAGER AS REQUIRED OR AS DIRECTED BY THE CEMP.

200mm 0 500 1000 1500 2000mm

SCALE 1:20 AT A1 SIZE SHEET

FOR INFORMATION

ISSUED FOR INFORMATION	19.10.22	A
AMENDMENTS	DATE	ISSUE

ARCHITECT: PACE ARCHITECTS

CLIENT: FDC

PROJECT: QANTAS TRAINING CENTER
28-30 BURROWS ROAD, ST PETERS
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CIVIL & STRUCTURAL ENGINEERS

DRAWING TITLE: EROSION SEDIMENT CONTROL DETAILS

DRAWING No: C014585.01-C 25

ISSUE: A

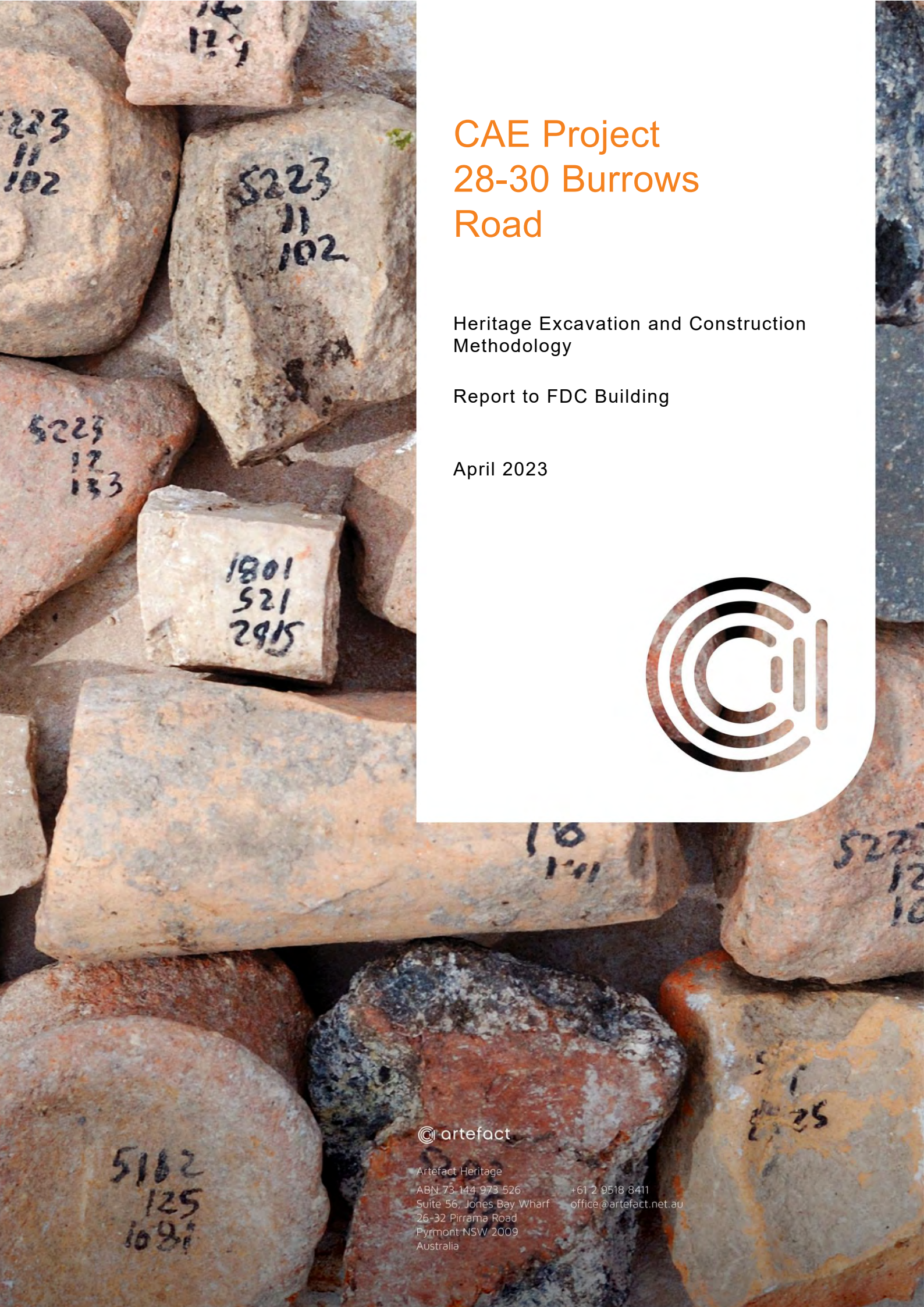
APPENDIX F – Heritage Excavation Construction Methodology

CAE Project 28-30 Burrows Road

Heritage Excavation and Construction Methodology

Report to FDC Building

April 2023



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Document history and status

Revision	Date issued	Reviewed by	Approved by	Date approved	Revision type
1	17/04/23	Anita Yousif	Anita Yousif	18/04/23	Draft 1
2	28/04/23	Anita Yousif	Anita Yousif	21/04/23	Draft 2
3	23/05/23	Anita Yousif	Anita Yousif	23/05/23	Final

Report name:	CAE Project 28-30 Burrows Road Heritage Excavation and Construction Methodology
Author:	Johnny Sokalik
Project manager:	Scott MacArthur
Project number:	220524
Name of organisation:	Artefact Heritage
Document version:	Final

EXECUTIVE SUMMARY

Artefact Heritage (Artefact) has been engaged by FDC Building (the proponent), to prepare a Heritage Excavation and Construction Methodology (HECM) for the proposed flight training centre at 28-30 Burrows Road, St Peters, and the associated construction of the stormwater outlet to be located within the Alexandra Canal (the project).

The potential impact of the works on historic heritage were assessed in a SoHI report prepared by Artefact in November 2022. The report was prepared in accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs), and in support of the State Significant Development Application (SSD-47601708).

The Statement of Heritage Impact (SoHI) provided recommendations to minimise and avoid impacts to significant heritage. FDC Building has engaged Artefact Heritage to prepare a HECM which will form part of the developments Construction Environmental Management Plan (CEMP).

The purpose of the HECM is to address recommendations made in the SoHI prepared by Artefact Heritage in 2022, and outline heritage management requirements for the sites identified within the study area.

CONTENTS

FIGURES

TABLES

GLOSSARY OF TERMS

ACHAR	Aboriginal Cultural Heritage Assessment Report
CEMP	Construction Environmental Management Plan
CNVP	Construction Noise and Vibration Management Plan
CoA	Conditions of Approval
DPC	NSW Department of Premier and Cabinet
DPIE	NSW Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
EMM	Environmental Mitigation Measures
EP&A Act	Environment Planning and Assessment Act 1979 (NSW)
HECM	Heritage Excavation and Construction Methodology
LEP	Local Environmental Plan
Minister, the	The Minister of New South Wales (NSW) Planning
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
PAD	Potential Archaeological Deposit
RNE	Register of the National Estate
SHI	State Heritage Inventory
SHR	State Heritage Register
SoHI	Statement of Heritage Impact
WMS	Work Method Statement

1.0 INTRODUCTION

1.1 Background

Artefact Heritage (Artefact) has been engaged by FDC Building (the proponent), to prepare a Heritage Excavation and Construction Methodology (HECM) for the proposed flight training facility at 28-30 Burrows Road, St Peters, and the construction of the stormwater outlet to be located within the Alexandra Canal (the project).

The project was declared as State Significant Development (SSD-47601708) by the Minister for Planning and Environment under Section 5.25 of the Environmental Planning & Assessment Act 1979. The Minister's Conditions of Approval (CoA) for the project were granted on 12 September 2022. As a result, the proposed works will not be subject to an excavation permit and must follow the conditions of approval outlined for the project.

The potential impact of the works on historic heritage was assessed in a SoHI report prepared by Artefact in November 2022. The report along with an Aboriginal Cultural Heritage Assessment Report (ACHAR) was prepared in accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs), and in support of the SSD Application. The Statement of Heritage Impact (SoHI) provided recommendations to minimise and avoid impacts to significant heritage.

The Development Consent was provided under Section 4.38 of the Environmental Planning and Assessment Act 1979 on the 02 March 2023. The Development Consent outlined conditions of approval for the project including the creation of HECM, and Unexpected Finds Protocol for non-Aboriginal Heritage as well as an Unexpected Finds Protocol and Human Remains Procedure for Aboriginal Heritage. This HECM addresses the CoA in the Development Consent for the project and will form part of the project's Construction Environmental Management Plan (CEMP).

1.2 Project area

The site is located at 28-30 Burrows Road, St Peters (Lot 2/DP 212652 and Lot15/DP32332) with a total area of approximately 8300 square metres. The site is in the City of Sydney Local Government Area (LGA), at the junction with the Inner West and Bayside LGAs. It is situated within a highly industrialised landscape, abutting industrial properties to the east and west. To the north, the site is bounded by Burrows Road, the southern portion of the site includes the Alexandra Canal (Figure 1).

1.3 Report limitations

The Aboriginal cultural heritage values of the project area were previously addressed in the ACHAR prepared by Artefact Heritage in September 2022.[1] As no Aboriginal archaeological sites or potential archaeological deposits (PADs) were identified within the study area, the ACHAR concluded that further Aboriginal archaeological assessment would not be required. Additional assessment of Aboriginal cultural heritage values has therefore not been included in this document. The TfNSW Unexpected heritage items procedure has been recommended for the management of unexpectedly discovered Aboriginal objects as per Section 5.1.

1.4 Authorship

This report was prepared by John Sokalik (Senior Heritage Consultant) and reviewed by Scott MacArthur (Principal), Katrina Stankowski (Principal), and Anita Yousif (Technical Director) all of Artefact Heritage.

[1] Artefact Heritage, November 2018. *Hornsby Quarry Aboriginal Archaeological Survey Report*. Report to GHD.

1.5 Management Process Summary

Table 1: Summary of heritage management procedures for the project.

Stages	Management / Hold points
Pre-enabling works inspection	Heritage consultant to inspect the area for the proposed works and control measures around the Alexandra Canal and photographically record the location prior to impacts.
Monitoring	Heritage consultant is to attend site and monitor all works immediately adjacent to and within the canal. See section 5.3.3
Unexpected Finds	Heritage consultant to attend site and follow the Unexpected Heritage Items Procedure as outlined in Sections 5.1.2, 5.3.4 and 8.1.
Human Remains	Heritage consultant to attend site and follow the Unexpected Heritage Items Procedure as outlined in Sections 5.1.3, 5.3.5 and 8.1.
Alexandra Canal restoration works	Heritage consultant is to attend site and monitor all works around the Alexandra Canal including restoration of the canal see Section 5.2.7. A final inspection will occur once the works are completed.

1.6 Compliance matrix

The purpose of this HECM and the overall CEMP is to address recommendations made in the 2022 SoHI, and outline management requirements for the heritage items identified within the study area. The project heritage conditions provided in the Development Consent and how they are to be implemented during the enabling program are outlined in the compliance matrix below.

Table 2: Heritage compliance matrix

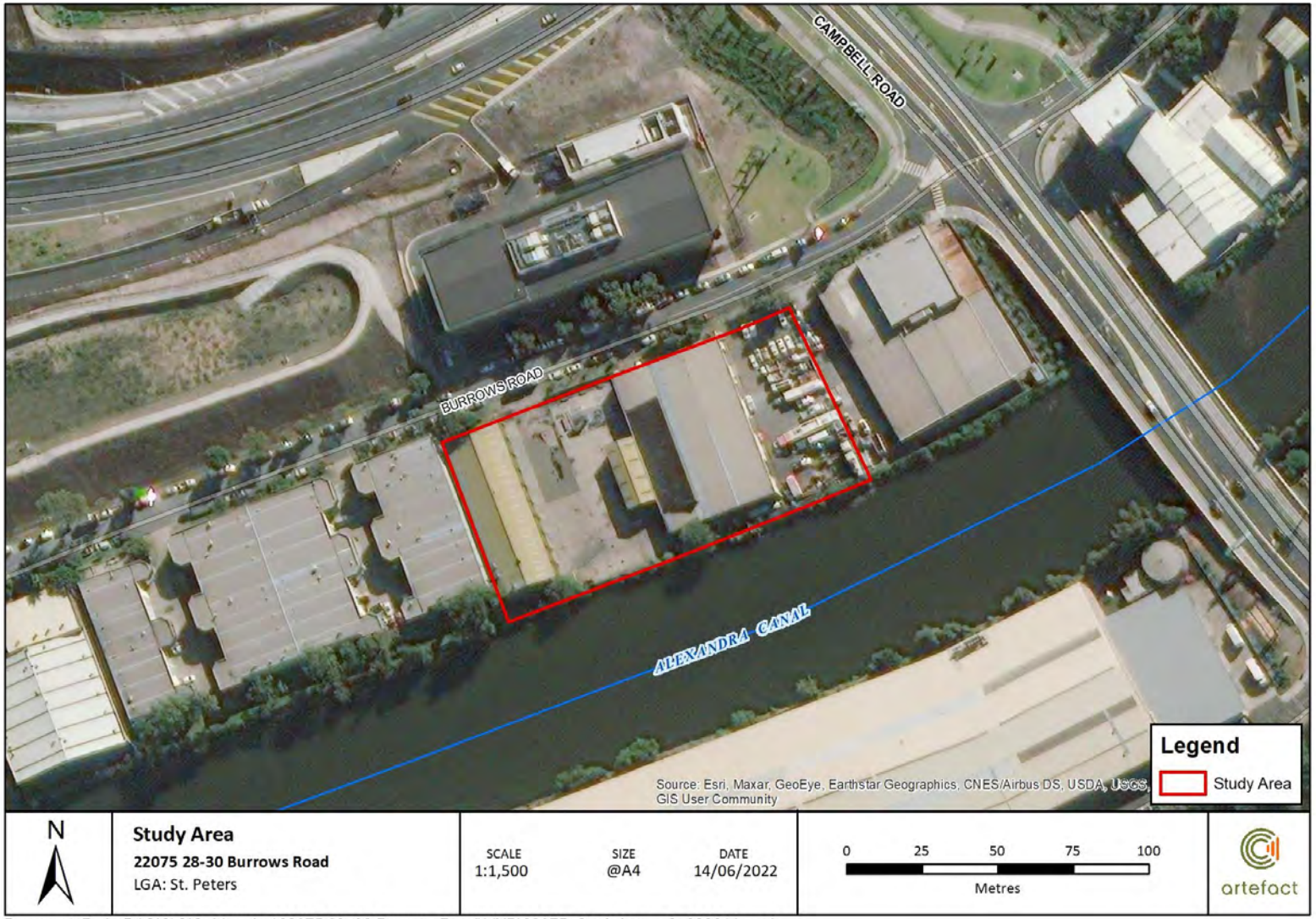
Condition Requirement		Reference	How addressed?
Conditions of Approval			
B35	Prior to the commencement of construction of the stormwater outlet discharging into the Alexandra Canal, the Applicant must prepare an Heritage Excavation and Construction Methodology (HECM) for the development to the satisfaction of the Planning Secretary. The HECM must form part of the development's CEMP, and must: (a) be prepared by a suitably qualified and experienced expert; and (b) describe the methodology for the excavation and construction of the stormwater outlet to be located within the Alexandra Canal sandstone fabric in accordance with the recommendations of the Statement of Heritage Impact, authored by Artefact Heritage Services dated 4 October 2022.	Section 4.0 Section 4.0 Section 5.0 Section 6.0 Section 8.1	This Heritage Excavation and Construction Methodology (HECM) report fulfills the requirements outlined in B35.
B36	The Applicant must: (a) not commence construction until the HECM required under condition B35 has been approved by the Planning Secretary; and (b) implement the most recent version of the HECM approved by the Planning Secretary for the duration of the development.	n/a	This HECM will be approved by the Secretary as a Sub-plan to the CEMP. Minor amendments would also be approved by the Environmental Representative (ER).
B37	If any non-Aboriginal archaeological relics are uncovered during any works being carried out for the development: (a) all work in the immediate vicinity of the suspected relic(s) must cease immediately. (b) Heritage NSW must be contacted immediately; and (c) the suspected relic(s) must be evaluated, recorded and, if necessary, excavated by a suitably qualified and experienced expert in accordance with the requirements of Heritage NSW.	Section 4.4 Section 5.3	This HECM provides management guidelines in the event that archaeological relics are uncovered. The TfNSW Unexpected heritage items procedure (2022) would be implemented where required.
B38	Work in the immediate vicinity of the any suspected non-Aboriginal archaeological relic(s) must not recommence until this has been authorised by Heritage NSW.	Section 5.3.1	The TfNSW Unexpected heritage items procedure (2022) would be implemented where required. This condition is the addressed in the procedure.
B39	If any item or object of Aboriginal heritage significance is identified on site: (a) all work in the immediate vicinity of the suspected Aboriginal item or object must cease immediately. (b) a 10 m wide buffer area around the suspected item or object must be cordoned off; and	Section 4.25.1	This HECM provides management guidelines in the event that an item or object of Aboriginal heritage significance is identified on site. The TfNSW Unexpected heritage items procedure (2022) would be implemented where required.

	(c) Heritage NSW must be contacted immediately.		
B40	Work in the immediate vicinity of the Aboriginal item or object may only recommence in accordance with the provisions of Part 6 of the National Parks and Wildlife Act 1974.	Section 5.1.4	The TfNSW Unexpected heritage items procedure (2022) would be implemented where required. This condition is the addressed in the procedure.
B41	If human remains are discovered on site during any works: (a) all work in the immediate vicinity of the human remains must cease immediately. (b) the area must be secured; and (c) the NSW Police Force and Heritage NSW must be contacted immediately.	Section 5.1.3 Section 5.3.5	This HECM provides management guidelines in the event that human remains are discovered on site during any works. The TfNSW Unexpected heritage items procedure (2022) would be implemented where required.
B42	Work in the immediate vicinity of the human remains must not recommence until this has been authorised by the NSW Police Force and Heritage NSW.	Section 5.1.4 Section 5.3.6	The TfNSW Unexpected heritage items procedure (2022) would be implemented where required. This condition is the addressed in the procedure.
Environmental Mitigation Measures			
	Impacts of construction activities on unexpected archaeological finds If unanticipated suspected Aboriginal objects are uncovered at any time throughout the life of the project, the following steps should be undertaken: • Cease all activity within the vicinity of the find • Leave the material in place and protect it from harm • Take note of the details of the material and its location, take a photograph of the find in situ, preferably with a scale • Inform the site manager/ area supervisor, who would then inform the superintendent/ principal Once the find has been secured, a suitably qualified archaeologist will be contacted to assess the significance of the find and determine management requirements. If the find is identified as a genuine Aboriginal object: • Heritage NSW and Registered Aboriginal Parties (RAPs) must be notified and consulted • A methodology for long-term storage of the find must be developed in consultation with RAPs • The Aboriginal object should be registered on AHIMS	Section 4.0 Section 4.0 Section 5.0 Section 6.0 Section 8.1	The TfNSW Unexpected heritage items procedure (2022) would be implemented where required. These mitigations are addressed in the procedure and in this HECM.

	• Further archaeological mitigation may be required prior to works recommencing. • Works should not recommence until written consent is received from the project archaeologist. • An unexpected finds policy should be implemented in the event that human skeletal remains or Aboriginal objects are identified during construction.		
	Impacts of construction activities on Alexandra Canal The works are to be designed to minimize and avoid impact on the original significant fabric of the canal. Any works that require impacts to the original fabric should be 'made good' once works are complete. • Where the works could impact original and highly significant heritage fabric, only tradespersons with experience in working with heritage materials should undertake works. • The methods, tools and materials used should not cause inadvertent damage to original and highly significant heritage fabric within the study areas. • Should unexpected damage to significant historic fabric occur, the advice of a heritage specialist should be sought before repairs are made; • All works are to be undertaken in accordance with the principles and objectives of the Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (the Burra Charter); • Where options exist for alternative installation methodologies and materials, that achieve the desired functional outcome, preference should be given to the option that has the least deleterious impact on significant heritage fabric. • A Photographic Archival Recording (PAR) report should be prepared for the site to document significant fabric and heritage significant views and vistas that would be impacted in accordance with the Alexandra Canal Conservation Management Plan (CMP) Policy 13, 82 and 86. • This report should be prepared in accordance with relevant guidelines issues by Heritage NSW. • A heritage induction for all contractors undertaking the works is required. This heritage induction must be prepared and delivered by a qualified heritage specialist and ensure that all contractors are aware of the nearby heritage listings and understand the heritage	Section 5.2 Section 5.3 Section 8.1	These mitigations are outlined in this HECM.

	significance of said listings, as well as areas to avoid and steps to take if any unexpected damage occurs during works. • If any artefacts are found during the construction process, they should be incorp they should be incorporated into the interpretation strategy for the entirety of Alexandra Canal in accordance with Policy 86 of the Alexandra Canal CMP.		

Figure 1. Location of the study area



2.0 LEGISLATIVE CONTEXT AND HERITAGE LISTINGS

2.1.1 Statutory heritage listings

A search of all relevant registers was undertaken on 19 July 2022. This search found that although the site has no statutory listings, two items within 200 metres of the site are listed on at least one statutory heritage register.

The results of the heritage registers search are provided in Table 3.

Table 3: Statutory heritage listed items within 200m of the site.

Item	Registered item name	Location	Significance	Listing	Distance from Site	Listing Number
Alexandra Canal	Alexandra Canal	Alexandra Canal	State	SHR	0 meters (Abutting)	I01621
	Alexandra Canal (between Cooks River and Huntley Street) including interior	Alexandra Canal	State	Sydney LEP 2012	0 meters (Abutting)	I3
	Alexandra Canal No. 89AZ	378, Adjacent to Burrows Road, Alexandria, St. Peters, Mascot, Tempe, NSW	State	Sydney Water s170 Heritage and Conservation Register	0 meters (Abutting)	4571712
Rudders Bond Store	Warehouse "Rudders Bond Store" including interior	53–57 Campbell Road, St Peters NSW 2044	Local	Sydney LEP 2012	100 metres	I1405

2.1.2 Non-statutory heritage listings

A search of non-statutory registers, including the Register of the National Estate (RNE) and The National Trust, indicates that there are no non-statutory listings for heritage items within the site. The search identified two items within 200m of the site.

Table 4: Non-statutory heritage listed items within 200m of the site.

Item	Item name	Location	Status	Listing	Distance from Site	Place ID
Alexandra Canal	Alexandra Canal, Airport Dr, Sydney Airport, NSW, Australia	Airport Drive, Sydney Airport, comprising the Alexandra Canal extending from its junction with the Cooks River in the south to its northern limit near Huntley Street, Alexandria.	Interim List (24/09/2002)	RNE (non-statutory archive)	0 meters (Abutting)	103889

	Alexandra Canal (or Shea's Creek)	Alexandra Canal running east and north from Cooks River, around Sydney Airport then through adjoining industrial areas to Alexandria.	N/A		National Trust	0 meters (Abutting)	6586

2.2 Description and significance of listed heritage items

A summary and statement of significance for items within the project area is provided in Section 2.2.1 & 2.2.2 below. A statement of significance for all items in proximity to the project area is provided in 2.2.3. Images of the Alexandra Canal item are provided in Figure 2 - Figure 10.

2.2.1 Items within the project area – Alexandra Canal description

The sandstone wall lining Alexandra Canal is not a structural wall and instead acts as a lining for the earthen embankment behind which is the main wall of the canal. [2] The ashlar sandstone blocks are arranged in a broken range bond which utilises varying sizes of stone block to construct each course. This style of wall construction was likely used as it was an economic use of sandstone and created a structure durable enough to withstand the conditions placed on the embankment. The wall is anchored into a stone rubble foundation and topped with a sandstone cap stone (Figure 2 to Figure 10). [3]

Figure 2. Alexandra Canal sandstone wall from 28 Burrows Road showing existing stormwater outlet (Source: Artefact 2022)

Figure 3. Wider shot of Alexandra Canal Sandstone wall from 28 Burrows Road (Source: Artefact 2022)

[2] WestConnex, *New M% Urban Design and Landscape Plan: Appendix E: Alexandra Canal Sub Plan, Heritage Impact Assessment,* 2017. Accessed: https://www.westconnex.com.au/media/xmqppn4l/new-m5-alexandra-canal-udlp-sub-plan-final-dec-2017.pdf.
[3] WestConnex, WestConnex: Appendix E Alexandra Canal Sub-Plan Final, 2017, 338.

Figure 4. Sandstone capstone of Alexandra Canal Sandstone wall (Source: Artefact, 2022)

Figure 5. View of Alexandra Canal western wall adjacent to 28 Burrows Road, from the eastern bank (Source: LOGOS, 2022)

Figure 6. Stormwater outlet adjacent to 28 Burrows Road, view from the eastern bank (Source: LOGOS, 2022)

Figure 7. Canal wall adjacent to 30 Burrows Road, showing another storm water outlet, which has been releasing acidic drainage indicated by the lack of algae. (Source: LOGOS, 2022)

Figure 8. Alexandra Canal wall adjacent to 30 Burrows Road (Source: LOGOS, 2022)

Figure 9. Alexandra Canal wall adjacent to 30 Burrows Road (Source: LOGOS, 2022)

Figure 10. Alexandra Canal wall adjacent to the north-eastern boundary of 30 Burrows Road (Source: LOGOS, 2022)

2.2.2 Alexandra Canal significanace

The following statement of significance for the Alexandra Canal has been extracted from the SHI listing:

> *Alexandra Canal is of high historic, aesthetic and technical/research significance. Historically, it is a rare example of 19th century navigational canal construction in Australia, being one of only two purpose built canals in the State, with one other known example in Victoria. It has the ability to demonstrate the NSW Governments initiative to create water transport as a means of developing an industrial complex in the Alexandria and Botany areas and exploiting the use of unemployed labour to achieve its scheme.*
>
> *It played a seminal role in the changing pattern and evolution of the occupation and industrial uses of the local area and nearby suburbs, which included filling large areas of low lying land for development.*
>
> *Aesthetically, intact original sections of the canal, comprising pitched dry packed ashlar sandstone, provides a textured and coloured finish which is aesthetically valuable in the cultural landscape. It is a major landmark and dramatic component of the industrial landscape of the area, particularly as viewed from the Ricketty Street Bridge and along Airport Drive.*
>
> *Scientifically, the excavation of the canal provided a valuable contribution to the understanding of the changing sea-levels along the eastern seaboard and the antiquity of the aboriginal presence in the area. Intact original sections of the fascine dyke sandstone construction are rare examples of late 19th century coastal engineering works.*
>
> *The area has been assessed as having no potential to contain historical archaeological material associated with the development or occupation of the area, either prior to or since the construction of the canal. As a result, the site would contain no material of historical significance, or material that could contribute to the significance of Alexandra Canal itself.*[4]

[4] Heritage NSW, "Alexandra Canal," *State Heritage Inventory,* published 2001, https://www.hms.heritage.nsw.gov.au/App/Item/ViewItem?itemId=5053860.

The following assessment of significance for Criterion E – Research Potential has been extracted from the 2004 CMP for the Alexandra Canal:[5]

- *The canal bed may contain examples of extinct flora & fauna species. The discovery of the butchered Dugong, aboriginal axes, and the remains of an ancient forest in this area, uncovered during construction which have revealed both a species and food source of Aboriginal occupation in the Botany Basin and a scientific understanding to the changing sea levels along the area*

- *The canals 3.9 kms of open space with defined edges that form the banks is an important and unique design feature and contributes to the cultural landscape.*

- *The Canal was built for navigational purposes this feature is important in understanding its history, design and function.*

- *The Canal has been formed from a natural water course (Sheas Creek) which is still active as a drainage system and provides for an [estuarine] environment*

2.2.3 Items in proximity of the project area - Rudders Bond Store

While it will not be directly impacted by the works, The Sydney LEP listed Rudders Bond Store (I1405) is located in proximity to the project area. The following statement of significance has been extracted from the SHI listing:

The site is of historical significance for its role in the production of engineered timber in Australia from approximately 1946 to 1958. The factory was built initially for Ralph Symonds and was later occupied by Rudders Bond Store. Symonds was a pioneering manufacturer of such timbers and the building contains a good example of the company's work in the timber frame of the building. The building has strong associations with Ralph Symonds, a pioneer of laminated timber construction in the Post-War era in Sydney and Melbourne, who designed the laminated timber structure supporting the roof of the factory on this site.

This building is of State and possibly National significance as a surviving example of the laminated arches pioneered by Ralph Symonds. As a physical example of these structures the building has great research potential for studying this innovative building technology and to some extent the production processes. Surviving early laminated timber buildings are rare. Miles Lewis identified another early key building; the Burge Brothers Building in Melbourne. Also designed by Symonds in 1945, the Burge Brothers Building is the oldest surviving building of its type in Australia. The subject warehouse would be the second oldest surviving building with engineered timber trusses in Australia.

[5] DPWS Heritage Design Services, *Alexandra Canal Conservation Management Plan*, 2005, p. 45.

The site is significant for its role in the history of engineered timbers across Australia and is of state heritage significance for its historical, associative, aesthetic, technical, rare and representative values

Figure 11. Heritage map of the site. 28 Burrows Road is highlighted in blue, and 30 Burrows Road is shown in Yellow. The adjacent heritage items are outlined in red. The approximate location of the new stormwater line is shown dashed in green (refer Figure 16) (Source: Google Earth, 2022)

3.0 PROPOSED WORKS

The proposed flight training facility will enable pilots and flight crews from Qantas and other airlines to undertake periodic training and testing to meet regulatory requirements by simulating both aircraft and emergency procedural environments. The flight training centre will be situated within a three-storey industrial warehouse and will include:

Flight simulator hall:

- 8 x simulator bays – State of the art full motion flight simulators with visual fidelity, motion and sound. This allows crew to be trained in all aspects of normal and non-normal operations, including instrument approaches and landings in all weather conditions.
- The proposed simulators will complement the flight training facilities in other states.

Emergency procedures component including:

- Cabin evacuation emergency trainer – Full-scale cabin mock-up is used as practical training device. These facilities allow emergency situations to be accurately portrayed and allow pilots and cabin crew to handle emergency situations in both wide and narrow-bodied aircraft.
- Slide descent tower – Enables realistic training of deployment and use of slides to evacuate aircraft for pilots and cabin crew.
- Door trainers – Enables realistic training of use of emergency exits to evacuate aircraft for pilots and cabin crew.

Ancillary spaces (administration and training areas) including:

- Equipment room – Storage of emergency equipment (oxygen tanks, defibrillators etc.) that supports the training and assessment of cabin crew and pilots of aviation medicine.
- Pilots lounge – Area for pilots to wait prior to simulator sessions.
- Meeting rooms and lunch room.
- Reception area.
- Toilets, plant, loading dock.

In addition to the above scope, to facilitate the construction of the flight training facility, a new stormwater outlet and easement are proposed along the southwest boundary of the property which will have an impact on the fabric of the sandstone wall of Alexandra Canal. Two concrete stormwater outlets into Alexandra Canal already exist along the wall to serve 28 and 30 Burrows Road. Artefact has been advised by a civil engineer that:

> *"The existing drainage line and easement is proposed to be relocated to facilitate the construction of the new building. The existing easement is currently traversing across the middle of the proposed warehouse. The relocation will divert the drainage line around the proposed building, along the western (downstream) side of the property.*
>
> *The relocation proposes a new discharge outlet to be constructed. The new drainage outlet is required to maintain a suitable pipe grade (greater than 0.3%). Noting the additional length required to traverse around the building, if the existing discharge point were to be utilised this would result in a flatter unacceptable pipe grade (approximately 0.14%) and overall unacceptable hydraulic conditions.*

To manage the construction of the proposed stormwater discharge point, reference should be made to the works detail on drawings CO14585.00-DA47. The pipe penetration will be constructed in a manner which maintains the heritage form of the channel and is similar to the many other existing pipe penetrations present along the Alexandra Canal."

A selection of the relevant Architectural Plans prepared by CAE and LOGOS, dated 26 July and 20 September 2022 and received by Artefact Heritage in September 2022, are provided in Figure 12 to Figure 21).

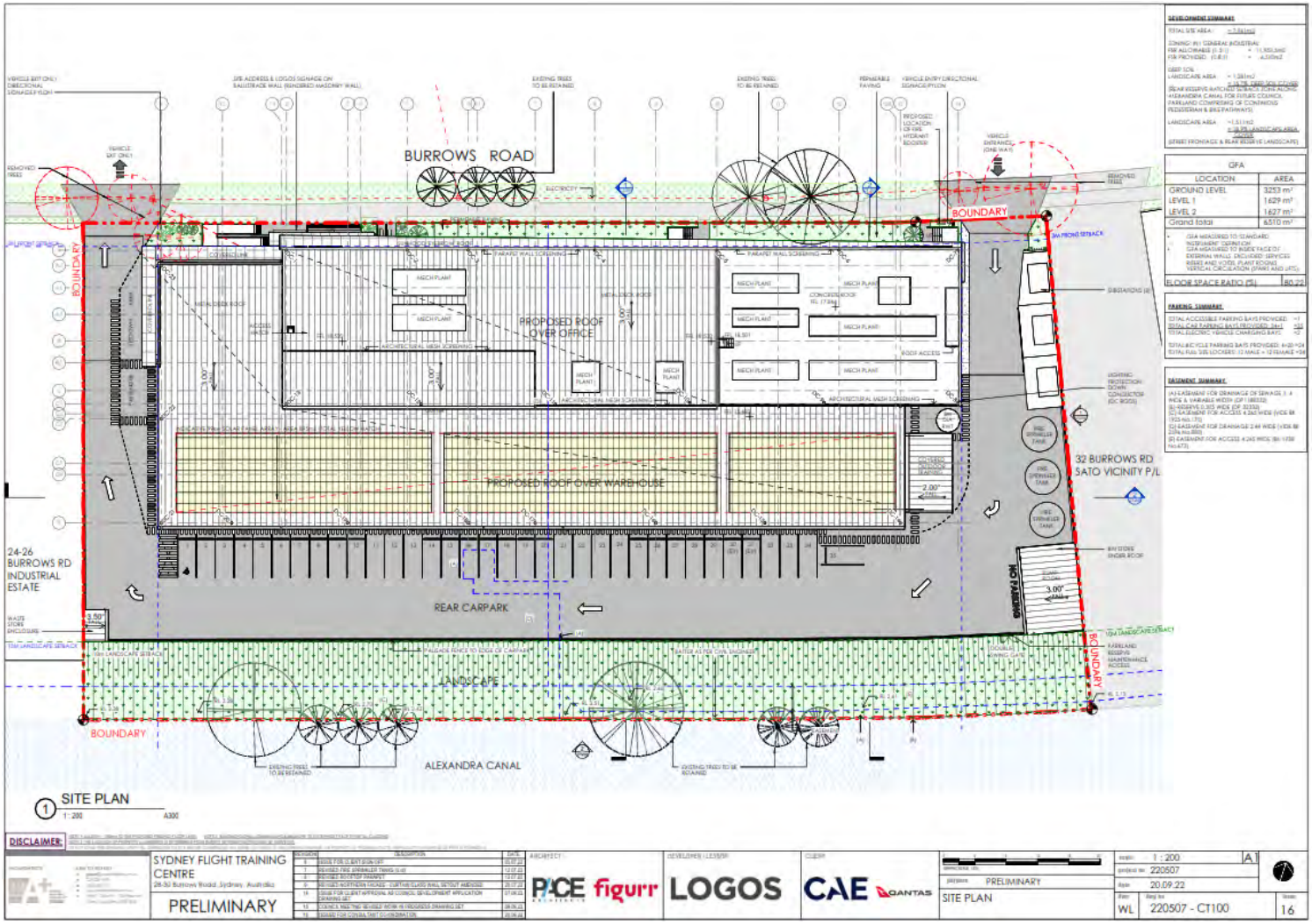


Figure 12. Site Plan of Sydney Flight Training Facility 28-30 Burrows Road. (Source: CAE and LOGOS, 2022)

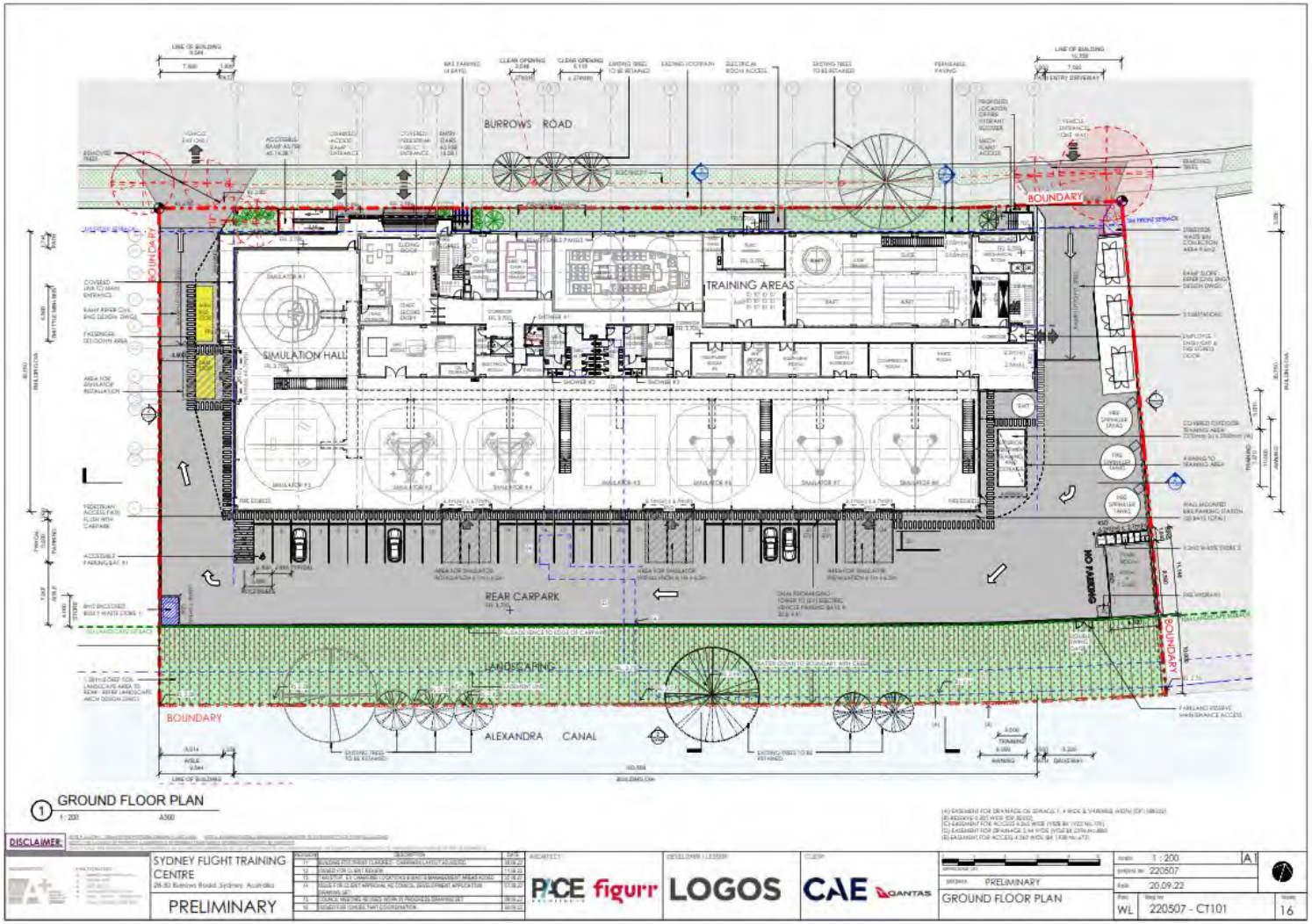


Figure 13. Ground Floor plan of Sydney Flight Training Facility 28-30 Burrows Road. (Source: CAE and LOGOS, 2022)

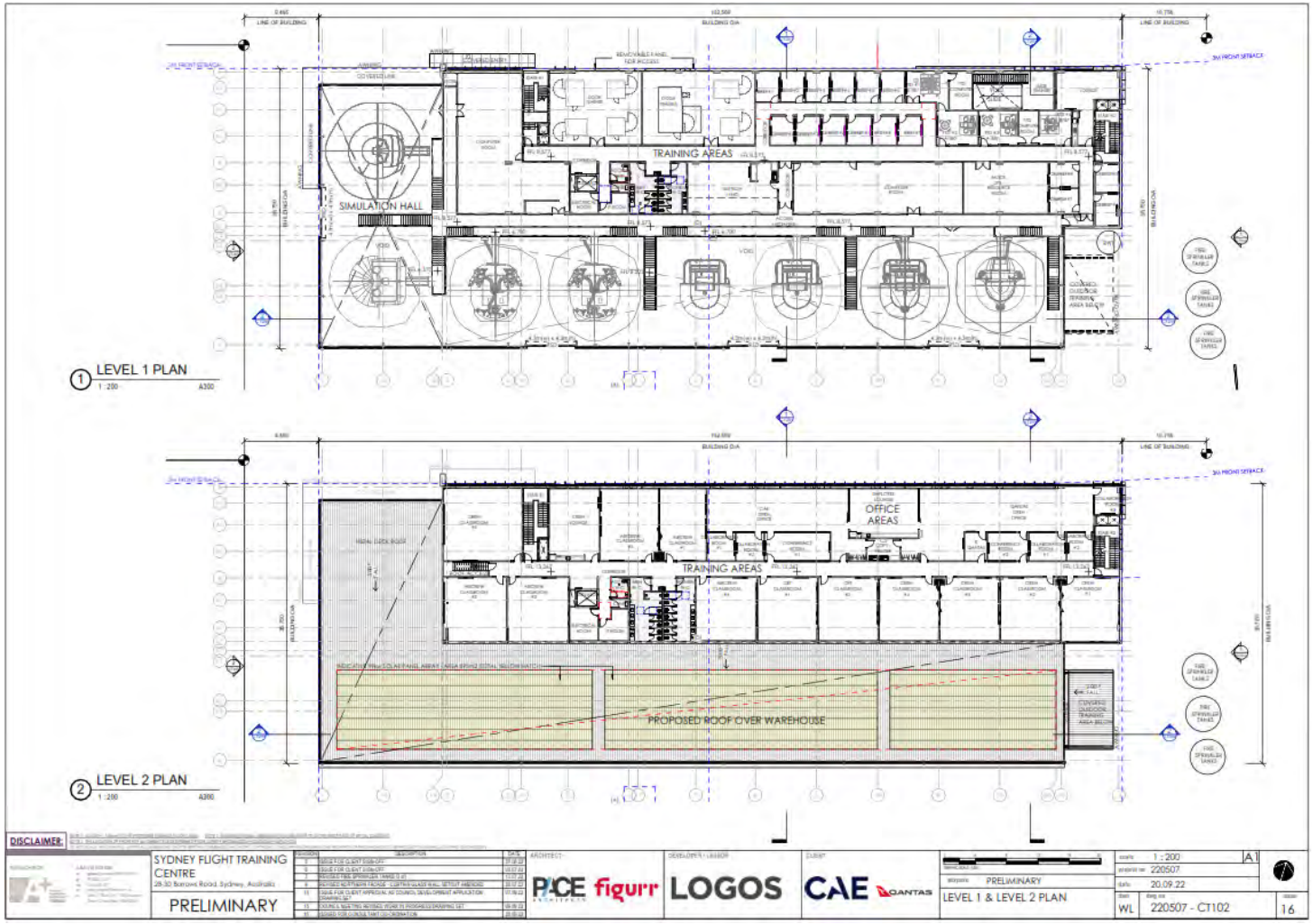


Figure 14. First and Second Floor plans of Sydney Flight Training Facility 28-30 Burrows Road. (Source: CAE and LOGOS, 2022)

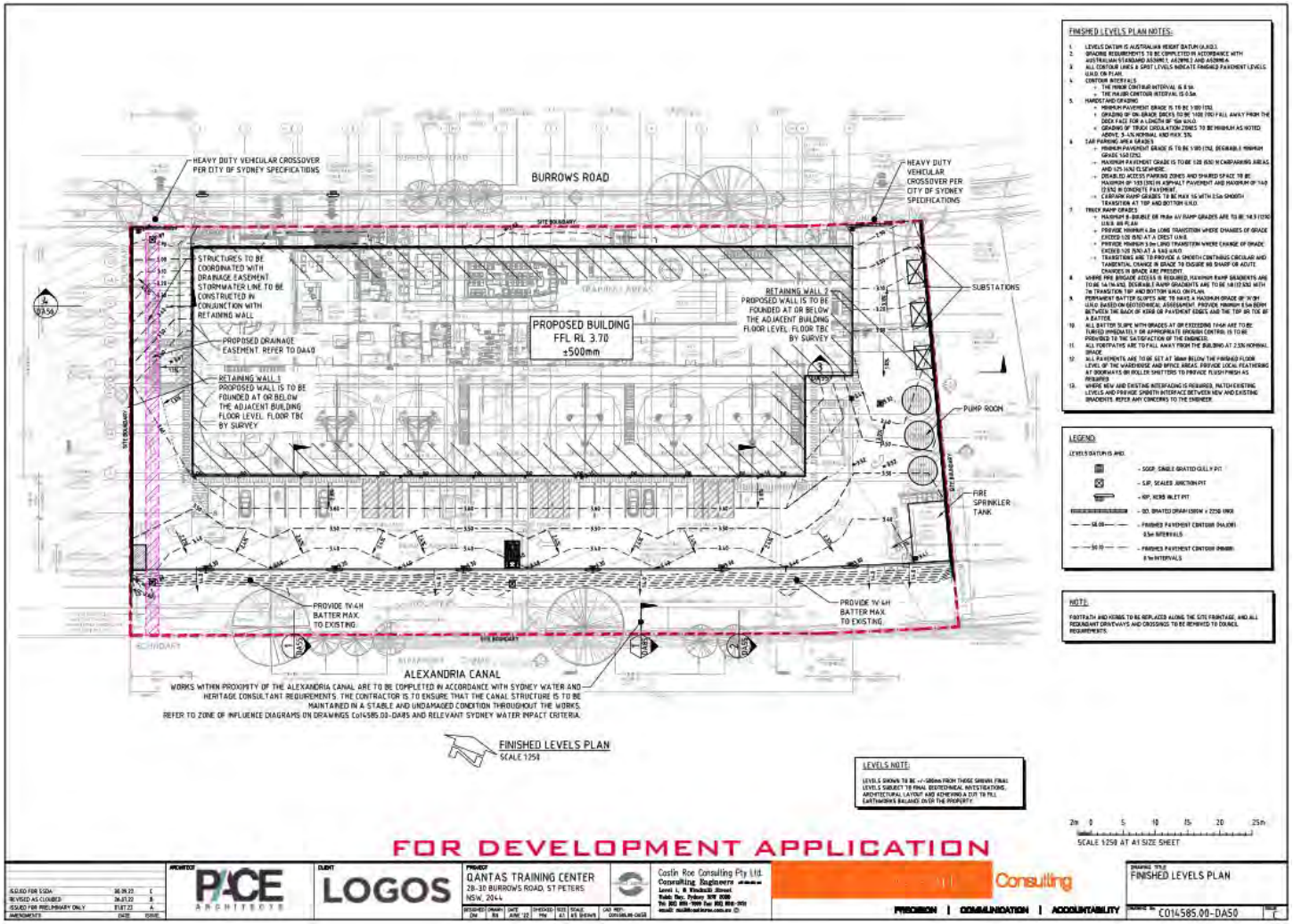


Figure 15. Finished Levels Plan (Source: LOGOS, 2022)

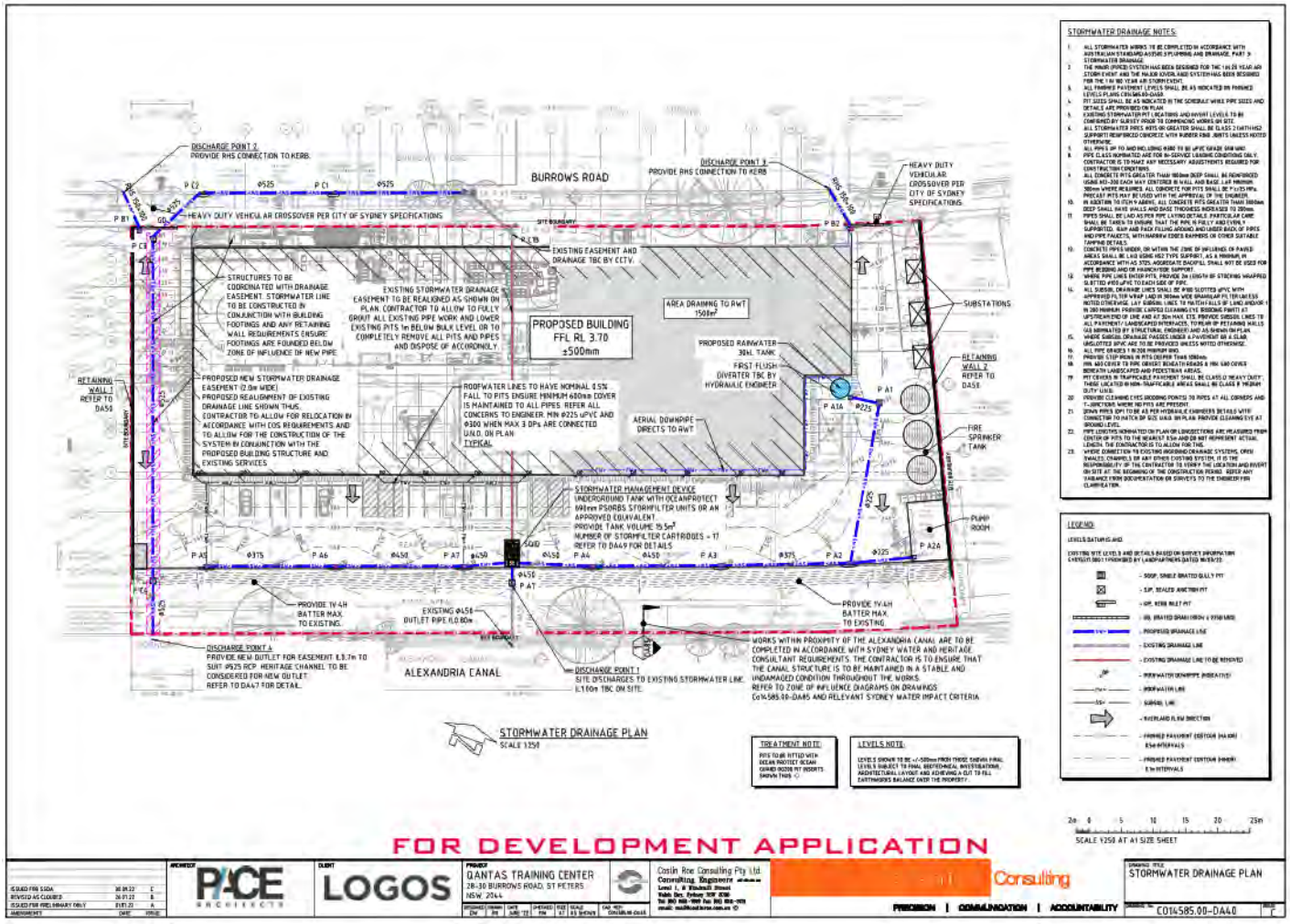


Figure 16. Stormwater Drainage Plan of Sydney Flight Training Facility 28-30 Burrows Road. (Source: CAE and LOGOS, 2022)

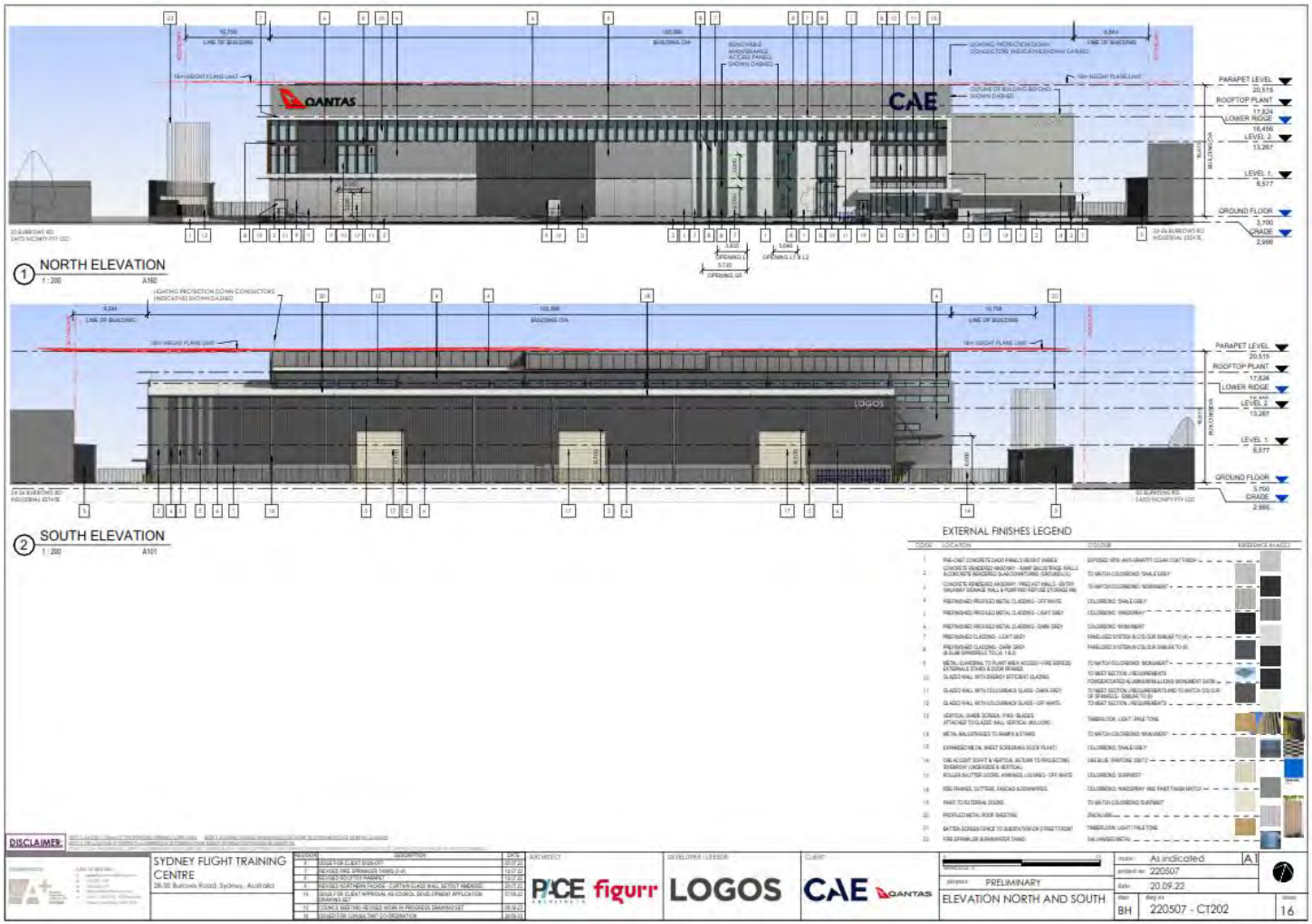


Figure 17. North and South Elevation of Sydney Flight Training Facility 28-30 Burrows Road. (Source: CAE and LOGOS, 2022)

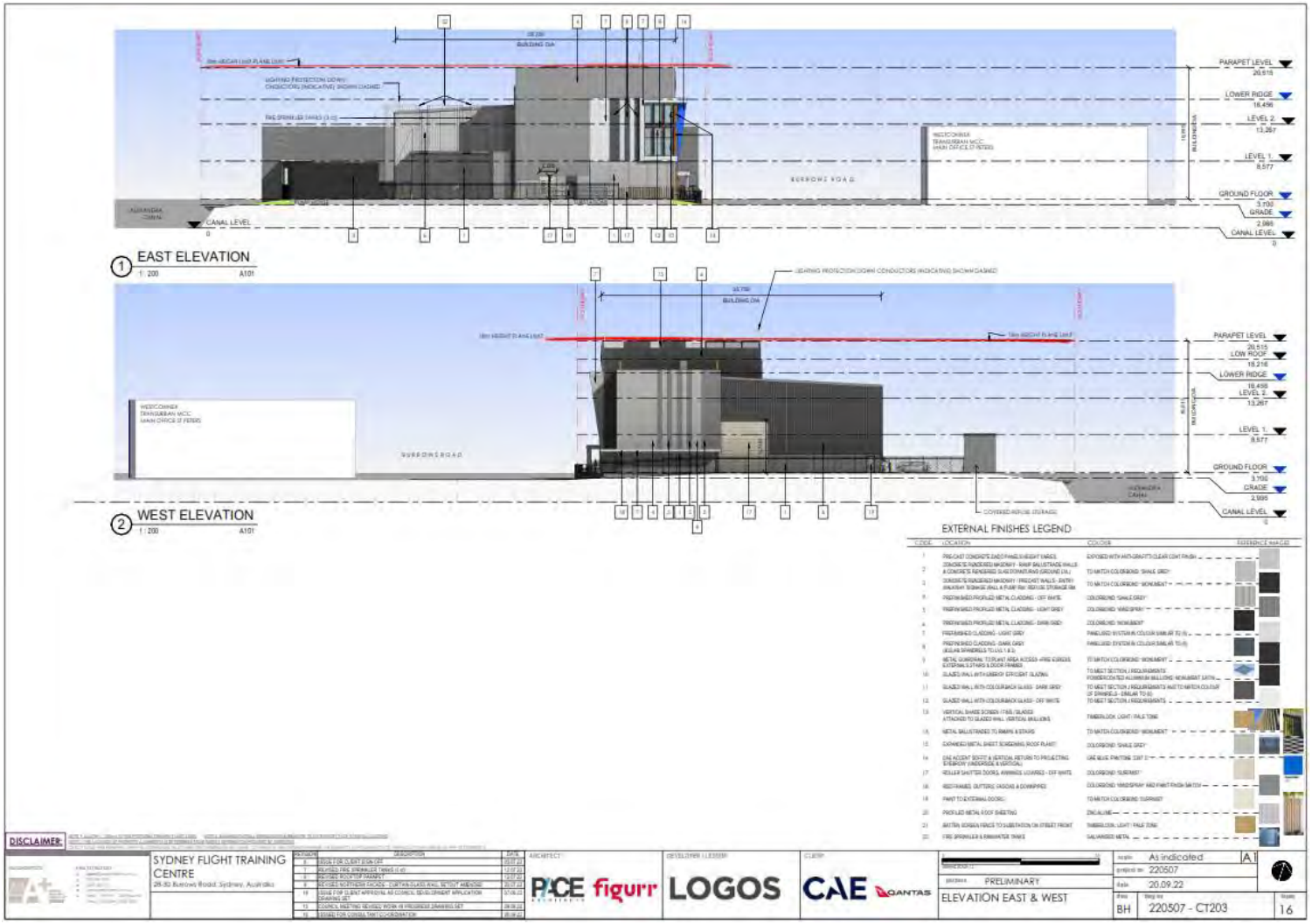


Figure 18. East and West Elevation of Sydney Flight Training Facility 28-30 Burrows Road. (Source: CAE and LOGOS, 2022)

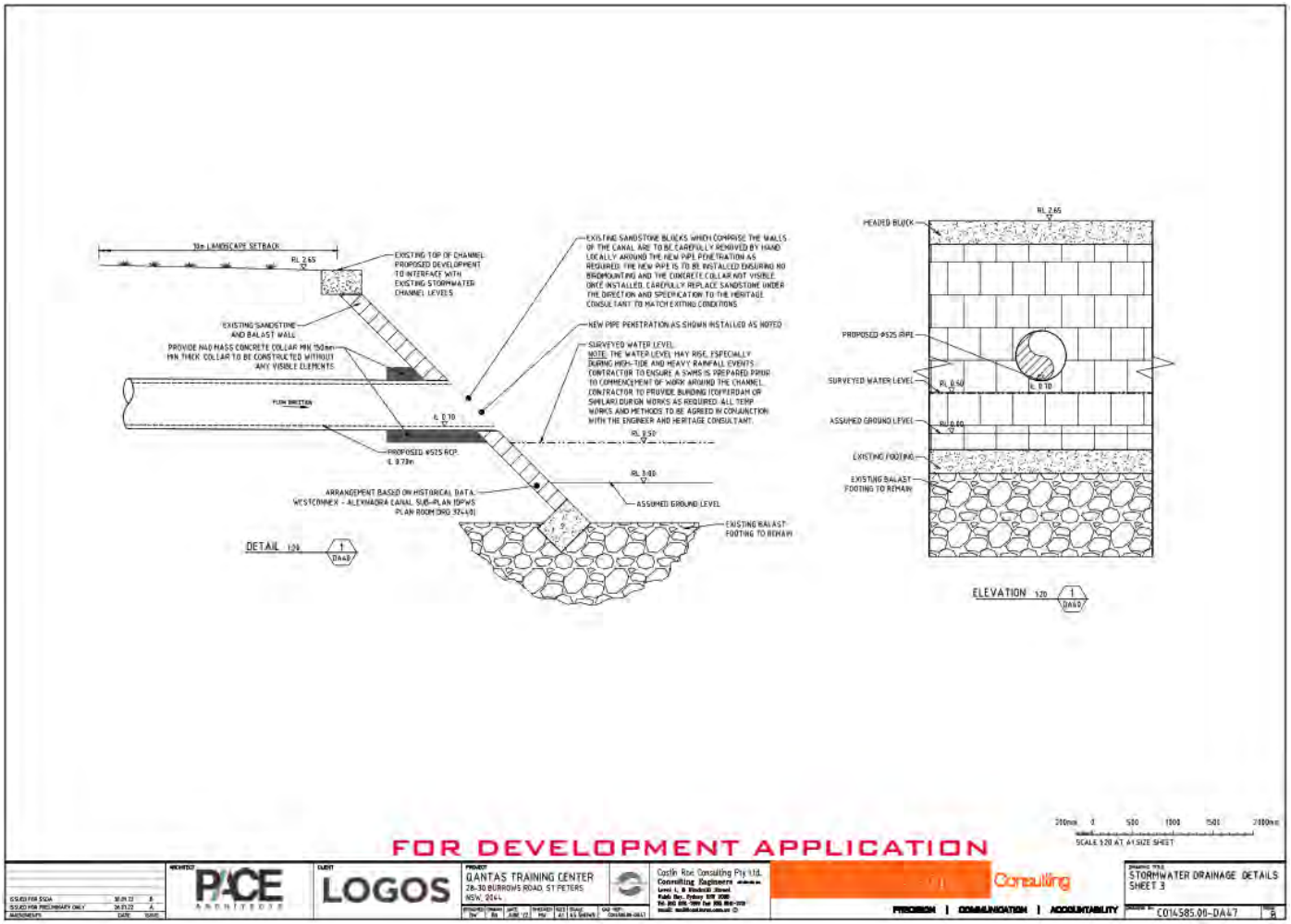


Figure 19. Section and Elevation of new stormwater outlet into Alexandra Canal, 28-30 Burrows Road. (Source: LOGOS, 2022)

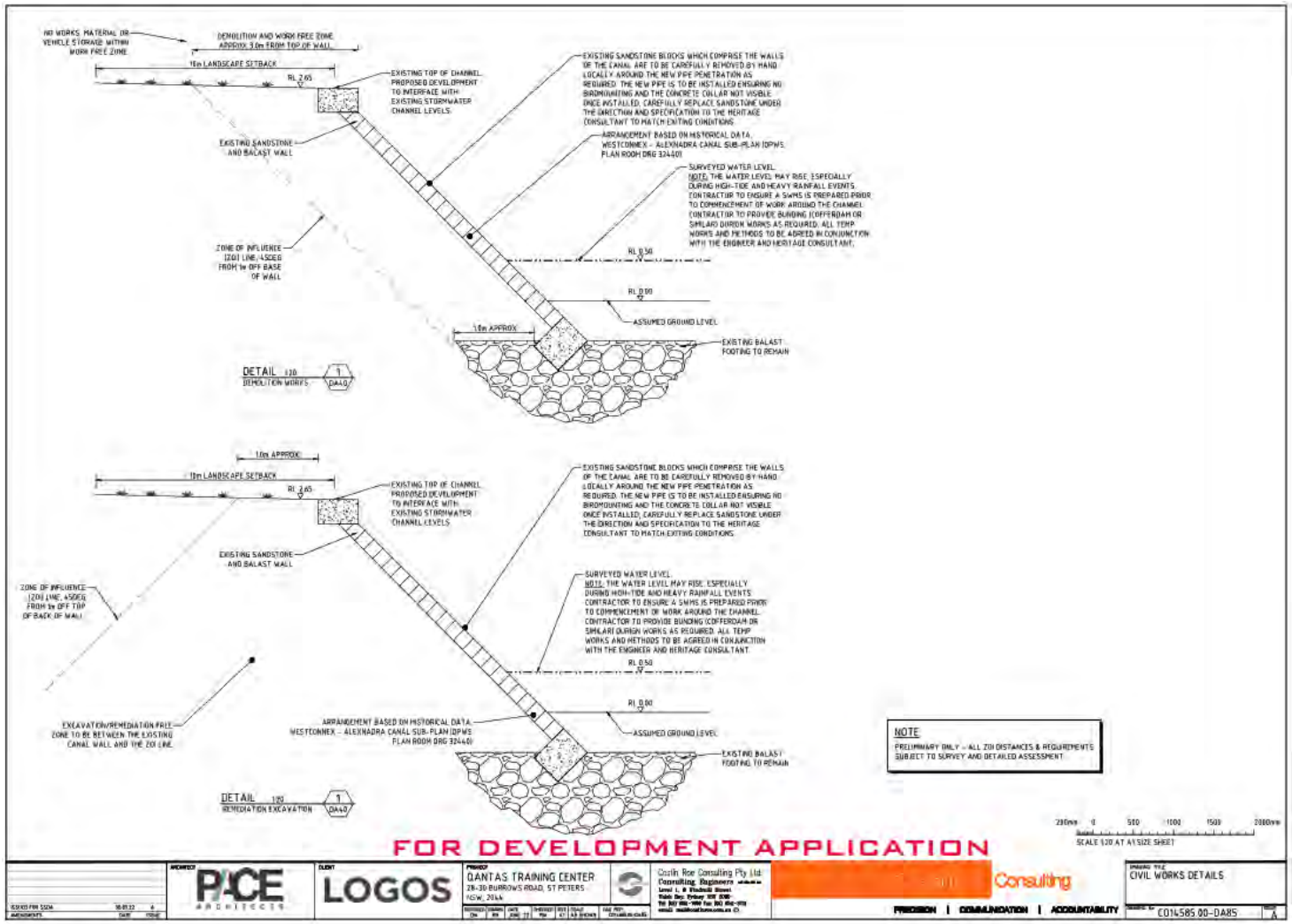


Figure 20. Section of Alexandra Canal Wall Civil Works Details (Source: LOGOS, 2022)

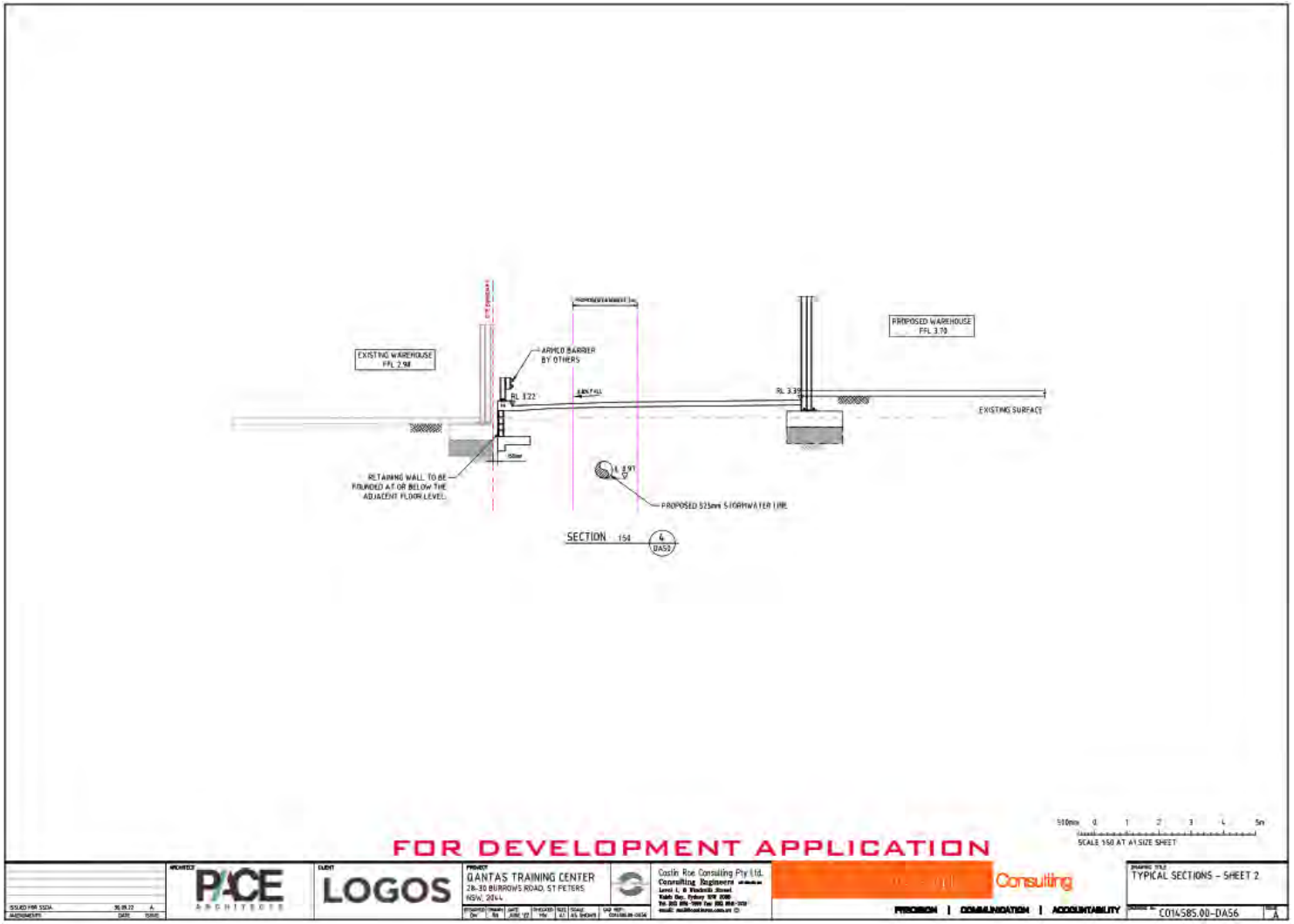


Figure 21. Typical section indicating level of new stormwater outlet (Source: LOGOS, 2022)

4.0 EXISTING ENVIRONMENT

4.1 Background reports

The existing environment and heritage context of the project has been assessed in the following background report prepared to support in support of the State Significant Development Application (SSD-47601708) for the project: Artefact Heritage, *28 – 30 Burrows Road, St Peters Statement of Heritage Impact*. Report to LOGOS, October 2022

4.2 Aboriginal heritage

4.2.1 Aboriginal archaeological potential

Artefact Heritage prepared an Aboriginal Cultural Heritage Assessment Report (ACHAR) to identify Aboriginal sites and areas of Aboriginal archaeological potential study area. The ACHAR was prepared in consultation with the Registered Aboriginal Parties (RAPs). No previously recorded or newly identified Aboriginal sites were identified in the vicinity of study area. The ACHAR concluded that there were no areas of Aboriginal archaeological sensitivity within the study area and the proposed construction footprint.

The overall findings for study area from the ACHAR were that:

- *No sites listed on the Aboriginal Heritage Information Management System (AHIMS) were discovered in the study area*
- *No previously unrecorded Aboriginal sites or objects were identified within the study area during survey*
- *The study area has been heavily disturbed by historical development activities*
- *The study area was assessed as having nil to low potential to retain intact archaeological deposits that may contain Aboriginal objects*

4.2.2 Aboriginal archaeological management

Based on the results of the assessment made in accordance with Aboriginal heritage guidelines mandated in the SEARs for the proposal, the following recommendations were made in the ACHAR:

- *The results of the Aboriginal consultation are to be confirmed, although no additional cultural heritage considerations have been provided to date*
- *As the study area was found to be disturbed and to have a nil-low potential for Aboriginal objects to be located within it, further archaeological assessment is not required.*
- *If changes are made to the proposal that may result in impacts to areas not assessed by this ACHAR, further assessment would be required.*
- *Unexpected Aboriginal objects remain protected by the National Parks and Wildlife Act 1974. If any suspected Aboriginal objects are uncovered in the*

course of construction activities, all work in the vicinity should cease immediately. A qualified archaeologist should be contacted to assess the find and Heritage NSW and Registered Aboriginal Parties must be notified.

- *If human remains, or suspected human remains, are found in the course of construction, all work in the vicinity should cease, the site should be secured, and the NSW Police and Heritage NSW should be notified.*

4.3 Built heritage

4.3.1 Heritage significant fabric

One item of significant fabric was identified within the study area in the SoHI (2022). Significance grading for the Alexandra Canal has been informed by the 2004 CMP for the Alexandra Canal:[6] A summary of the significant fabric within and in the proximity of the study area is provided in Table 5.

Table 5. Summary of significant fabric gradings at St Marys Station

Element	Source	Grading
Alexandra Canal (within)	Alexandra Canal CMP (2004)	High
Rudders Bond Store (100 m outside)	SHI	Not graded

4.4 Non-Aboriginal archaeology

4.4.1 Non-Aboriginal archaeological potential

The 2022 SoHI identified areas of archaeological potential within the works area. Findings of this assessment have been provided below.

4.4.2 Historic phases

The updated archaeological assessment identified three phases of historical development in the project area:

- Phase 1– Early industry (c.1788-1889)
- Phase 2– Resumption and vacant land (c.1889-1940s)
- Phase 3– Industrial development (c.1940s-Present)

The overall findings for study area from the SoHI and statement of significance for the study area at 28-30 Burrows Road is provided below:

The industrial warehouse structures at 28-30 Burrows Road, which date to the second half of the 20th century, contribute to the understanding of St Peters as an industrial area throughout the 19th and 20th centuries. Although the structures are representative of 20th century industrial warehouses, they have no outstanding features that demonstrate the principal characteristics of such building types. The

[6] DPWS Heritage Design Services, *Alexandra Canal Conservation Management Plan*, 2004, p. 45.

buildings also do not possess uncommon, rare or endangered aspects of the local area's cultural or natural history.

The site has low potential for remains of early industry in the local area associated with the use of the site as a dam connected to a flour mill owned by Sir Daniel Cooper during the 19th century (Phase 1:1788-1889). Any artefactual deposits associated with this phase would be residual and sporadic in nature. This archaeological resource would be unlikely to meet the threshold for local significance due to limited research potential. The site has moderate potential for artefactual remains associated with the resumption and backfilling of the dam in c.1889, as well as sporadic accidental deposition of personal effects during the vacancy of the land (Phase 2: c.1889-1940s). Such remains would be decontextualised, and as such, would have no research potential and would not meet the threshold for local significance. The site has high potential for remains of the footings and services of the industrial warehouses dating to the second half of the 20th century (1940s-Present), but such remains would be unlikely to be associated with artefactual deposits. Such remains have no research potential and would not meet the threshold for local significance.

The site does not meet the threshold for local historical, aesthetic, associative or social significance and does not meet the local threshold for research potential, rarity or representativeness.

The following statement regarding the archaeological potential for the Alexandra Canal has also been extracted from the SoHI:

In addition, archaeological evidence of the Alexandra Canal is likely to include the original cuts or trenching for the canal itself, any associated infrastructure and earlier linings of the canal. The potential for such evidence is high. However, the research potential for this archaeological resource is limited, as these elements are known or well documented. This phase has no research potential, as there is no potential for such evidence to demonstrate information not readily available from other sites along the canal or from historical resources. This remains would not be relevant to general questions about human history, other substantive questions relating to Australian history or contribute to other major questions about 20th century industries in the Sydney area. The archaeological resource of the Alexandra Canal would not reach the threshold for local significance under the criterion of research potential.

Table 6: Summary of archaeological potential and significance

Phase	Activity and remains	Potential	Significance
Phase 1 (1788-1889)	Evidence of early land grants, agricultural remains. Remains associated with early industrial development. This phase would exhibit the cutting for the dam as well as accumulated residual fill, which could include sporadic artefacts, representing a mix of intentional deposition events or accidental loss of personal or objects associated with industry.	Low	Unlikely to meet the threshold for local significance
Phase 2 (1889-1940s)	Industrial remains – This phase would likely exhibit a single backfilling event. The backfill is likely to contain a mix of artefactual deposits and building materials, either from the nearby vicinity, such as that of the flour mill, or from a site elsewhere.	Moderate	Unlikely to meet the threshold for local significance
Phase 3 (1950-present)	Represents the industrial development of the site in the second half of the 20th century. Remains may include concrete slabs and footings.	High	Unlikely to meet the threshold for local significance

5.0 HERITAGE MANAGEMENT PROCEDURE

This section of the Heritage Management Procedure outlines the procedures, controls and mitigation measures that would be implemented to manage and mitigate Aboriginal and non-Aboriginal cultural heritage risks for the proposed works. The management measures are based on the mitigation measures compiled from the relevant requirements of the project such as the CoA, EIS and EMMs.

5.1 Aboriginal archaeological management

5.1.1 Aboriginal Cultural Heritage Assessment Report

An ACHAR was prepared by Artefact as part of the EIS for the project. Comprehensive Aboriginal consultation was undertaken as part of the preparation of the ACHAR. The ACHAR did not identify any Aboriginal objects, sites, or areas of archaeological sensitivity in, or within 100m of, the study area. As a result, it is recommended that the construction site be managed under the TfNSW Unexpected heritage items procedure (2022).

5.1.2 Unexpected finds

Following the discovery of new finds of Aboriginal objects – works will cease in the immediate area and the area would be secured. Assessment of the site/object and subsequent management of the site will be carried out in accordance with the TfNSW Unexpected heritage items procedure (Section 8.1). The use of the TfNSW Unexpected heritage items procedure would satisfy the requirements of B39, and B40 to prepare and implement an Unexpected Heritage Finds Procedure for the project.

All new sites will be recorded on standard Archaeological Heritage Information Management Service (AHIMS) site cards and lodged with Heritage NSW, DPC in accordance with the EMMs.

Following the discovery of unexpected Aboriginal objects, the proponent would notify, Heritage NSW, DPC, City of Sydney Council, Aboriginal and Torres Strait Island Reference Group and the RAPs in accordance with the EMMs.

5.1.3 Human remains

If suspected human remains are identified the TfNSW Unexpected heritage items procedure and would be implemented in accordance with B41, B42 and the EMMs.

Works will immediately cease in that area. The discoverer will immediately notify machinery operators so that no further disturbance of the remains will occur, as well as notify the foreman/site supervisor, principal contractor, project archaeologist and the Environmental Representative. The TfNSW Unexpected heritage items procedure will be enacted. Preliminary notification to the NSW Police will be undertaken by the Environmental Manager.

Once confirmation is received from the technical specialist that the remains are of human origin then formulation of an archaeological or heritage management plan will e required. TfNSW Unexpected heritage items procedure. No works are to recommence until clearance is provided by Heritage NSW, DPC and/or the NSW Police as required by the TfNSW Unexpected heritage items procedure and condition B42.

5.1.4 Clearance

A written clearance confirmation would be provided by the project archaeologist to the proponent once the Aboriginal archaeological management of an unexpected find has been completed. This would be signed off by proponent before works recommenced. Construction would continue under the TfNSW Unexpected heritage items procedure.

5.1.5 Reporting

Upon completion of any unexpected finds reporting and required mitigation measures, post excavation reporting in accordance with the Heritage NSW, DPC Aboriginal requirements will be undertaken within two years of the completion of archaeological works. The post-excavation report is to be prepared by the Aboriginal archaeologist in consultation with the RAPs. RAPs would review the draft report prior to finalisation.

5.2 Built heritage management

5.2.1 General

Impacts to heritage items as a result of the proposed works would be limited to the Alexandra Canal (SHR# I01621) curtilage. It is expected that impacts to significant built heritage fabric associated with Alexandra Canal would generally be minimal and will only affect heritage fabric that has been considered as part of the project approvals as required by B35 and the EMMs.

The proposed activities are largely limited to the fabric of the canal wall, but the sandstone remnants are considered to be significant fabric. The removal of sandstone blocks in order to instal a new outlet will result in permanent modification of fabric associated with the Alexandra Canal. Hoarding and barriers would be installed to delineate the main work site from the Alexandra Canal area.

The level of impacts to Alexandra Canal are informed by the SoHI and design plans issued to Artefact Heritage in preparation of this HECM.

5.2.2 Design requirements

The design development of the proposed works was considered as part of the development of the SoHI and this HECM. The design considered the heritage values of the study area and in particular Alexandra Canal which included consultation with the Heritage Council of NSW and other relevant stakeholders. The design maintains the established aesthetic and form of Alexandra Canal, minimises impacts to significant fabric, and does not destroy, modify or impact heritage fabric that is not approved under the project conditions in accordance with B35 and the EMMs.

Input into the design development has been provided by an appropriately qualified and suitably experienced heritage architect in accordance with the recommendations outlined in the SoHI.

The following measures would also be put in place to minimise adverse impacts resulting from the proposed works. These measures outline mitigation strategies that would be employed during the works in order to avoid or reduce impact levels to Alexandra Canal where possible:

- Exclusion zones during works
- Vibration monitoring.

5.2.3 Archival photographic recording

Archival photographic recording has been undertaken by Artefact Heritage according to the methodologies of the following documents as specified in the EMMs:

- NSW Heritage Council guideline “Photographic Recording of Heritage Items Using Film or Digital Capture” (2006); and
- NSW Heritage Office publication “How to Prepare Archival Records of Heritage Items” (1998).

The proposed works would involve the permanent modification and installation of elements within the Alexandra Canal which would affect the setting of the heritage item. As a result, archival recording has been undertaken prior to the commencement of works. The Archival Recording Report will be

prepared and provided to the proponent to submit to the Planning Secretary, Heritage NSW, DPC and relevant councils and local historical societies within 12 months of the completion of the works in accordance with EMMs and recommendations of the SoHI.

5.2.4 Heritage interpretation

Due to the minor nature of the works, the preparation of a heritage interpretation strategy is not required for the proposed works.

5.2.5 Exclusion zones

Exclusion zones, including hoarding, fencing, screening or mapped no go zones would be provided where the proposed works are to be undertaken in close proximity to significant elements to minimise the risk of impacts. In particular, the Alexandra Canal must not be adversely affected in accordance with B35 and the EMMs. At a minimum, the location nearby heritage items and significant elements must be marked on environmental control plans.

Physical barriers such as hoarding, screening or protective blankets would primarily be needed where works or plant movement would be undertaken within about 5m of significant fabric of a heritage item such as the Alexandra Canal. Where physical barriers are set up around the canal, they must be sufficiently set back from the structure (approximately 3m) to ensure that if the hoarding collapsed it would not strike the items. Signage would be attached to the barriers to identify the items and outline management requirements.

The requirements for exclusion zones when working in the vicinity of significant elements would be included in site inductions, toolbox meetings, and marked on site maps and signs onsite.

5.2.6 Vibration monitoring

The proposed works would involve the use of vibration intensive plant including handheld drills, small vibratory rollers, hydraulic hammers, and vibratory piles. The EIS Technical Paper Appendix X: Noise and Vibration Impact Assessment prepared for the project identifies that the distance is less than the minimum working distance for an unsound heritage structure for impact piling works.

It is recommended that the Noise and Vibration Management Sub-Plan for the project is followed in order to minimise impacts to the Alexandra Canal. If vibration limits are exceeded or if it is identified that the levels of vibration are causing damage to heritage fabric, works would cease, and the construction methodology would be reviewed by the project engineers in consultation with a Heritage Consultant in order to mitigate further impacts. A temporary protection plans to outline protection measures required for significant fabric during activities causing potential vibration impacts would be prepared prior to commencement of works.

5.2.7 Heritage architect and monitoring

Where proposed works would modify or impact significant heritage fabric of the Alexandra Canal, work methodologies will be undertaken by skilled tradespeople in consultation with an appropriately qualified and suitably experienced heritage architect in accordance with the EMMs and SoHI. These works will be monitored by a qualified heritage consultant. If evidence of deterioration is observed in significant fabric as a result of the enabling works, such as impacts caused by vibrations, or if there is an inadvertent impact to significant fabric, advice on management and treatment would be sought from the heritage architect.

Where necessary the heritage architect would also provide additional input into the project works design where it relates to significant heritage fabric, or where the design would affect the established aesthetic and forms of the Alexandra Canal.

5.3 Non-Aboriginal archaeological management

5.3.1 Archaeological management

Archaeological management would be undertaken in accordance with the SoHI and this HECM. Ground disturbance would mostly be undertaken within the areas of nil or low potential for archaeological remains of local significance which are identified within the study area. The proposed works would therefore be managed in accordance with this HECM, as required by B37 and the EMMs, which consists of management under the TfNSW Unexpected heritage items procedure.

5.3.2 Excavation directors

Before commencement of archaeological excavation, the Proponent must, in consultation with Heritage NSW, nominate a suitably qualified Excavation Director, who complies with Heritage Council of NSW's Criteria for Assessment of Excavation Director (September 2019), to oversee and advise on matters associated with historical archaeology for the approval of the Planning Secretary. The Excavation Director would be present to oversee excavation where required, advise on archaeological issues, and advise on the duration and extent of oversight required during archaeological excavations.

As ground disturbance for the proposed works would be limited to areas identified to unlikely have archaeological remains that would reach the threshold of local significance oversight by an Excavation Director is not required for these works. Therefore, the involvement of the Excavation Director would only be required in the event of the discovery of a significant unexpected find. If a significant unexpected find is encountered during the proposed works, a suitably qualified Excavation Director would be nominated to provide advice on archaeological management of the find.

If a significant unexpected find is encountered during the proposed works, Anita Yousif (Artefact Heritage) would be nominated as Primary Excavation Director and Jenny Winnett (Artefact Heritage) would be nominated as Secondary Excavation Director.

5.3.3 Archaeological monitoring

It is recommended that monitoring for historical archaeological remains be undertaken during an impact works within or adjacent to the Alexandra Canal. Should historical features be identified during the proposed works, excavation will switch to single context excavation until the base of the feature is identified. It is important that historical features are excavated by single context excavation, as otherwise retrieved material may be mixed between historical features and natural contexts. Hand excavation will preserve the integrity of underlying natural deposits. In general, historic deposits will not be sieved, and no artefacts collected.

5.3.4 Unexpected finds

In accordance with the management strategy outlined in the SoHI and this HECM, due to the low archaeological potential of subsurface works within the study area works would be managed under the TfNSW Unexpected heritage items procedure (Section 8.1). In the event that an unexpected find is encountered works will cease in the area and the area will be secured. The project archaeologists will be contacted to assess the find and advise on the management required. This would satisfy the requirements of B37, B39 and the EMMs.

It is noted that there is a minor difference between archaeological remains assessed in the SoHI but identified through the unexpected finds procedure, compared to archaeological finds that are considered unexpected. An archaeological find would be unexpected if it was not identified in the SoHI as a class or type of possible remain, or if it was identified as locally significant but was assessed, after identification, as being of State significance.

5.3.5 Human remains

If suspected human remains are identified, The TfNSW Unexpected heritage items procedure would be implemented in accordance with B41, B42 and the EMMs.

Works will immediately cease in that area. The discoverer will immediately notify machinery operators so that no further disturbance of the remains will occur, as well as notify the foreman/site supervisor, principal contractor, project archaeologist and the project's Environmental Representative. Preliminary notification to the NSW Police will be undertaken by the Environmental Manager.

Once confirmation is received from the technical specialist that the remains are of human origin then formulation of an archaeological or heritage management plan will be required. TfNSW Unexpected heritage items procedure. No works are to recommence until clearance is provided by Heritage NSW, DPC and/or the NSW Police as required by the TfNSW Unexpected heritage items procedure and condition B42.

5.3.6 Clearance

A written clearance confirmation would be provided by the project archaeologist to the proponent once the Aboriginal archaeological management of an unexpected find has been completed. This would be signed off by proponent before works recommenced. Construction would continue under the TfNSW Unexpected heritage items procedure.

5.3.7 Storage of archaeological materials

If archaeological remains are encountered which include artefact deposits or other elements which are determined by the Excavation Director to be suitable for collection, then these would be salvaged for cataloguing and analysis as part of the archaeological management. Where possible artefact cleaning and preliminary cataloguing would occur on site, otherwise artefacts would be catalogued and stored off site at a designated facility. Artefact's cataloguing database would be used along with a sampling procedure outlined in the unexpected find response to the archaeological remains that has been approved by the Primary Excavation Director.

5.3.8 Reporting

In the event that significant unexpected finds requiring archaeological management are encountered during the proposed works, a non-Aboriginal Archaeological Excavation Report would be prepared at the completion of works. The post excavation reporting will be prepared in accordance with Heritage Council of NSW and Heritage NSW, DPC requirements and guidelines, and will be undertaken within 12 months of the completion of archaeological works as required by the EMMs. The non-Aboriginal Archaeological Excavation Report would be prepared under the direction of the Primary Excavation Director.

The non-Aboriginal Archaeological Excavation Report will be prepared in accordance with the standard requirements of an Excavation permit issued by the Heritage Council:

a) An executive summary of the archaeological programme;
b) Due credit to the client paying for the excavation, on the title page;
c) An accurate site location and site plan (with scale and north arrow);
d) Historical research, references and bibliography;
e) Detailed information on the excavation, including the aim, the context for the excavation, procedures, treatment of artefacts (cleaning, conserving, sorting, cataloguing, labelling, scale photographs and/or drawings, location of repository) and analysis of the information retrieved;
f) Nominated repository for the items;

g) Conclusions from the archaeological programme. The information must include a reassessment of the site's heritage significance, statement(s) on how archaeological investigations at this site have contributed to the community's understanding of the site and other comparable archaeological sites in the local area and any relevant recommendations for the future management of the site information and artefacts;
h) Details of how this information about this excavation has been publicly disseminated (for example provide details about Public Open Days and include copies of press releases, public brochures and/or information signs produced to explain the archaeological significance of the site).

In addition to the Planning Secretary, Heritage NSW, DPC and City of Sydney Council, copies of the non-Aboriginal Archaeological Excavation Report would be provided to relevant local historical societies and local libraries.

6.0 ROLES AND RESPONSIBILITIES

Responsibility for the implementation of the management measures outlined in this HECM are presented in Table 7.

All personnel are responsible for ensuring heritage items are protected and managed in accordance with the CoA and this HECM.

Failure to report discovery or damage or destruction resulting from unauthorised removal or alteration to a site of an archaeological object may be prosecuted under the *NP&W Act* and/or *Heritage Act*.

Table 7. Summary of roles and responsibilities

Roles	Responsibilities
Principal	• Ensure HECM adequately addresses heritage compliance • Ensure heritage incidents are escalated to the relevant authorities in line with the SoHI
Construction Manager	• Allocate sufficient resources for the implementation of this HECM • Ensure that the outcomes of the visual checks/ compliance construction monitoring/ incident reporting are systematically evaluated as part of ongoing management of construction activities
Environment Manager	• Oversee the overall implementation of this HECM • Ensure all relevant personnel have and understand the most up-to-date copy of this HECM • Ensure that any required actions arising from the detection of unexpected heritage items or if clearing is required outside of the approved project area are reported to the relevant personnel for further action and ensure that the actions are effectively implemented
Site supervisors/ Site foreman/ contractors/subcontractors	• Understand and implement mitigation protocols as required in the HECM and any other required measures during construction • Undertake relevant training to implement the requirements of this HECM • All personnel are responsible for ensuring that heritage items are protected • All site personnel to undertake environmental inductions which will include reference to the requirements of this HECM and the reporting process for unexpected finds
Qualified heritage professional (archaeologist and/or heritage consultant)	• The archaeologist will be responsible for providing advice to minimise potential impacts to any archaeological resources identified during construction activities.

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8.0 APPENDICES

8.1 TfNSW Unexpected heritage items procedure (2022)

8.2 SoHI

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APPENDIX G – REMEDIATION ACTION PLAN

Logos Australia

Remediation Action Plan

28 to 30 Burrows Road
St Peters, NSW

19 September 2022

62126-145521 (Rev 3)

JBS&G

www.jbsg.com.au

28 to 30 Burrows Road
St Peters, NSW

19 September 2022

62126-145521 (Rev 3)
JBS&G

Table of Contents

List of Tables

List of Figures

Appendices

Abbreviations

Term	Definition
ASS	Acid sulfate soil
bgl	below ground level
BTEX	Benzene, toluene, ethylbenzene and xylene
COPC	Contaminants of potential concern
CSM	Conceptual site model
DD	Due Diligence
DD	Due diligence
DGV	Default Guideline Value
DO	dissolved oxygen
DQI	Data quality indicator
DQO	Data quality objective
DSI	Detailed Site Investigation
EC	Electrical conductivity
ENM	Excavated Natural Material
EPA	NSW Environment Protection Authority
ESD	Ecological Sustainable Development
GME	Groundwater monitoring event
GPR	Ground penetrating radar
ha	Hectares
HIL	Health Investigation Level
HSL	Health Screening Level
JBS&G	JBS&G Australia Pty Ltd
LNAPL	Light non-aqueous phase liquids
LTEMP	Long-term environmental management plan
MAH	Monocyclic aromatic hydrocarbons
MNA	Monitored Natural Attenuation
MTP	Material tracking plan
OCP	Organochlorine pesticides
PAH	Polycyclic aromatic hydrocarbons
PASS	Potential acid sulfate soil
PCB	Polychlorinated biphenyl
PFAS	Per- and polyfluoroalkyl substances
PID	photoionization detector
PID	photoionization detector
QA/QC	Quality assurance/quality control
RAP	Remediation Action Plan
RL	Relative level
RWP	Remedial works plan
SES	Sullivan Environmental Sciences
SVE	Soil-vapour extraction
TRH	Total recoverable hydrocarbons
UPSS	Underground petroleum storage systems
UST	underground storage tank
VENM	Virgin Excavated Natural Material
VOC	Volatile organic compounds

1. Introduction

1.1 Background

JBS&G Australia Pty Ltd (JBS&G) has been engaged by Logos Australia (Logos, the client) to provide environmental consultancy services in relation to assessment of contamination in relation to the proposed redevelopment at 28 to 30 Burrows Road, St Peters NSW (the site). The site is legally identified as Lot 2 in Deposited Plan (DP) 212652 and Lot 15 in DP 32332, and occupies a total area of approximately 0.8 hectares (ha). The site location and layout are shown in **Figure 1** and **Figure 2.**

JBS&G has previously completed a Detailed Site Investigation (DSI) at the site, as documented in JBS&G (2022[1]). The site has historically been used as a mechanics workshop, including spray booths and a truck wash. The client is proposing to redevelop the site for commercial/industrial purposes. The redevelopment proposal comprises demolition of existing structures and construction of a multi-level commercial/industrial warehouse building at grade.

JBS&G (2022) identified redundant infrastructure associated with historical site operations, including underground petroleum storage systems (UPSS), an oil/water separator system and a sewer pump. Additionally, JBS&G (2022) reported impacted soil and groundwater underlying the site. The DSI reported that remedial works were required to make the site suitable for the proposed redevelopment.

On this basis Logos has further engaged JBS&G to prepare a Remediation Action Plan (RAP) to address the contamination issues identified on site by previous investigations, such that the site can be made suitable for the proposed development.

This RAP was developed in accordance with guidelines made or approved by the NSW Environment Protection Authority (EPA) and relevant Australian Standards.

1.2 Objective

The objective of this RAP is to document the procedures and standards to be followed to remove the risks posed by the identified contamination issues, such that the site is made suitable for the proposed redevelopment while ensuring the protection of human health and the surrounding environment.

1.3 Previous Assessments

Previous environmental assessments and reports as available to JBS&G and/or prepared by JBS&G and relating to the site are listed following:

- SES (2020) *Due Diligence Contamination Assessment, 28-30 Burrows Road, St Peters NSW*. Sullivan Environmental Sciences dated 25 August 2020; and
- JBS&G (2022) *Detailed Site Investigation, 28-30 Burrows Road, St Peters, NSW*. JBS&G Australia Pty Ltd reference 62110/142,245 Rev A dated 8 June 2022.

[1] JBS&G (2022) *Detailed Site Investigation, 28-30 Burrows Road, St Peters, NSW*. JBS&G Australia Pty Ltd reference 62110/142,245 Rev A dated 8 June 2022.

1.4 Proposed Development

The RAP has been prepared on the basis of the most recent development plans available for the site (See **Appendix A**). The first stage of the development will comprise the demolition of all existing above ground structures where it is not yet confirmed whether the existing pavements / hardstand will be removed as part of construction works. The second stage of the development will comprise the construction of:

- A 3750 m^2 combined slab-on-grade warehouse and office building, occupying the central and northern site extent;
- Internal carparking and roadways; and
- A 10 m landscaping setback abutting Alexandria Canal on the southern site boundary.

As such, consideration has been given to the relevant land-use of "HIL D - Commercial/industrial, includes premises such as shops, offices, factories and industrial sites" as detailed in NEPC (2013[2]) in determining remedial extents and setting validation standards.

[2] NEPC (2013) *National Environment Protection (Assessment of Site Contamination) Measure, 1999 (as amended 2013)*. National Environment Protection Council dated 2013.

2. Site Condition and Surrounding Environment

2.1 Site Identification

The location of the site is shown on **Figure 1** and the layout of the site at the time of the assessment is shown on **Figure 2**. The site details are summarized in **Table 2.1**, with the site described in detail in the following sections.

Table 2.1 Site Identification Details

Lot/DP	Lot 2 DP 212652 and Lot 15 in DP 32332
Address	28 to 30 Burrows Road, St Peters NSW
Local Government Authority	City of Sydney Council
Site Zoning	IN1 – General Industrial
Coordinates	Reference **Figure 2**
Previous Use	Various industrial and commercial uses
Proposed Use	Commercial / industrial (at grade warehouse)
Site Area	approximately 0.8 ha

2.2 Site Condition

The site condition was reported in JBS&G (2022). The site was reported to comprise a rectangular parcel of land used for commercial/industrial purposes and was divided into two properties as discussed separately below. Relevant features are shown on **Figure 2.**

28 Burrows Road

This portion of the site contained a large warehouse (QMS Australia) in the western portion of the property with access from Burrows Road to the north. The warehouse was used as an outdoor furniture repair workshop and depot. The southern portion of the warehouse was previously used as a spray-booth but was used for the storage of outdoor furniture at the time of inspection. A disused truck wash was also present along the eastern boundary of the property and was being used as undercover storage for outdoor furniture stock.

A sump pit (previously used for waste oil storage) was located in the south-western portion of the property. The sump was in good condition with no evident cracking. Oil staining was present at the base of the sump.

A sewer pump, oil water separator and pit were located in the south-eastern portion of the property. The oil water separator and pit were not in use as part of current site operations but were noted to contained residual water with a hydrocarbon odour and sheen.

The ground surface of 28 Burrows Road was mostly covered in hardstand on which there were no obvious signs of gross contamination. Fill points and vent pipes present on site indicate the presence of five underground storage tanks (USTs) onsite in the northern and southern portions of site. An additional vent pipe was observed in the north-western portion of the site (north of the warehouse) indicating the potential for an additional UST in this area. The fill and/or dip points could not be opened during site investigations to confirm the contents of the USTs.

30 Burrows Road

A large warehouse was present on the western portion of 30 Burrows Road, containing four tenants (two mechanic workshops, engineering business and marine mechanic workshop). Units #1 and #4 housed automotive and truck mechanic workshops that contained several car hoists. No chemicals were stored on site with the exception of automotive engine oil and several aerosol paint tins in Units #1 and #4 and gas cylinders used for welding in Unit #3.

The eastern portion of the property was used for storage and as a car park for vehicles being serviced on the property. Several shipping containers used for storage were present along the south-east boundary. Scrap metal and disassembled cars were also stored in this area with surficial oil staining observed on the hardstand.

The ground surface of 30 Burrows Road was mostly covered by hardstand. Surface staining was observed throughout the carpark where cars and trucks were stored. Evidence of two USTs and the remains of a disused fuel bowser were observed in the north-eastern portion of the site.

2.3 Surrounding Land Uses

The land uses adjacent to the site as observed during the DSI and by review of readily accessible online records are listed below:

- North – the site was bound by Burrows Road, then an above ground multi-storey building with at grade car-parking, associated with Westconnex (M8);
- East – the eastern site boundary abutted commercial/industrial premises including AJB Diesel Mechanical Services and Machine 1867 (motorcycle shop). Further east additional commercial/industrial premises and Alexandria Canal were present;
- South – the site was bound to the south by Alexandria Canal. On the opposite side of the Canal, large commercial logistics and food supply warehouses were present; and
- West – the western site boundary was shared with a commercial estate followed by additional commercial/industrial premises (plywood distributor, architectural/hardware store, engineering store, etc.). Additional land for the Westconnex (M8) was present further west.

2.4 Site Environmental Setting

2.4.1 Topography

A review of eSpade 2.2 (OEH 2022[3]) indicates that the site exists within an area mapped as 'Disturbed Terrain'. Topography is described as disturbed by human activity, local relief usually <2 m but up to 10 m. Most ground in these areas has been levelled to slopes <3 %.

The site inspection undertaken by JBS&G and reported in JBS&G (2022) indicates that the site is almost entirely paved and flattened, with the exception of southern portion of the site which grades down into Alexandria Canal.

[3] OEH (2022) *eSpade 2.0*

2.4.2 Geology and Soils

Areas of Disturbed Terrain are reported to comprise artificial fill, potentially dredged estuarine sand and mud, demolition rubble, industrial and household waste, often incorporating rocks and local soil materials.

SES (2020) reported that the site was mapped as being underlain by Quaternary sediments characterised by peat, sandy peat and muds. Intrusive investigations reported the presence of fill to a maximum depth of 0.8 m below ground level (bgl) that was underlain by natural alluvial soils. The fill was reported to include gravelly sands and clays with inclusions of slag, sandstone, ash, igneous gravel, brick fragments, steel, ironstone gravel and asbestos.

2.4.3 Acid Sulfate Soils

A review of DLWC (1998[4]) risk map for Botany Bay indicates that the site exists within an area mapped as Disturbed Terrain. Soil investigation is required to assess these areas for acid sulfate soil (ASS) potential.

JBS&G (2022) undertook a program of ASS assessment. JBS&G (2022) reported that the shallow gravelly sand fill-based soils encountered as part of this investigation do not comprise potential acid sulfate soil (PASS). However, the saturated underlying sands (at a depth of >2 m) comprise PASS and will require management during future construction activities if works were to result in the disturbance of these materials.

2.4.4 Hydrology

The site is largely occupied by buildings or otherwise covered in hardstand and there is limited potential for infiltration of surface water into site soils. Rainfall runoff is captured by building/site stormwater infrastructure that is expected to discharge to Alexandra Canal to the south of the site.

2.4.5 Hydrogeology

SES (2020) reported that the site is mapped within an area that includes porous and highly productive aquifers. The site is located within Prohibition Area 2 of the Botany Sands Groundwater Aquifer, where abstraction of groundwater for the above purposes is banned.

SES (2020) and JBS&G (2022) reported site groundwater to be present at depths ranging from 1.4 to 2.4 m bgl.

Site groundwater was reported to have the following characteristics:

- Electrical conductivity (EC) ranging from 498 to 964 µs/cm;
- pH ranging from 6.19 to 6.56; and
- Dissolved oxygen (DO) levels ranging from 0.04 to 1.81 mg/L.

Groundwater depths graded downward from the northern to the southern site portion, indicating that groundwater flow is generally toward Alexandra Canal. No evidence of tidal water intrusion / influence to groundwater underlying the site has been identified, with levels of dissolved solids measured in groundwater consistent with fresh water.

Based on the environmental setting and site conditions reported in SES (2020), groundwater at the site was expected to comprise a shallow unconfined system and flow to the south towards Alexandra Canal.

[4] DLWC (1998) *Acid Sulfate Soil Risk Maps – Edition 2, Botany Bay*. Department of Land and Water Conservation dated 1998.

3. Site History Review and Previous Investigations

3.1 Site History Summary

The site is situated within an industrial area that has contained factories, foundries, workshops and mills from circa 1920. Based on available information, it appears the site has been used for various commercial / industrial purposes including vehicle maintenance and storage from approximately 1955.

3.2 Contamination Assessment (SES 2020)

Sullivan Environmental Sciences (SES) completed a due diligence contamination assessment (DD) for the site. The scope of works included a desktop review of available background information, sampling a total of 21 soil bores, sampling a total of five groundwater monitoring wells (located in close proximity to likely USTs) and documentation of a contamination assessment report in order to assess potential health risks for future commercial/industrial use of the land and provide recommendations for additional investigations or remediation.

The following summarises the key findings of the assessment:

- At the time of the investigation, 28 Burrows Road was being used exclusively as a storage facility for taxicab vehicles, where access for intrusive investigations was limited. 30 Burrows Road contained a mechanics workshop business, engineering support business and paper roll warehouse. No further detail was provided on the historical land-uses of the site.
- Within 28 Burrows Road, evidence of up to six USTs were reported on the property. At least one of the USTs still contained fuel / liquid (approximately 1000 L) in which the tank had an estimated volume of 20 000 L. None of the tanks were being used at the time of the investigation, however, it could not be confirmed if the tanks had been decommissioned *in-situ*. Within 30 Burrows Road, evidence of up to two disused USTs were also identified, however the contents could not be confirmed. There were no records of Dangerous Goods licences as held by SafeWork NSW for either of the properties.
- Intrusive investigations were largely limited to outdoor areas where access was further restricted by the presence of parked cars stored across the extent of the site. The location of soil and groundwater samples are shown on **Figure 3**;
- Intrusive investigations reported the presence of fill to a maximum depth of 0.8 m bgl that was underlain by natural alluvial soils. The fill was reported to include gravelly sands and clays with inclusions of slag, sandstone, ash, igneous gravel, brick fragments, steel, ironstone gravel and asbestos.
- Petroleum hydrocarbon impacts (at levels exceeding health screening levels for vapour intrusion) were further reported in soils and groundwater in proximity of the USTs. It was considered that no enclosed buildings were present over the areas of impact, there was no vapour risk; however, should future development place buildings over or adjacent to these areas then impacted soils would present an unacceptable human health vapour risk that would require remediation.
- Further investigation works were recommended to delineate the extent of impacts and characterise areas that were inaccessible as part of the investigation. A RAP was also noted to be required to document the methods available to remediate identified contamination in those areas of concern around USTs and asbestos contaminated fill for future development purposes.

3.3 Detailed Site Investigation (JBS&G 2022)

JBS&G was engaged to undertake an DSI of the site. The scope of works comprised review of available background information, a detailed site inspection, completion of a program of intrusive investigation works as described following:

- Advancement of five new soil boreholes, collection of representative soil samples, field screening of samples with a photoionization detector (PID);
- Construction of new groundwater monitoring wells in the soil boreholes. Groundwater wells were constructed to target shallow groundwater and intercept light non-aqueous phase liquids (LNAPL) where present;
- Completion of a groundwater monitoring event (GME) on both newly installed and previously installed groundwater wells for contaminants of potential concern (COPCs);
- Installation and sampling of 42 sub-slab soil-vapour probes using VaporPins; and
- Laboratory analysis of selected samples for a range of potential COPCs including ASS and asbestos in soil.

The location of soil, groundwater and soil-vapour sampling locations are shown on **Figure 3**. Based on the results of the investigation, and with consideration of the proposed redevelopment, the following conclusions were provided:

- Medium to heavy chain petroleum hydrocarbon (TRH) impacts were reported at various locations across the extent of the site as associated with fuel storage infrastructure (comprising USTs and associated pipes, bowsers as well as sumps and pits etc.);
- The highest hydrocarbon concentrations were reported in the south-eastern portion at JBS_MW4, where TRH $C_{>10-40}$ was reported at a concentration of 3.4 mg/L. The concentration exceeds the solubility limit of 2.0 mg/L (NEPC 2013) which indicated the potential presence of LNAPL impacts within proximity to the location. The source of the TRH impacts reported at JBS_MW4 are considered to be most likely associated with surface oil staining observed in the area as sourced from the operation of the mechanics workshop;
- All other constituents within groundwater (including heavy metals, chlorinated hydrocarbons, per- and poly-fluoroalkyl substances (PFAS)) were reported at concentrations either below detection limits or not considered to pose a risk to on or off-site receptors and therefore do not require further assessment and/or management;
- Results from a sub-slab vapour investigation that included the installation of 42 probes reported contaminant concentrations below laboratory detection limits or the adopted guideline values for the assessment, thus indicating that the identified petroleum hydrocarbon impacts within site soils and groundwater as well as other potential volatile contamination sources underlying the site, do not pose an unacceptable health risk for the proposed development;
- Soil investigations identified the presence of fill across the extent of the site at depths ranging from 0.3 m to 0.9 m bgl. The fill comprises gravelly sand with ash, slag, brick, concrete. Asbestos was reported at three locations and likely extends across all fill-based soils at the site, given the presence of building and demolition wastes in all site fill. Isolated PCB impacts were reported in shallow fill to the south of the central portion of the site;
- Based on the results of the assessment it was considered that shallow gravelly sand-fill based soils do not comprise PASS. However saturated underlying sands at a depth of >2 m were considered to comprise PASS and would require management during future construction activities if works disturb these materials;

JBS&G (2022) reported that a RAP will be required to address remediation/management of:

- Asbestos impacted fill (present at depths ranging from 0.3 to 0.9 m) that is likely present across the site based on the results from SES (2020) and the observation of building and demolition wastes within fill across the extent of the site.
- Isolated PCB impacts within fill materials in the north-western portion of the site.
- The removal of all fuel storage infrastructure (comprising USTs and associated pipes, bowsers as well as sumps and pits etc) in accordance with the UPSS Regulation[5] to allow for the restoration of background groundwater quality to the extent practicable.

[5] *Guidelines for implementing the POEO (Underground Petroleum Storage Systems) Regulation 2019* (December 2020) (UPSS Regulation).

4. Summary of Known Contamination

4.1 General

Environmental data as abstracted from SES (2020) and JBS&G (2022) is provided as **Appendix B**. Concentrations of COPCs have been screened against a range of criteria as appropriate to the assessment of potential contamination on industrial sites. The criteria adopted are consistent with the DSI (JBS&G 2022).

The following sections present a conceptual site model (CSM) for the site prior to the commencement of remediation. The purpose of the CSM is to identify potentially complete source-pathway-receptor linkages at the site such that an informed assessment of potential remedial options can be made.

4.2 Conceptual Site Model

4.2.1 Sources of Contamination

Sources of contamination exist at the site as reported in JBS&G (2022). Point sources are shown on **Figure 2**.

- UPSS, comprising eight probable USTs and associated infrastructure as located throughout the site at four locations. The contents of the USTs was not able to be determined during the DSI;
- Residual disused operational infrastructure, comprising:
    - A sump pit servicing the western building;
    - An oil separator pit located adjacent to the central west building; and
    - A sewer pump located adjacent to the central west building.
- Surface oil staining on the southeast site corner.

In addition to the above, fill material is present throughout the site ranging in depth from 0.2 m to 1.1 m bgl. Fill material was observed to contain building and demolition wastes.

4.2.2 Affected Media

The available environmental data indicates that soil and groundwater at the site are contaminated. Both media have been identified to contain a range of typical urban/industrial contaminants, most notably TRHs.

Soil was identified to contain TRHs, BTEXN, polycyclic aromatic hydrocarbons (PAHs), PCBs, asbestos, heavy metals, organochlorine pesticides (OCPs), PFAS and monocyclic aromatic hydrocarbons (MAHs). Affected soils are associated with both point-based and diffuse sources as identified in **Section 4.2.1**. Exceedances of site assessment criteria are shown on **Figure 4**. Each of the areas of affected soils are discussed following:

- Soil proximal to USTs and operational infrastructure has been found to contain elevated TRHs, petroleum constituents (BTEXN and MAHs) and PAHs. The TRHs identified generally comprised semi- to non-volatile fraction ranges (principally $C_{>10-16}$ and $C_{>16-34}$), noting that volatile (C_{6-10}) and long chain non-volatile ($C_{>34-40}$) hydrocarbons were also identified in soil to a lesser extent. The concentration of TRHs in soil exceeded the applicable health screening levels (HSLs) adopted in JBS&G (2022) at three locations surrounding the central northern USTs: BH13, BH16 and BH18. Whilst concentrations of TRHs exceeded the adopted HSLs for vapour intrusion, soil-vapour assessment undertaken across the site did not identify potential risks associated with this pathway;

- Soil proximal to/underlying surface oil staining (at location JBS_MW4) has been found to contain elevated concentrations of semi- to non-volatile TRHs. Whilst not identified as presenting a potential risk to future onsite receptors, surface oil staining has been associated with elevated groundwater based TRHs and is a potential aesthetic issue;
- General fill-based soils have been found to contain heavy metals, PCBs and asbestos. No elevated heavy metals concentrations indicative of a substantial localised source were identified within the available data. PCBs were identified at one location to exceed the applicable health investigation level (HIL) for commercial/industrial land use. Asbestos was reported in fill material by SES (2020). The asbestos impacts appear to be associated with the observations of ash, slag and building demolition wastes within fill-based soils that extend across most of the site footprint to depths ranging from approximately 0.3 m to 0.9 m bgl. As such, it is assumed that the majority of fill-based soils at the site are likely to contain asbestos. Fill material was further reported to contain generally low/trace levels of OCPs and PFAS, which are considered not to pose a potential risk to future receptors.

Groundwater was identified to contain heavy metals, TRHs, BTEXN, PAHs, PFAS and MAHs. Elevated TRH in groundwater concentrations are shown on **Figure 5**. Each of the COPCs identified in groundwater are discussed following:

- Semi- to non-volatile TRHs ($C_{>10-16}$ and $C_{>16-34}$) were identified at various locations across the extent of the site. The highest concentration was reported at JBS_MW04 on the southeast site boundary (TRH $C_{>10-40}$ at 3.4 mg/L).
- Elevated concentrations of semi- to non-volatile TRHs were also reported at JBS_MW03 (TRH $C_{>10-40}$ at 0.9 mg/L) and MW05 (TRH $C_{>10-40}$ at 1.0 mg/L). Elevated levels of TRHs at these locations are attributable to point-source impacts as identified in **Section 4.2.1**;
- Petroleum constituents (BTEX and MAHs) were identified in groundwater, generally collocated with TRH impacts. Elevated benzene was reported at MW02 exceeding drinking water criteria. JBS&G (2022) reported that BTEX identified in groundwater were considered not to pose a potential risk to future onsite or offsite receptors; and
- Heavy metals, chlorinated hydrocarbons and BTEX were identified in groundwater. JBS&G (2022) reported that levels of heavy metals, chlorinated hydrocarbons and BTEX were either below detection limits or not considered to pose a risk to onsite or offsite receptors.

Soil-vapour was found to be generally absent of detectable concentrations of TRHs and/or VOCs. BTEX compounds were detected at three locations, substantially below the applicable HSLs. Whilst sources of potential volatile contaminant impact were identified at the site, direct sampling of soil-vapour immediately below existing concrete slabs indicated that sub-surface gas was free from volatile constituents at concentrations which represented potential risks to future receptors.

4.2.3 Human and Ecological Receptors

The primary human receptors of concern are future commercial users of the site and users of commercial properties surrounding the site. Other potential receptors will include construction workers during the site redevelopment, and potential future sub-surface intrusive / maintenance workers.

The primary ecological receptors of concern are proposed future on-site areas of plantings and the Alexandra Canal located downgradient of the site.

4.2.4 Potential and Complete Exposure Pathways

JBS&G (2022) summarises potential human receptors and associated exposure pathways for the site.

Table 4.1 Summary of Potential Human Exposures

Receptor	Location	Media	Potential Exposure Pathways	Exposure Pathway Status
On-site Receptors				
Existing and/or future commercial users	Within buildings	Soils	Inhalation (vapours)	Incomplete
		Groundwater	Inhalation (vapours)	Incomplete
	Outdoor areas	Soils[1]	Inhalation (particulates) Oral ingestion Dermal contact	Potentially complete in minor landscaped areas.
Construction worker or intrusive maintenance worker (short duration)	Construction areas/excavations	Soils	Inhalation (vapours and particulates/fibres) Oral (infiltrating seepage water) Dermal (infiltrating seepage water)	Complete
		Groundwater	Inhalation (vapours and particulates/fibres) Oral (infiltrating seepage water) Dermal (infiltrating seepage water)	Complete
Off-site Receptors				
Recreational users of Alexandra Canal	Surface waters downgradient of the site	Surface Water as potentially affected by site groundwater	Inhalation (vapours) Oral Dermal Ingestion	Incomplete
Off-site Commercial users	Within buildings or outdoor areas.	Soils and/or groundwater	Inhalation (vapours and particulates/fibres)	Incomplete

1) It is understood that the future ground surface at the site will largely comprise of hardstand which will result in limited potential human exposure pathways to underlying site soils. On this basis, the soil exposure pathways presented will only be applicable in minor areas of exposed soils.

Given that the site is primarily covered by hardstand pavements and building footprints which will largely remain under the proposed development, site users will largely not be exposed by direct contact to any impacts within site soils. Notwithstanding, in minor landscaped areas, fill based soils will require appropriate management in order to preclude exposures to the impacts identified above.

Off-site receptors comprise the users of Alexandra Canal who may be exposed to environmental impact via a recreational exposure pathway – based on the available information, it is considered unlikely that site derived impacts are posing an unacceptable health risk to users of Alexandra Canal.

Potentially complete ecological exposure pathways comprise migration of impacted groundwater from the site into the adjacent marine/estuarine environment of Alexandria Canal and uptake by ecological receptors.

Additionally, plants established within future on-site areas of plantings will potentially be exposed to impacted soils and/or shallow groundwater.

4.2.5 Preferential Pathways

For the purpose of this assessment, preferential pathways have been identified as natural and/or man-made pathways that result in the preferential migration of COPC as either liquids or gasses.

No known service easements are located in proximity to the hydrocarbon impacts at the site. As such, migration of the petroleum hydrocarbon impacts via a preferential pathway is considered unlikely at the site.

4.2.6 Data Gaps

No significant data gaps have been identified by review of the CSM. However, data gaps that will require consideration during the implementation of this RAP are listed following:

- The extent of PCB impacted soils that require remediation has not been completely delineated. The extent of PCB impacts that will require remediation will be informed by the results of site validation activities (**Section 7.3.1**);
- Final waste characterisation of material to be removed from the site, including TCLP analysis is recommended once the surplus materials have been stockpiled and sampled in accordance with the requirements of this RAP;
- The extent of asbestos in soil occurrence has to date, not been completed at a density consistent with WA DOH (2021). As such, additional asbestos investigations may be required to further inform the scale and nature of asbestos exposure controls required for the construction works in accordance with SafeWork NSW as well as refine the extent of soils that may require on-going management during redevelopment of the site;
- Where future excavation works extend to a depth of groundwater, further confirmatory sampling/analysis for PASS will be required to inform appropriate management procedures of these materials; and
- There is the potential for additional unidentified sources of contamination at the site (e.g. example additional USTs, sumps or pits) where pre-remediation activities (**Section 6.3.1**) will be required to assess for these features to the extent practicable.

5. Remediation Options

5.1 Guidelines and Legislation

The RAP has been prepared with reference to the following guidelines and legislation:

- EPA (1995) *Contaminated Sites: Sampling Design Guidelines*. NSW Environment Protection Authority dated September 1995;
- EPA (2014a) *Best Practice Note: Landfarming*. NSW Environment Protection Authority;
- EPA (2014b) *Waste Classification Guidelines – Part 1: Classifying Waste*. NSW Environment Protection Authority dated 2014;
- EPA (2017) *Contaminated Land Management Guidelines for the NSW Site Auditor Scheme (3rd edition)*. NSW Environment Protection Authority dated October 2017;
- EPA (2020) *Consultants Reporting on Contaminated Land Contaminated Land Guidelines*, NSW Environment Protection Authority dated April 2020;
- *Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019* under the *Protection of Environment Operations Act 1997* (UPSS Regulation);
- *State Environment Planning Policy (Resilience and Hazards) 2021* (SEPP-RH);
- SWA (2020a) *How to safely remove asbestos - Code of Practice.* Safe Work Australia, 2020;
- SWA (2020b) *How to manage and control asbestos in the workplace - Code of Practice*. Safe Work Australia, 2020; and
- *Work Health and Safety Regulation 2017*.

5.2 Remediation Objectives

Redundant infrastructure and contaminated environmental media are present at the site which require to be remediated for the site to be considered suitable for the proposed land uses. This is consequent of:

- The presence of disused UPSS which requires to be decommissioned and removed in accordance with the UPSS Regulations;
- Elevated concentrations of TRHs in soil and groundwater which potentially pose unacceptable risks to offsite ecological receptors; and
- The presence of asbestos and, to a lesser extent, PCBs in fill-based soil which pose a potentially unacceptable risk to future human site users.

The objective of the remediation is to remove risks posed by the identified contamination issues, such that the site is made suitable for the proposed development. It is a further objective to undertake works, in accordance with applicable guidelines and legislation, in a manner which is concordant with the principles of ecologically sustainable development (ESD).

5.3 Extent of Remediation

Based on the findings of the previous investigations (see **Section 3**) and pre-empting the range of available remedial options as evaluated in **Section 5.2**, the anticipated extent of the proposed remedial works includes:

- Removal of disused UPSS/USTs and former operational infrastructure;
- Remediation of TRH impacted soils associated with UPSS/USTs, former operational infrastructure and grossly stained soils;
- Remediation of localised/minor extents of PCB impacted soils present within the central site extent. The PCB impacts are not yet delineated and the remedial extent will be informed by the results of validation sampling. As such, the excavation will proceed until validation is achieved;
- Application of engineering controls to fill-based soils across the entire extent of the site such that the potential risks posed by the presence of asbestos are reduced to low and acceptable levels; and
- Long-term monitoring of contaminant levels within groundwater at the site following source remediation activities.

An indicative extent of remediation is shown on **Figure 6**.

5.4 Remedial Options

The preferred hierarchy of options for remediation (clean up) and/or management adopted by NSW EPA has been established within the NEPC (2013) Assessment of Site Contamination Policy Framework as follows:

- On-site treatment so that the contaminant is either destroyed or the associated risk is reduced to an acceptable level; and
- Off-site treatment so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site; or

If the above options are not practicable:

- Consolidation and isolation of the contaminant on site by containment with a properly designed barrier;
- Removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material; or
- Where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

In addition, when deciding which option to choose, consideration is also required to be given to the sustainability (environmental, economic and social) aspects of each option to ensure an appropriate balance between the benefits and effects of undertaking remedial/management options. In cases where no readily available or economically feasible method is available for remediation, it may be possible to adopt appropriate regulatory controls or develop other forms of remediation.

Consideration of each of the approaches (EPA 2017), is presented in **Table 5.2** and **Table 5.2**. Under the UPSS regulation, disused petroleum storage infrastructure requires to be removed from the site. Further, as part of site demolition works, residual operational site infrastructure will be removed from the site. As such, the assessment is applicable only to TRH, asbestos and PCB impacted soil.

Table 5.1 Soil Remedial Options Assessment

Remedial Option	Applicability	Assessment
1. On-site treatment so that the contaminants are either destroyed or the associated hazards are reduced to an acceptable level.	Impacted Fill There are no practical means of destroying/removing asbestos or PCBs within soils.	Not applicable
	Petroleum Hydrocarbon Impacted Soils Hydrocarbon impacts in soils can be addressed by bioremediation / landfarming of the impacted soils. There is sufficient space on site to address the likely small volume of petroleum hydrocarbon impacted soils and the soils are required to excavated regardless to facilitate the construction of the car park.	**The preferred option**
2. Off-site treatment so that the contaminants are either destroyed or the associated hazards are reduced to an acceptable level, after which the soil is returned to the site.	Impacted Fill As above (**Option 1**).	Not applicable
	Petroleum Hydrocarbon Impacted Soils Hydrocarbon impacts in soils can be addressed by bioremediation / landfarming of the impacted soils. However treatment of impacted soils offsite provides no benefit over Option 1.	Not applicable.
3. On-site *in-situ* management of the contaminant by capping and cover, and ongoing management.	Impacted Fill This option provides for the retention of impacted soil on-site beneath a physical barrier such that there are no complete exposure pathways available between the contaminated material and sensitive human receptors and/or potential ecological receptors. Across the site, the barrier will comprise the hardstand surface under the proposed development scheme. In such instances, an asbestos register/asbestos management plan (AMP) would be required at the site to document the presence/location of bonded asbestos materials. Where persistent contaminants are present (i.e. PCBs) this would option would result in ongoing requirements for management under the contaminated land management framework. Moreover, this option minimizes the amount of waste produced from the proposed development works and is therefore consistent with ecological sustainable development (ESD) principles.	For fill impacted by asbestos only this is **The preferred option**. For fill impacted by PCBs, this is not preferred
	Petroleum Hydrocarbon Impacted Soils The petroleum hydrocarbon impacted soils pose a potential ongoing risk of impact migration to groundwater . This is not a preferred option as it does not result in the reduction of ongoing impacts to groundwater or an assocaited improvement to groundwater quality.	Not preferred.
4. Excavation and off-site removal of the impacted material.	Impacted Fill There are currently suitably licensed waste facilities in the Sydney Metropolitan region capable of accepting asbestos and PCB contaminated soils. Offsite disposal of impacted fill soils is likely the fastest method of remediation, but also involves disturbance of the impacted materials and should be limited to excess material that cannot remain contained onsite. This option also generates the highest quantity of waste, since the materials are disposed to landfill rather than retained on site. Off-site disposal is considered a potential option for all fill material, but only provides a beneficial outcome for PCBs (i.e. minimisation of extent of ongoing management requirements)	For fill impacted by asbestos only this is Not preferred. For fill impacted by PCBs, **this is preferred**
	Petroleum Hydrocarbon Impacted Soils Similarly to as discussed for impacted fill, waste facilities are available which can receive petroleum hydrocarbon impacted soils from the site. This method is not preferred as it will result in waste generation that can otherwise be avoided by on-site treatment.	A potential option.

Groundwater at the site is impacted as a result of point-source contamination comprising historical/disused UPSS and former operational infrastructure. Further impacts are likely present in groundwater as attributable to residual TRHs present in soils surrounding point-sources. As such, the primary remediation approach for groundwater will be to remove any ongoing sources of impact as per **Table 5.1**.

Notwithstanding, consideration has been given to the range of available remediation techniques which may be appropriate for the removal/reduction of any residual TRH impacts following source removal works.

Table 5.2 Groundwater Remedial Options Assessment

Remedial Option	Applicability	Assessment
Hydrocarbon source removal by multi-phase extraction (MPE)	MPE can be considered to be an effective method of removing existing LNAPL impact on the site, however no LNAPL has previously been identified in groundwater. The MPE system would consume substantial amounts of energy, which is not consistent with the ESD objectives of the remediation.	Not preferred
Hydrocarbon source destruction by ISCO	This option has not been considered further, as this is considered to be a non-proven remediation method in Australian conditions and it will likely result in significant changes to the underlying geochemistry of the site that could result in the mobilisation of contaminants. The resource and energy use associated with the chemical production of the oxidant is not considered to be consistent with the principles of ESD.	Not applicable
Hydrocarbon source removal by air sparging and soil vapour extraction	This remedial option is similar to MPE, with the exception that removal occurs via extraction of impacted soil-vapour. This system would consume substantial amounts of energy, which is inconsistent with the ESD principles of the remediation.	Not preferred
Hydrocarbon source removal by total fluids pumping and treatment of recovered fluid	This method is potentially effective at removal of impacted groundwater and LNAPL (if present). Notwithstanding, the impacts are generally present in fraction ranges which are semi to non-volatile and typically less mobile, limiting the effectiveness of direct extraction methods. This further increases the quantity of groundwater which would require to be removed to achieve an effective remediation. In addition, total fluids pumping would consume substantial amounts of energy and requires regular maintenance, which makes this option the least cost effective.	Not preferred
Hydrocarbon source removal by passive skimming	This option is considered an effective method of removing LNAPL. Notwithstanding, no LNAPL has been identified within site groundwater. This option is not suitable for removal of dissolved phase hydrocarbon impacts in groundwater.	Not applicable
Monitored natural attenuation (MNA) of source material	MNA comprises a range of natural occurring processes the cause the destruction/transformation of organic constituents. This includes both redox (i.e. chemical) and biological degradation. MNA is suitable to application at the site following removal of the groundwater source (as covered by **Table 5.1**)	**The preferred option**

Remedial Option	Applicability	Assessment
Hydraulic containment of hydrocarbon source material.	Hydraulic containment would work by the isolation by the current extent of hydrocarbon impacted water. This would comprise the installation of vertical barriers to contain the current extent of groundwater impact laterally. These vertical barriers would require to penetrate a substantial distance into the sub-surface. Recharge to the affected area would then require control by sealing of the surface of the affected area to prevent future infiltration. The installation of a containment system to the depth required is a substantial civil project. It will cause substantial disruption and generate substantial quantities of waste. The option is not considered to comply with the principles of ESD.	Not preferred

Should further impacted material (i.e. not previously identified in historical investigations) be identified as part of an unexpected find during construction works, the remedial options screening matrix in **Table 5.1** and **Table 5.2** will be required to be reviewed. Notwithstanding, it is anticipated that any impacts will be relatively isolated and could be appropriately managed through controlled excavation and off-site disposal.

Based on **Table 5.1** and **Table 5.2**, the following remedial approaches are preferred:

- Excavation and off-site disposal of PCB impacted fill materials;
- On-site management of asbestos fill materials by retention under hardstand proposed across the extent of the site, or otherwise under a sufficient depth of capping soils / growing media in the limited areas of the site where landscaping / plantings are proposed; and
- On-site treatment to remove petroleum hydrocarbons from impacted soils by bioremediation.

Under the UPSS regulation, disused petroleum storage infrastructure requires to be removed from the site. Further, as part of site demolition works, residual infrastructure will be removed from the site.

5.5 Assessment of Bioremediation

EPA (2014a) has been issued by the NSW EPA to control the bioremediation of hydrocarbon impacted soils. EPA (2014a) nominates several factors that affect the potential suitability of contaminants and soils to be remediated by bioremediation (referred to as landfarming in the guideline). Each of the factors has been assessed for the site in **Table 5.3** as applicable to the preferred remedial approach of bioremediation of soils to remove petroleum hydrocarbons.

Table 5.3 Assessment of Factors Affecting Bioremediation / Landfarming Suitability

EPA 2014 Factor	Assessment
Contaminant types	Landfarming is nominated as a suitable treatment method for petroleum hydrocarbons in soils. Biodegradation is nominated as causing the reduction of petroleum hydrocarbons in landfarmed soils.
Contaminant concentrations	A screening criteria of 8 % total petroleum hydrocarbon concentrations (80 000 mg/kg) is a nominated screening for suitability of soils for landfarming. The maximum levels of petroleum hydrocarbons in soils on the site are anticipated to be well below this level, noting that the highest previously reported concentration is less than 40 000 mg/kg. It is noted that petroleum hydrocarbon impacted soils are potentially malodorous, and where potentially offensive odours are detected at the site boundary, then air emissions management will be required for the soils.
Volume of contaminated soils	It is unlikely that large volumes of soils will require bioremediation. An estimated maximum quantity of 200 m3 of impacted soils is anticipated which is insignificant when considered with the overall extent of the site.
Site area	The site area exceeds the 0.5-hectare threshold nominated in EPA (2014a).
Site topography	EPA (2014a) reports sites with steep gradients are not suitable for landfarming. The site is relatively level, as consistent with the general topography of the local area (See **Section 2.4.1**).
Local geology	Impacted soils are considered likely to consists of sands, clayey sands and infrequently sandy clays and peat. The soils will be landfarmed within a purpose designed area within the extent of the site which shall be provided with surface cover to mitigate the potential for leaching of impact to soils underlying.
Hydrogeology	Groundwater underlying the site has been assessed and found to be impacted by site attributable hydrocarbons. Remediation of the site is being undertaken to reduce the extent of impacted soil in contact with groundwater. As noted above measures are available to be put in place to prevent additional contamination of the groundwater resource during remediation.
Meteorology	Sydney has a humid climate that is mild with no dry season, constantly moist (year-round rainfall). Summers are hot and muggy with thunderstorms. Winters are mild. Seasonality is moderate. The temperatures vary throughout the year, with high summer temperatures, sometimes peaking above 40 °C and colder temperatures of in winter with typical night time lows of 6 °C. Rainfall occurs throughout the year with typically 90 to 100 rain days a year.
Distance to sensitive receptors	The site is located within a historical commercial / industrial area, and substantial distances are present to potentially sensitive receptors as may be associated with residential developments as undertaken to the north and east and associated with larger Green Square Town Square.
Time	EPA (2014a) reports that timeframes associated with bioremediation will potentially vary. Provision has been made in the RAP for remedial timeframes of 6 weeks. Where bioremediation cannot be achieved in these timeframes, contingency actions are available to allow landfarming rates to be accelerated (i.e. increased turning of soils, addition of bioremediation additives etc).
Cost	EPA (2014a) notes that landfarming should not be considered a cheap remedial option and costs may become prohibitive to undertake landfarming properly. To this extent, it is considered that the cost to undertake landfarming is typically a function of the site area available to undertake the landfarming works and the resources required to control environmental emissions from the works. Landfarming / bioremediation will be a cost effective option for the site.

6. Remediation Action Plan

6.1 Approvals, licences and notifications

State Environment Planning Policy (Resilience and Hazards) 2021

From review of the site location and proposed activities, the remediation works are classified as Category 2 Remediation Works (**Section 11.2**) as per the meaning provided in *State Environment Planning Policy (Resilience and Hazards) 2021* (SEPP-RH) and will not require specific development consent under the *Environmental Planning and Assessment Act 1997*.

Notification of remediation works will be required to be given to Council at least 30 days prior to commencement, and Council requires notification within 30 days from completion of remediation works, consistent with SEPP-RH requirements and Council's Contaminated Land Policy.

Asbestos Works

Asbestos impacted fill-based soils have been reported in SES (2020) and JBS&G (2022). The asbestos appears to have been identified in bonded form (i.e. asbestos containing material (ACM)). Given that the proposed remediation works will result in the disturbance of these materials, there is a requirement for the Remedial Contractor, or their nominated sub-contractor, to notify SafeWork NSW five business days before commencing works. Further, the works must be undertaken by a Class B Licensed Asbestos Contractor – however, noting that the extent of asbestos in soil occurrence has to date, not been completed at a density consistent with WA DOH (2021), it is recommended that a Class A Licensed Asbestos Contractor be engaged for any works that involve the disturbance of fill based soils.

Remediation works shall not commence until all required approvals, licences and notifications have been granted and/or received.

6.2 Site Establishment

All safety and environmental controls are to be implemented as the first stage of remediation works. These controls will include, but not be limited to:

- Locate and isolate all required underground utilities within the site such that excavation works can safely proceed;
- Assess the potential impacts of the excavation works to neighbouring properties. It is recommended that a suitably qualified engineer be consulted prior to any excavation works, such that appropriate controls (if required) can be implemented;
- Assess need for traffic controls;
- Work area security fencing;
- Site signage and contact numbers; and
- Sediment fencing as appropriate to mitigate sediment laden runoff from the site.

6.3 Remediation Works

6.3.1 Pre-Remediation Activities

6.3.1.1 GPR Survey

Following the demolition and removal of all above ground structures, a ground penetrating radar (GPR) survey will be required to be conducted by a practising geophysicist (under the supervision of environmental consultant) on an approximate 2 m grid over the complete site extent. The survey will attempt to identify any underground anomalies which may be indicative of a UST or other potential

source of hydrocarbon contamination (sump, pit etc) as well as delineate the extent of USTs previously identified (SES 2020).

Where potential USTs, sumps or pits are identified, then the hardstand overlying the areas shall be broken out and removed to allow for inspection and/or test pitting to be conducted until the infrastructure is positively identified or confirmed to be absent.

6.3.1.2 Hardstand Removal and Surface Inspection

Should the existing hardstand surfaces be removed as part of site works, then the materials will require inspection (by the environmental consultant and remedial contractor) for the potential presence of adhered asbestos (that may be encountered on the underside of the slabs) prior to potential crushing and off-site disposal in accordance with the requirements of NSW EPA (2014b).

Following the complete removal of all hardstand surfaces, the environmental consultant shall undertake a walkover (in a 2 m by 2 m grid) to identify any additional potential sources of contamination (such as surface staining, unidentified infrastructure etc) that may require remediation. Should surface oil staining or additional infrastructure be identified, then the underlying materials / features will be required to assessed or managed in accordance with **Section 6.3.1.3** or **Section 6.3.4** respectively. Should a unique source of contamination be identified (i.e. different from that identified as part of the site history in **Sections 3** and **4**) then the unexpected find protocol (**Section 8**) will be required to be implemented.

6.3.1.3 Delineation of TRH Impacts at JBS_MW4

The source of TRH impacts at historical sampling location JBS_MW4 is likely associated with surface oil staining. As such, the delineation of TRH impacts within this area will largely be informed by observing the extent of surface oil staining (either on the existing ground surface or underlying soils following hardstand removal as part of remediation works in the area or if all hardstand surfaces are decided to be removed). Notwithstanding, given the limited soil sampling works conducted as part of historical investigations (due to lack of access) within this portion of the site, additional sampling at locations shown on **Figure 7** will be conducted at a minimum in order to provide further delineation of TRH impacts within this portion of the site. The sampling will be conducted via the advancement of test-pits via the following methodology:

- Test pits will be advanced by excavator in one metre increments until groundwater is intercepted or field screening observations (see below) indicate a low potential for hydrocarbon impacts;
- Soil strata will be inspected by the environmental consultant for signs of contamination (discolouration, staining, odours etc);
- Soil samples will be collected directly underneath the hardstand then generally at 0.5-1.0 m intervals to the maximum depth of the test-pit. Select samples will be analysed for TRH/BTEX at a NATA accredited laboratory in order to inform any remediation requirements in the area. It is noted however, that the final remedial extent will be informed by validation sampling results in accordance with **Section 7.3.3**.

Should additional oil staining be observed in other areas of the site following demolition works, then the above methodology will be conducted within each area to inform the requirements for remediation.

6.3.2 Excavation of PCB Impacted Soil

The localised instance of PCB impacted soil requires to be excavated and disposed from the site. This impact is noted to coincide with the sewer pump (See **Section 6.3.3**). Any soil identified as potentially impacted by PCBs is considered not suitable for bioremediation and reuse on site. PCB

impacted soils require to be separated from residual soils on the southern side of the sewer pump (if possible) prior to commencement of sewer pump remediation (see **Section 6.3.3**).

The following work procedures are to be followed:

- Hardstand overlying JBS_MW3 shall be broken out and disposed in accordance with EPA (2014b);
- Fill-based soil shall be excavated over an approximate area of 5 m x 5 m up to a depth of 0.6 m (i.e. extent of fill material);
- Where this area coincides with soils to be remediated as part of **Section 6.3.3** the PCB impacted soils shall be separately stockpiled/managed so as to ensure that no PCB contaminated soils are retained on site following remediation; and
- The resulting excavation will require validation in accordance with **Section 7.3.1**.

The constraints on remediation as described in **Section 6.3.7** shall apply. Where possible, fill and natural soils (that require excavation for remedial purposes) should be segregated, handled and managed separately to minimise the extent of asbestos related management controls.

6.3.3 Removal of Residual Operational Infrastructure and Impacted Soils

Residual infrastructure requires to be removed. The infrastructure is identified on **Figure 2**, comprising:

- A sump pit servicing the western building;
- An oil separator pit located adjacent to the central west building; and
- A sewer pump located adjacent to the central west building.

In general, the following work procedures are to be followed:

- The contents of all liquid containers and sumps shall be disposed form the site in accordance with EPA (2014b);
- The infrastructure, including all piping, pumps, feed-in services, drainage conduits, concrete bunds, etc. shall be demolished and disposed form the site in accordance with EPA (2014b); and
- It is anticipated that soil impacts will be present proximal to the infrastructure. Impacted soils shall be progressively excavated under the supervision of the Environmental Consultant until all grossly impacted soils have been removed from the excavation to the practical extent. The resulting excavation will require validation in accordance with **Section 7.3.2**.

It is noted that the extent of removal of the sewer pump coincides with the northern extent of PCB impacted soil located at JBS_MW3. The removal of PCB impacted soils shall occur prior to removal of soils impacted by TRHs (only).

The constraints on remediation as described in **Section 6.3.7** shall apply.

6.3.4 Removal of UPSS/USTs and Associated Impacted Soils

Residual UPSS/USTs require decommissioning in accordance with relevant Australian Standards. In general, the following work procedures are to be followed:

- The location and extent of all residual UPSS/USTs shall be confirmed prior to commencement of works. This shall include:
    - A detailed site inspection comprising review of all ground surfaces previously covered by vehicles/stored materials in historical assessments;

- GPR survey of the site to look for underground anomalies which may indicate the presence of UPSS/USTs not currently known to exist on site; and
- Confirmation of the location/extent of known UPSS/USTs as shown on **Figure 2**.

- The USTs should be emptied of all dangerous goods and made gas-free. Any contents of the tank will be disposed off-site in accordance with EPA (2014b);
- Where possible, all associated piping should be disconnected and made safe so that no flammable or combustible liquid remain;
- Hardstand overlying areas suspected or known to contain UPSS/USTs shall be broken out and removed. Inspection and/or test pitting of soil shall be undertaken in areas with known or suspected UPSS/USTs until the infrastructure is positively identified or confirmed to be absent;
- UPSS/USTs will be excavated for off-site disposal in accordance with EPA (2014b); and
- It is anticipated that soil impacts will be present proximal to the UPSS/USTs. Impacted soils shall be progressively excavated under the supervision of the Environmental Consultant until all grossly impacted soils have been removed from the excavation to the practical extent. The resulting excavation will require validation in accordance with **Section 7.3.2**. Where possible, fill and natural soils (that require excavation for remedial purposes) should be segregated, handled and managed separately to minimise the extent of asbestos related management controls.

The constraints on remediation as described in **Section 6.3.7** shall apply.

6.3.5 Excavation of Hydrocarbon-Stained Soils and Associated Impacts

The localised instance of TRH staining on the southeast site portion requires to be excavated and remediated onsite. The following general work methodology shall be followed:

- The extent of surficial staining shall be confirmed upon vacation of stored materials and vehicles within the site;
- Hardstand on the southeast site portion shall be broken out and disposed in accordance with EPA (2014b) over an area of approximately 10 m x 10 m. The extent of hardstand removal shall include at least 2 m x 2 m surrounding JBS_MW04;
- Fill-based soil shall be excavated in 0.2 m layers;
- Upon removal of each consecutive layer, the Environmental Consultant shall observe exposed soils for potential localised gross hydrocarbon impact indicators. Where gross hydrocarbon impacted soils are identified, the excavation shall proceed over the area of impacted soils, with all liberated soils progressively stockpiled;
- Any grossly hydrocarbon impacted soils shall be subject to bioremediation (See **Section 6.3.6**);
- The resulting excavation will require validation in accordance with **Section 7.3.3**.

The constraints on remediation as described in **Section 6.3.7** shall apply. With respect to remedial excavations of hydrocarbon-stained soils on site, it is noted that excavations can only proceed to the extent that they will not undermine the structural integrity of any neighbouring structures. Specialist geotechnical and/or structural engineering advice will be required to inform safe excavation requirements, noting that excavations will only proceed to the extent that they do not undermine the structural integrity of any neighbouring structures as informed by the specialist's recommendations.

Where possible, fill and natural soils (that require excavation for remedial purposes) should be segregated, handled and managed separately to minimise the extent of asbestos related management controls.

6.3.6 Bioremediation

Impacted soils will be spread out in a designated landfarming area and will be subject to bioremediation prior to an assessment of whether the soils are suitable for re-use on site. It is anticipated that approximately 650 m^3 will be impacted by petroleum hydrocarbon and will be require bioremediation.

Soils to be bioremediated / landfarmed will be spread over a maximum area of approximately 500 m^2, with the maximum height not exceeding 0.5 m. The layout of landfarm piles shall be determined by the Environmental Consultant and Remedial Contractor based on screening during excavation. Controls to prevent sediment run-off will be placed around all landfarm piles.

It is proposed that the impacted soils be turned on a weekly frequency for a period of four to six weeks. JBS&G propose to inspect the material on a weekly basis, and where found to be suitable by field analysis, undertake validation sampling and analysis to demonstrate the suitability of the material to be used as backfill at the site.

Suitable bioremediated material will be used as backfill on-site. Material considered not suitable for reuse on-site (i.e. materials unable to be bioremediated) will be classified in accordance with EPA (2014b) prior to off-site disposal.

Where possible, fill and natural soils (that require bioremediation) should be segregated, handled and managed separately to minimise the extent of asbestos related management controls. Furthermore, the constraints on excavation and stockpiling (outlined in **Section 6.3.7**) including the requirements for assessment and management (where required) of ASS/PASS in saturated natural soils will require consideration when bioremediating soils.

6.3.7 Constraints on Excavation and Stockpiling

The practicable limits of excavation include the consideration of the following:

- Physical limitations of available equipment;
- Excavation of saturated materials (typically below a depth of 2 m bgs) shall only occur where aesthetic indicators of petroleum hydrocarbon impact are present. This may include hydrocarbons odours or otherwise sheens present in seepage water;
- Geotechnical constraints associated with excavation safety and excavation stabilisation requirements (e.g. benching) and / or potential effects on nearby infrastructure – this is most applicable along the southern boundary of the site, where uncontrolled excavations may undermine the structural integrity of neighbouring structures. (**Section 6.3.5**). As such, specialist geotechnical and/or structural engineering advice will be required to inform safe excavation requirements, noting that excavations will only proceed to the extent that they do not undermine the structural integrity of any neighbouring structures as informed by the specialist's recommendations; and
- Structural constraints should the excavation extend to a close proximity to roadways, footpaths, building and underground conduits.

Excavated material will be segregated and stockpiled based on an initial screening of levels of contamination. During excavation, any natural saturated soils encountered shall be stockpiled separately and field screened for the presence of ASS/PASS conditions during works. Where any such conditions are encountered, the requirements for management as informed by an acid sulfate soil management plan (ASSMP) (to be prepared elsewhere) shall be followed. The excavated

material will be temporarily stockpiled on plastic sheeting to provide a separation layer between potentially contaminated soils and surface soils.

Site won fill obtained from areas of the site not impacted by petroleum hydrocarbons and / or validated, stockpiled soils will be used to partially backfill the open excavations, battering the excavation edges to minimise fall hazards if required.

6.3.8 Onsite Containment

The preferred remedial option for the asbestos impacted fill based soils on the site is management on-site by long term containment. The following procedures as documented following will require to be implemented to ensure that environmental/health risks associated with the retention of these soils are appropriately controlled.

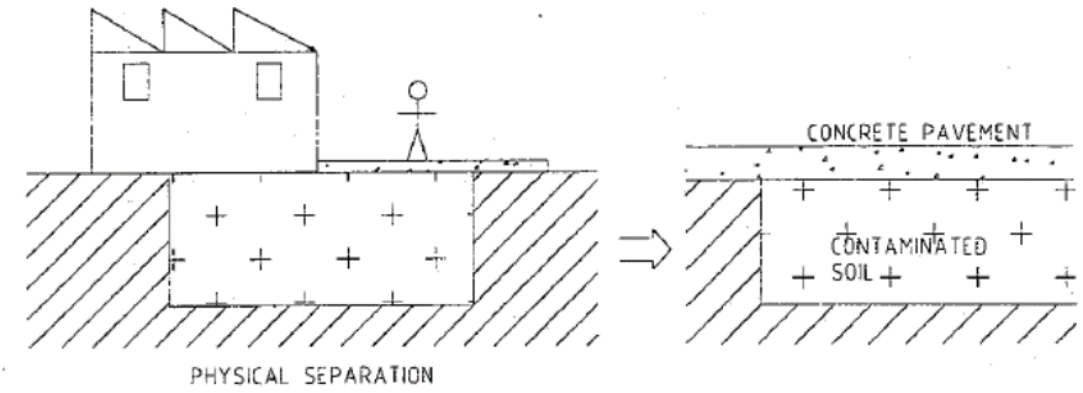
6.3.8.1 Overview

Impacted fill will be managed to the extent achievable via containment and the implementation of permanent physical separation which eliminates the inhalation exposure pathway for airborne asbestos fibres.

The minimum requirements for the physical separation to be adopted in remediation of the site include:

- A minimum soil cover thickness of 0.5 m[6] in landscaped or mass planting/shallow landscaped areas and 1.5 m in tree pit zones which is underlain by a visual "marker layer" in unpaved areas, i.e., planter boxes in landscaped areas etc.; or
- Permanent concrete floor/ground slabs as underlain by a 0.1 m minimum thickness (and potentially up to 1.5 m) "capping layer" and visual "marker layer", i.e., underlying buildings, roads, pathways; or
- Top (concrete) of pile foundations (no marker layer required for below pile foundations).

A conceptual sketch, sourced from ANZECC 1999[7], is shown following:



The marker layer shall consist of a bright orange coloured non-woven polyester continuous filament or PET (such as nonwoven geotextiles) or similar with a minimum density of approximately 150 grams per square metre (or equivalent). The marker layer must:

- Be easily recognisable within soils (i.e., bright orange in colour);

[6] It is noted that excavations to a depth of 0.5 m to install a marker and capping layer will not be possible within if excavations have the potential impact the structural integrity of neighbouring structures. As such, it is proposed to install a minimum soil cover thickness of 0.1 m (underlain by a marker layer) in these areas. Specialist geotechnical and/or structural engineering advice to be completed prior to implementation of this RAP.

[7] *Guidelines for the Assessment of On-site Containment of Contaminated Soil,* Australian and New Zealand Environment and Conservation Council, September 1999. (ANZECC 1999).

- Be durable as a long term marker layer (i.e., > 140 grams per square metre); and
- Maintain integrity during remedial/civil works such as capping layer insulation and road/building construction.

Additionally, the marker layer must meet geotechnical and civil specifications where required.

The specific details of the marker layer are required to be included in the site validation report and long term Environmental Management Plan (LTEMP) documents in addition to surveyed plans showing the extent of the capped area.

6.3.8.2 Specific Capping Arrangements

The following capping procedures will be applied to each of the potential exposure scenarios across the site, prior to completion of construction works:

- Beneath permanent concrete structures, the installation of a marker layer over contaminated fill material with capping layer consisting of a minimum thickness of 0.1 m environmentally suitable materials below the permanent concrete slab as the physical barrier.
- Permanent hardstand structures (i.e., concrete slabs, pile caps or asphaltic concrete or similar, footpaths, but not bricks or pavers) – installation of a marker layer overlying potentially contaminated material followed by sub-grade material validated as environmentally suitable materials for human exposure and then the permanent structure (e.g., exterior concrete footpaths, asphaltic roads, etc.).
- Mass planting / shallow landscaping areas – installation of the marker layer at a minimum depth of 500 mm below the final finished site levels, with a capping layer consisting of environmentally suitable materials for potential human and/or ecological exposure.
- New tree pit zones / deep landscaping zones – installation of the marker layer at a minimum depth of 1.5 m below the final finished site levels, with a capping layer consisting of environmentally suitable materials for potential human and/or ecological exposure, noting that the maker layer should extend the depth required for installation of the new tree's existing root ball or otherwise consistent with the anticipated root zone of the deep landscaping area.
- Within underground services trenches / services – service infrastructure will require remediation to 150 mm below the depth of services, with a marker layer and capping layer installed consisting of environmentally suitable materials for potential human and/or ecological exposure.

Material above the marker layer extending to the final finished ground level will be required to be an environmentally suitable material for human and/or ecological exposure (as appropriate) as discussed further in **Section 6.5**.

Validation of the interim and permanent capping arrangements will be required as outlined in **Section 7,** including inspections by the Environmental Consultant, a survey plan prepared by a registered surveyor showing the level and lateral extent of the impacted soils, marker layer, and capping in relation to the site boundaries.

6.4 Establishment of Monitored Natural Attenuation Well Network

Remediation of groundwater at the site will occur by removal of hydrocarbon impact sources (See **Section 6.3.3** to **Section 6.3.5**) then monitoring of natural attenuation as is anticipated to occur following source removal. In order to verify the success of source removal in improving the condition of groundwater, a network of groundwater wells requires to be maintained during remedial works, or otherwise reinstalled, such that ongoing groundwater monitoring is able to be

undertaken under the LTEMP. As a minimum, the anticipated network of groundwater wells required to demonstrate the remedial objectives have been met is shown on **Figure 8**. However, additional wells may be required dependant upon the results from soil remediation activities. Where additional installation of wells is required, the location and construction of these wells will be determined by the Environmental Consultant at the time of installation to ensure that the remedial objectives are met and with due consideration of the future operational site layout.

6.5 Material Importation

Based on the scope of remedial works described herein, it is anticipated that if materials are required to be imported to site, it will generally be as a result of construction requirements or otherwise to ensure appropriate growing media are established within the planter boxes / garden areas as proposed on the site.

Prior to importation of all material, appropriate assessment of such materials must be completed to demonstrate the material is both fit for purpose and suitable from a contamination view point. In accordance with EPA requirements, the extent of assessment will be determined by the type of material proposed to be imported.

Where material proposed to be imported is Virgin Excavated Natural Material (VENM), an assessment must demonstrate that the material is compliant with the definition of VENM as presented in the POEO Act 1997, adopting in the minimum requirements for characterisation of fill material as presented in EPA (1995).

Where material proposed to be imported has been characterised under the Resource Recovery Framework (Order/Exemption), the material must firstly be demonstrated by the supplier as suitable for use in accordance with the requirements of the Order via provision of a statement of compliance. Suitable materials are anticipated to comprise but will not necessarily be limited to: excavated natural material – ENM, recycled aggregate, basalt fines, compost, mixed organic waste, pasteurised garden organics and recovered fines, with reference to the list of current orders and exemptions on the NSW EPA website.

In addition to the testing completed by the supplier, given the low frequency of compliance testing required under these Exemptions, the specific material proposed to be imported will require an additional compliance assessment prior to approval to import. The additional assessment is required to ensure that the incoming material does not pose an unacceptable risk to human health and/or environment at the placement site and is therefore suitable for use. It is anticipated that such assessment activities will include visual inspections, representative sampling and laboratory analysis of material to demonstrate the material meets the requirements of this RAP. As for VENM assessments, it is considered suitable to define such requirements on a specific site basis given the potential variability of project site requirements.

Material tracking records in addition to the import assessment report are required to be included in the final validation report for the site.

6.6 Validation

Validation of the remedial works will be conducted by the Environmental Consultant to demonstrate the remediation/management objectives have been achieved and to document the final condition of the site at the completion of works such that conclusions may be drawn on the end use suitability of the site for the proposed development. Details of the validation program are provided in **Section 7**.

It is noted that due to site access and/or construction constraints, that the remediation and validation works may occur in stages. Any works that occur at the site following validation of an area will be completed in accordance with the proposed Long-term environmental management plan (LTEMP) as per **Section 7.6.1**.

6.7 Site Dis-establishment

On completion of the remediation works all plant/equipment and safety/environmental controls shall be removed from the site. Details are provided in the Site Management Plan in **Section 9**.

6.8 Contingency Plan

Given the available site history information, consideration has been given to the potential for additional small scale issues that may arise during works (from a contamination viewpoint). Should further impacted material (i.e. not previously identified in historical investigations) be identified as part of an unexpected find during construction works, the remedial options screening matrix in **Table 5.1** will be required to be reviewed. Notwithstanding, due to the site history and relatively shallow depth of fill it is anticipated that any impacts will be relatively isolated and could be appropriately managed through either on-site in-situ management (i.e. option 3) or controlled excavation and off-site disposal.

7. Validation Plan

7.1 General

Data will be required to be collected during remediation/management and construction works to assess the effectiveness of the implemented management actions and document the final condition of the site at the completion of all works. Such information will allow conclusions to be drawn on the end suitability of the site for the proposed use. The general principles to be implemented with regard to the validation assessment are discussed in accordance with EPA (2017) requirements in the following sections.

It is anticipated that the validation assessment will be required to address the following broad issues:

- Confirm the site conditions are consistent with those identified during previous site investigation activities as documented herein;
- Evaluation of previously inaccessible areas of the site for indicators of potential contamination (i.e. previously unidentified UPSS/USTs, infrastructure or additional surface staining);
- Validation that source excavation/removal works have successfully separated historical infrastructure and associated impacted soils to the practical extent;
- Validation that soil remediation works has reduced the level of petroleum hydrocarbon contaminated to soils such that potential for ongoing contribution of TRH impacts to groundwater is minimised;
- Validation that soil remediation works has removed PCB contaminated soils from the site;
- Validation that the final site surface does not contain visually identifiable bonded asbestos impacts or other unacceptable aesthetic issues; and
- Confirmation that marker layer / site pavement is in place to retain underlying asbestos contaminated soils.

7.2 Data Quality Objectives

Data quality objectives (DQOs) have been developed for the validation assessment, as discussed in the following sections.

7.2.1 State the Problem

JBS&G (2022) has identified the presence of contaminated site media and residual disused infrastructure at the site. The infrastructure and associated contaminated media require to be remediated to make the site suitable for the proposed development.

A set of environmental data are required to verify that remediation works as documented in **Section 5** have been implemented in a manner which causes potential risks associated with contaminated site media to reduce to low and acceptable levels.

7.2.2 Identify the Decision

The following decisions are required to be made during the validation works:

- Is any disused infrastructure remaining at the site which represents a potential contamination risk?
- Are there any unacceptable risks to future human site receptors, associated with TRH and PCB impacts in site media, following the remediation of soils?
- Are impacted fill materials appropriately contained to control potential future exposures of human and ecological receptors to impacted material?
- Have all aesthetic issues been addressed?
- Has all material imported to site to achieve development objectives been demonstrated as suitable for use?
- Were surplus materials classified and disposed off-site to a facility licensed to accept the classified waste, or where relevant, appropriately recycled for beneficial re-use?
- Have the works been completed in accordance with the RAP, or where variations to the works were required, have these met the objectives of the RAP?
- Is the site suitable for the proposed land uses subject to implementation of long-term management of residual impacts?

7.2.3 Identify Inputs to the Decision

The inputs to the decisions are:

- Previous investigation results as discussed in **Section 3**;
- The proposed development and final proposed land form and site features;
- Field observations in relation to inspection of all excavation bases, walls, stockpiles and final site surfaces for signs of asbestos impacts or other indicators of potential contamination;
- Environmental data as collected from the validation of remedial excavations (if required as part of an unexpected find);
- Material characterisation data obtained during assessment of surplus material prior to off-site beneficial re-use or disposal;
- Disposal dockets and relevant documents in relation to appropriate disposal of material (if required) to be removed from site as part of the remediation works (landfill dockets, beneficial reuse / recycling dockets, trade waste disposal, etc.);
- Material characterisation data (including field observations, sampling and analytical data) obtained during assessment of material proposed to be imported to the site;
- Relevant guideline criteria for validation and waste classification;
- Records of installation of marker layers and capping by visual observation, photographs and supported by formal site survey;
- Management measures documented within an Asbestos Register/Management Plan (if required) to ensure compliance with WHS legislation; and
- Data quality indicators (DQIs) as assessed by quality assurance / quality control (QA/QC).

7.2.4 Define the Study Boundaries

The study boundaries are defined as the lateral site extent (**Section 2.1**) and the vertical extent of remediation works (not anticipated to exceed 2.5 m bgl.

Ultimately the study boundaries will comprise the lateral and vertical extent of the site successfully validated in accordance with the requirements of this plan. The temporal limits of the assessment will comprise the duration of the remedial works and validation program.

7.2.5 Develop a Decision Rule

The decision rules adopted to answer the decisions identified in **Section 6.1.2** are summarised in **Table 7.1**.

Table 7.1 Summary of Decision Rules

Decision Required to be Made	Decision Rule
1. Is any disused infrastructure remaining at the site which represents a potential contamination risk?	Where: Inspection of the site surface and test-pitting within locations of known/suspected USTs, operational infrastructure and surface oil staining indicates that all these features have been identified; GPR survey of the site does not indicate that any additional UPSS/USTs are present on the site; and All known UPSS/USTs and operational infrastructure has been observed to be removed from the site. Then the answer is Yes. Otherwise the answer is No.
2. Are there any unacceptable risks to future human site receptors, associated with TRH and PCB impacts in soil, following the remediation of soils?	Soil validation data shall be collected of the walls and base of excavations and of the bioremediated soils. If the soils validation results meet the adopted validation criteria then the answer is Yes. If the soil validation results fail the adopted validation criteria then the answer is No.
3. Are impacted fill materials appropriately contained to control potential future exposures of human and ecological receptors to impacted material?	At the completion of the remediation and site development works a marker layer and capping consisting of pavement or otherwise an minimum depth of 0.5 m non-impacted soils shall be present across the extent of the site where fill materials are still in place. If site observations (inspections and photographs) and site surveys are available to demonstrate these works have occurred then the answer is Yes. If there is uncertainty as to whether these measures have been installed across the extent of the site then the answer is No.
4. Have all aesthetic issues been addressed?	If the final site surface is free of asbestos impacts and absent of significant petroleum odours or otherwise visual indicators of petroleum hydrocarbon impact (i.e. sheens), the answer to the decision will be Yes. Otherwise, the answer to the decision will be No.

Decision Required to be Made	Decision Rule
5. Were surplus materials classified and disposed off-site to a facility licensed to accept the classified waste, or where relevant, appropriately recycled for beneficial re-use?	**Waste Materials** Soil analytical data will be compared against EPA (2014b) criteria. Statistical analysis (comprising a review of 95% UCL of the mean, standard deviation and maximum values of dataset) of the data in accordance with relevant guidance documents will be undertaken, where appropriate, to facilitate the decisions (as detailed above). Documentation from the operation receiving the material including the dates, tonnage and classification of the accepted material will be required to facilitate the decision. If the statistical criteria stated above are satisfied, the decision is Yes, and if receipts are provided recording the disposal of material to an off-site licensed facility, the decision is Yes. If the material exceeds the criteria, and no disposal receipts are provided, the answer is No. **Beneficial Off-site Re-use** Based on the presence of ASS/PASS in natural site soils, and the presence of asbestos in site fill it is not anticipated that soil excavated from the site will be able to be beneficially reused under general exemptions. Where any such beneficial reuse is proposed a separate assessment will be required.
6. Where material is imported to site for development purposes is it considered environmentally suitability for use?	Analytical data sets and inspection data will be reviewed for each proposed material type/source against established definitions for acceptable material (i.e. VENM, resource recovery exemptions, etc) and EPA endorsed criteria as established in the RAP as validation criteria. If the complete data set for the applicable material meet the requirements relevant to the material type, the answer to the decision is Yes and material may be imported to site. If the data set exceeds the adopted criterion, the answer to the decision is No and the material cannot be imported to site for use in development activities.
7. Have remedial and validation works met the requirements of the RAP?	If the answer to Question 1 Yes and/or an answer to Questions 2-5 No, the answer to the decision is No. Further assessment is required to establish the nature and extent of additional remediation/management as may be required. If the RAP requirements were addressed, and there are no outstanding issues, the answer to the decision is Yes.
8. Is the site suitable for the proposed land uses subject to implementation of long-term management of residual impacts?	If the answer to Questions 6 and 7 is Yes, then the answer to the decision is also Yes. Otherwise, the answer to the decision is No. In this instance further remediation/ management actions will require to be implemented and appropriately documented such that a future review of the above decisions may result in a different decision outcome.

7.2.6 Specify the Limits on Decision Error

This step is to establish the decision maker's tolerable limits on decision errors, which are used to establish performance goals for limiting uncertainty in the data. Data generated during this project must be appropriate to allow decisions to be made with confidence.

Specific limits for this project have been adopted in accordance with the appropriate guidance from the NSW EPA, NEPC (2013), appropriate indicators of data quality (DQIs used to assess quality assurance / quality control) and standard JBS&G procedures for field sampling and handling.

To assess the usability of the data prior to making decisions, the data will be assessed against pre-determined DQI) established for the project as discussed below in relation to precision, accuracy, representativeness, comparability and completeness (PARCC parameters). The acceptable limit on decision error is 95% compliance with DQIs.

The DQIs and data assessment criteria are summarised as presented in **Table 6.2**.

- **Precision** - measures the reproducibility of measurements under a given set of conditions. The precision of the laboratory data and sampling techniques is assessed by calculating the Relative Percent Difference (RPD) of duplicate samples.
- **Accuracy** - measures the bias in a measurement system. The accuracy of the laboratory data that are generated during this study is a measure of the closeness of the analytical results obtained by a method to the 'true' value. Accuracy is assessed by reference to the analytical results of laboratory control samples, laboratory spikes and analyses against reference standards.
- **Representativeness** – expresses the degree which sample data accurately and precisely represent a characteristic of a population or an environmental condition. Representativeness is achieved by collecting samples on a representative basis across the site, and by using an adequate number of sample locations to characterise the site to the required accuracy.
- **Comparability** - expresses the confidence with which one data set can be compared with another. This is achieved through maintaining a level of consistency in techniques used to collect samples; ensuring analysing laboratories use consistent analysis techniques and reporting methods.
- **Completeness** – is defined as the percentage of measurements made which are judged to be valid measurements. The completeness goal is set at there being sufficient valid data generated during the study.
- **Sensitivity** – expresses the appropriateness of the chosen field and laboratory methods, including the limits of reporting, in producing reliable data in relation to the adopted site assessment criteria.

Table 7.2 Summary of Data Quality Indicators

Data Quality Objectives	Frequency	Data Quality Indicator
Precision		
Blind duplicates (intra laboratory)	1 / 20 primary samples	1-10x LOR – no limit; 10x-30x LOR - <50 % relative percent difference (RPD)[1] >30x LOR - <30 % RPD
Blind duplicates (inter laboratory)	1 / 20 primary samples	
Laboratory duplicates	1 / 20 primary samples	
Accuracy		
Surrogate spikes	All organic samples	70-130 %
Laboratory control samples	1 per lab batch	70-130 %
Matrix spikes	1 per lab batch	70-130 %
Representativeness		
Sampling appropriate for media and analytes	All samples	-[2]
Samples extracted within holding times.	All samples	TRHs, VOCs and SVOCs – 14 days Asbestos – no limit
Trip spike (BTEX only)	1 per sampling event	70-130% recovery
Rinsate blank	1 per sampling event	<LOR
Method blank	1 per lab batch	<LOR
Comparability		
Standard operating procedures for sample collection & handling	All Samples	All samples
Standard analytical methods used for all analyses	All Samples	NATA accredited methods
Consistent field conditions, sampling staff and laboratory analysis	All Samples	All samples[2]
Limits of reporting appropriate and consistent	All Samples	All samples[2]
Completeness		
Sample description and COCs completed and appropriate	All Samples	All samples[2]
Appropriate documentation	All Samples	All samples[2]
Satisfactory frequency and result for QC samples	All QA/QC samples	95% compliance
Data from critical samples is considered valid	-	Critical samples valid
Sensitivity		
Analytical methods and limits of recovery appropriate for media and adopted Site assessment criteria	All samples	LOR ≤ site assessment criteria

[1] If the RPD between duplicates is greater than the pre-determined data quality indicator, a judgment will be made as to whether the excess is critical in relation to the validation of the data set or unacceptable sampling error is occurring in the field.

[2] A qualitative assessment of compliance with standard procedures and appropriate sample collection methods will be completed during the DQI compliance assessment.

7.3 Validation Inspections and Sampling

The validation inspections, sampling and analysis required for remediation areas are summarised in **Table 7.3** and detailed in the following sections.

Table 7.3 Validation Inspection and Sampling Program

Item	RAP Sampling Density			Analytical Suite
Source Removal Excavation Validation				
	Excavation Floors	Excavation Walls	Materials	
Excavations formed by the removal of contaminated soils (except PCB impacts).	1 / 100 m^2 (10 m grid) Minimum 2 samples per excavation. Minimum 2 samples per UST removed.	1 / 4 m (from each distinct horizon or material type or 1 m vertical soil profile)	N/A	TRHs and BTEXN (all excavations) Additional PCB analysis surrounding JBS_MW3
Excavations formed by the removal of impacted materials (if identified as part of an unexpected find)	1 / 100 m^2 (10 m grid) Minimum 2 samples	1 / 10 m (from each distinct horizon or material type or 1 m vertical soil profile) Minimum 4 samples	N/A	As determined by the nature of the impact
Petroleum Hydrocarbon Impacted Soils Remediation				
Bioremediated Soils / Landfarm pile(s)	1 sample per 25 m^3, minimum 3 samples per pile.			TRH BTEXN
Materials Importation				
Imported VENM	Minimum of 3 samples per source site / material type to 500 m^3 then 1 sample per 500 m^3 thereafter			TRH/BTEX PAH Heavy Metals OCP/PCBs Asbestos (500 ml)
Quarry VENM Materials (e.g. blue metal, sandstone, shale)	Confirmation that the material is quarried rock (VENM) prior to importation, and visual confirmation.			Site Inspection required.
Material subject to a NSW EPA Resource Recovery Order/Exemption	Confirmation by the supplier that the material meets the terms of the order. Then environmental consultant sampling at a minimum of 3 samples per source site / material type to 500 m^3 then 1 sample per 500 m^3 thereafter, prior to importation			TRH/BTEX PAH Heavy Metals OCP/PCBs Asbestos (500 ml)
Export of Materials				
Surplus waste materials for off-site disposal are to be classified in accordance with EPA (2014b).	**ALL FILL ASSUMED TO CONTAIN ASBESTOS** Stockpiled materials for off-site disposal require a minimum of 5 samples (up to 75 m^3) or a sample density of 1/25 m^3 to 200 m^3 (whichever is greater) Decreased sampling frequency to be justified on basis of stockpile homogeneity and risk of contaminants present.			Heavy metals TRH/BTEXN PAHs OCP/PCBs Asbestos Spocas (ASS) TCLP (Heavy metals and PAHs) at the Environmental Consultant's discretion.

7.3.1 Excavation of PCB Impacted Soil

The validation program for the removal of the PCB impacted soils comprises:

- Inspection of the excavated areas by a suitably trained and experienced environmental consultant to confirm the extent of potentially impacted materials have been removed. This inspection shall be cognisant of aesthetic indicators of PCB impact (i.e. staining, oils, etc.) whilst PCBs are not odourous, they are potentially dissolved within odourous solutes (i.e. oils). If additional potentially impacted material is identified, further excavation will be conducted and the affected area will be re-inspected until such time as visual and olfactory validation is obtained;
- Following visual and olfactory validation, soil (as appropriate to the nature of the impact) samples will be collected from the remediation area walls at a rate of 1 sample per 10 linear m, and from the excavation bases at a rate of 1 sample per 100 m^2 (minimum 2 samples per base and one sample from each wall); and
- Excavation validation samples will be analysed at a laboratory NATA accredited for the required analyses on an accelerated turnaround time (i.e. 24 hr) to allow for excavations to be backfilled as soon as possible and mitigate the potential risk of oxidising PASS (see further commentary below). If the concentration of COPCs are identified in any of the excavation validation samples exceeding criteria, then the soils will be excavated 0.3 m deeper or otherwise 3 m further in the lateral direction of failure and the validation process repeated. Alternatively, where impact exceeding criteria is not identified by the laboratory, the remedial areas will be deemed to have been successfully remediated and validated.

PCB impacted soils shall not be bioremediated for beneficial onsite reuse. Bioremediation of impacted soils may be undertaken where the quantity of PCB impacted soils is large and this may reduce the ultimate waste classification of material requiring to be disposed from the site (by reducing TRH concentrations).

Soils within the walls and base of the open excavation shall be field screened (in accordance with the requirements of the ASSMP) for ASS – where the results indicate the potential for PASS materials to be oxidised in the period following excavation pending validation results, the environmental consultant shall give direction to the contractor to backfill the excavation. Any additional remedial excavations required will be completed in subsequent stages.

7.3.2 Removal of Residual UPSS/USTs and Operational Infrastructure

Following removal of residual operational infrastructure, the Environmental Consultant shall:

- Inspect underlying surfaces and/or resultant excavation for indicators of additional connecting services or residual infrastructure (i.e. piping, concrete conduits, etc.);
- Where no indicators of residual infrastructure are identified, the Environmental Consultant shall photograph the resultant surfaces/excavation for inclusion in the validation report;
- The Environmental Consultant shall then direct the Remedial Contractor to undertake excavation/removal of residual impacted soils (if present). The procedure for validation of impacted soil removal is presented in **Section 7.3.3**; and
- Upon disposal of infrastructure, the Remedial Contractor shall provide disposal dockets to the Environmental Consultant for inclusion in the validation report.

7.3.3 Petroleum Hydrocarbon Impacted Soils Excavation

The validation program for the removal of the petroleum hydrocarbon impacted soils comprises:

- Inspection of the excavated areas by a suitably trained and experienced environmental consultant to confirm the extent of potentially impacted materials have been removed. This inspection shall be cognisant of aesthetic indicators of petroleum hydrocarbon impact. The potential presence of petroleum hydrocarbons should be further assessed by the use of a PID. If additional potentially impacted material is identified, further excavation will be conducted and the affected area will be re-inspected until such time as visual and olfactory validation is obtained;
- Following visual and olfactory validation, soil (as appropriate to the nature of the impact) samples will be collected from the remediation area walls at a rate of 1 sample per 4 linear m, and from the excavation bases at a rate of 1 sample per 100 m^2 (minimum 2 samples per excavation base or UST removed and two samples from each wall);
- Excavation validation samples will be analysed at a laboratory NATA accredited for the required analyses on an accelerated turnaround time (i.e. 24 hr) to allow for excavations to be backfilled as soon as possible and mitigate the potential risk of oxidising PASS (see further commentary below). If the concentration of COPCs are identified in any of the excavation validation samples exceeding criteria, then the soils will be excavated 0.3 m deeper or otherwise 3 m in a further lateral extent in the direction of failure and the validation process repeated. Alternatively, where impact exceeding criteria is not identified by the laboratory, the remedial areas will be deemed to have been successfully remediated and validated; and
- Excavated soils shall be transferred to the prepared area on the site for bioremediation by landfarming.

Soils within the walls and base of the open excavation shall be field screened (in accordance with the requirements of the ASSMP) for ASS – where the results indicate the potential for PASS materials to be oxidised in the period following excavation pending validation results, the environmental consultant shall give direction to the contractor to backfill the excavation. Any additional remedial excavations required will be completed in subsequent stages.

7.3.4 Validation of Bioremediated Soils

The completion of bioremediation of petroleum hydrocarbon impacted soils within the landfarm requires to be confirmed by validation sampling. Soils within the landfarm will be spread at a typical thickness of 0.5 m. Validation samples shall be collected from an excavation to a depth of 0.25 m below the landfarm surface and direct transfer of the soils to a laboratory supplied sample jar. Samples shall be confirmed to be free of aesthetic indicators of impact prior to analysis.

Samples shall be collected at a minimum frequency of 3 samples per 25 m^3. Landfarmed soils shall be analysed for concentrations of TRHs and BTEXN.

If the concentration of COPCs are identified in any of the landfarm pile samples exceeding criteria, then consideration will be given to continuing the process of landfarming, or alternatively disposing of soils from the site. Where impact exceeding criteria is not identified by the laboratory, the subject landfarm piles will be deemed to have been successfully remediated and validated, and will be considered suitable for reinstatement below the cap.

7.3.5 Validation of Retention of Impacted Soils On-Site

The preferred remedial method for the widespread asbestos affected soils is long term retention on the site. This shall be undertaken as per a long-term containment strategy.

A further objective of the site development works will be minimisation of wastes as generated by the project. There is a likelihood as consequent of the proposed development works, e.g. excavations as required to facilitate sub-surface service installation, that surplus soils will be generated during the site remediation and associate earthworks. Consideration may be given to assessment of surplus soils for beneficial reuse where the subject soils are free from asbestos and/or considered not to comprise ASS/PASS.

With this proposed waste minimisation strategy, it is likely that impacted fill soils may be caused to be redistributed across the site. For example, surplus soils from the northern portion of the site may be used to raise site levels on the southern site portion (subject to civil/earthworks requirements). This relocation of impacted soils / fill materials is proposed to be restricted to unsaturated horizons within the site only. The validation of the appropriate re-use of impacted materials within the site and the long-term management of the soils to control potential health and ecological risks will be dependent on three aspects of site validation:

- Material tracking;
- Consideration of distribution of site impacts by comparison to previous health risk assessments undertaken for the site;
- Installation of a marker layer; and
- Installation of a capping layer.

The validation of each component is discussed further following.

Material Tracking

The movement of all impacted materials (subject to long term containment) on the site is required to be subject to a Material Tracking Plan (MTP). The MTP shall be administered by the environmental consultant with the provision of all required information by the remediation contractor and will generally contain the following elements:

- Date (yyyy/mm/dd);
- Site figure showing source (cut) and placement (fill);
- Estimated volume (cubic metres);
- Type of material (asbestos, VENM etc);
- Depth of source (RL);
- Depth of placement (RL);
- Source (from) information in terms of MGA56 co-ordinates as established by site GPS and/or survey;
- Placement (to) information in terms of MGA56 co-ordinates as established by site GPS and/or survey;
- Source (from) information in terms of site feature (e.g. Building X);
- Placement (to) information in terms of site feature (e.g. under future basement);
- Reference document (where necessary, i.e. virgin excavated natural material / excavated natural material classification);
- Purpose of placement (i.e. containment, surplus to site requirements etc); and
- Comments (when required).

Marker Layer

Visual inspection will be undertaken by the Environmental Consultant to verify the installation of the marker layer across the complete extent of the site where fill soils are present in the sub-surface. Photographic records and a survey prepared by the Project Surveyor of the marker layer installation, including vertical and lateral extents will be retained for inclusion in the Validation Report.

Capping Layer

Material to be used as a capping layer (other than concrete pavement) must be validated by the Environmental Consultant to be environmentally suitable, consisting of VENM, ENM, suitable on-site materials (i.e. materials from another portion of the development site that are non-impacted) or material considered suitable for beneficial reuse via a resource recovery exemption issued by NSW EPA. Additionally, contaminant concentrations in any capping layer material must not exceed the adopted site validation criteria for soils.

The capping layer must be placed at the thicknesses specified for each capping scenario as detailed in **Section 6.3.8**. Photographic records and a survey of the capping layer installation, which details the final thicknesses of the capping layer, including the vertical and lateral extents prepared by the Contractor will be retained for inclusion in the Validation Report. This shall also make reference to the requirements for landscaping soils and zones as consistent with the final development plans (to be prepared).

7.3.6 Ground Surface Validation (Aesthetics)

Prior to the completion of remedial works and following placement of the marker layer, the ground surface of the site shall be thoroughly inspected by the environmental consultant to confirm the absence of visual ACM which may have been incidentally deposited during works.

Should any observable ACM be identified, the area should be emu-picked prior to re-inspection by the environmental consultant.

7.3.7 Groundwater Validation Data Requirements

7.3.7.1 Assessment of MNA

Monitored natural attenuation shall be undertaken by sampling and analysis events of all monitoring wells available within the monitoring network (refer to **Figure 8** and **Section 6.4**). The actual long term implementation of the MNA program shall be advised in the LTEMP to be prepared for the site at the cessation of the source remediation works. Notwithstanding, the assessment of MNA is anticipated to comprise:

- Sampling and analysis of available monitoring wells on a biannual basis;
- Analysis of samples for principle constituents of potential including TRH and BTEXN; and
- Additional analysis of all well for indicators of natural attenuation including nitrate, sulphate, ferrous iron and methane.

Groundwater analysis data shall be analysed to determine the occurrence of natural attenuation processes by primary and secondary lines of evidence. Prior to the availability of five rounds of data, assessment of primary lines of evidence shall be by qualitative assessment of the analytical data set. With the availability of five or more rounds, analysis data sets shall be assessed for each locations by Mann-Kendall analysis undertaken by ProUCL to determine a statistically significant trend.

On the basis of the results, revision of the requirements for ongoing monitoring will potentially be made to the EMP consistent with the following:

- Identification of the hydrocarbon impacted monitoring wells and inclusion for future monitoring;
- Identification of key “delineation” wells hydrogeologically downgradient of the extent of petroleum hydrocarbon impact; and
- Identification of hydrogeologically upgradient wells to be used as background wells.

As advised in detail to the proposed EMP, assessment of MNA shall be undertaken until such time that:

- Levels of COPCs in all monitoring wells are below the adopted assessment criteria in three consecutive rounds; or
- Levels of COPCs are found by statistical analysis undertaken using ProUCL to be reducing in each well; or
- Assessment of secondary indicators of natural attenuation supports the occurrence of natural attenuation processes in at least three consecutive events.

7.3.7.2 Groundwater Sampling

Groundwater sampling shall be conducted via a low flow sampling method with peristaltic pump for all other constituents. Purging was undertaken to ensure the sample collected is representative of groundwater conditions. Field parameters of pH, conductivity, redox and temperature will be measured with field electrodes in a flow cell and samples obtained once the parameters stabilise such that:

- Consecutive EC readings are within 3 %;
- Consecutive Eh readings are within 10 mV;
- Consecutive DO readings are within 10 %; and
- Consecutive pH readings are within 0.05.

Groundwater samples shall be transferred directly to laboratory supplied sample bottles. Sample bottles shall be clearly marked with sample identification details and transferred to an esky chilled with loose ice.

7.4 Validation Criteria

7.4.1 Soil

Soil validation data collected on site will be compared to the most conservative petroleum hydrocarbon in soil criteria as advised to NEPC (2013) for the protection of human health.

Aesthetic impacts of soils will be interpreted by on-site observations of indicators of soil staining and/or ACM and/or odours and/or other anthropogenic materials.

The petroleum hydrocarbon site validation criteria are nominated in **Table 7.4** following.

Table 7.4: Soil Validation Criteria

Constituent	Health Investigation Levels	Health Screening Level for Vapour Intrusion (mg/kg)	Management Limits – Coarse Soil
PCBs (total)	7	-	-
TRH C_{6-10} Less BTEX (F1)	-	45	700
TRH $C_{>10-C16}$ Less naphthalene (F2)	-	110	1000
TRH $C_{>16-34}$	-	-	3500
TRH $C_{>34-40}$	-	-	10 000
Benzene	-	0.5	-
Toluene	-	160	-
Ethylbenzene	-	55	-
Xylenes	-	40	-
Naphthalene	-	3	-

7.4.2 Groundwater

Groundwater data collected on-site will be compared to guidelines provided to ANZG (August 2018[8]) for marine ecosystems protective of 95% of species and the lowest of the criteria provided to NEPC (2013) for the protection of marine ecosystems, aquatic foods, recreational uses and visual amenity as consistent with the water quality objectives for the Cooks River catchment. With respect to the assessment of recreational exposures down-gradient of the site, data will be compared to drinking water guidelines as summarised in NEPC (2013) and adjusted by an order of magnitude consistent with a recreational exposure being the most likely sensitive potential exposure pathway. Noting that the site is situated within the Zone 2 Management Zone for the Botany Sands Aquifer, in which the use of groundwater for drinking purposes is banned, the comparison of groundwater data to drinking water guidelines is considered not applicable to the validation assessment.

The adopted groundwater petroleum hydrocarbon criteria are listed in **Table 7.5** following.

Table 7.5: Groundwater Validation Criteria (all units are µg/L unless otherwise shown)

	Limit of Reporting	Laboratory Method	Recreational Criteria[1]	Aquatic Ecosystem Criteria[2]	HSL –Commercial / Indsutrial[3]
TOTAL RECOVERABLE HYDROCARBONS					
F1 C_6-C_{10}	250	P&T GC/MS (USEPA 8020A, 8000)	-	-	6000
F2 >C_{10}-C_{16}	250	P&T GC/MS (USEPA 8020A, 8000)	-	-	NL
BTEX					
Benzene	1.0	P&T GC/MS (USEPA 8020A)	10	500	5000
Toluene	1.0	P&T GC/MS (USEPA 8020A)	8000	180	NL
Ethylbenzene	1.0	P&T GC/MS (USEPA 8020A)	3000	5	NL
m-Xylene	1.0	P&T GC/MS (USEPA 8020A)	6000 (total Xylene)	75	NL
p-Xylene	1.0	P&T GC/MS (USEPA 8020A)		200	NL
o-Xylene	1.0	P&T GC/MS (USEPA 8020A)		350	NL

Notes:
1. 10 times drinking water NHMRC (2011)
2. Ecological Criteria ANZG (2018) 95% Marine Waters reliability, unless otherwise noted.
3. NEPC (2013) B1 – Table 1A(4) HSL health screening values for vapour intrusion – sand soils 2-4 m. NL: Non limiting

7.5 Waste Disposal Off-site

All wastes requiring off-site disposal must be classified in accordance with *Waste Classification Guidelines* (EPA 2014). The Remedial Contractor is responsible for the lawful disposal of the classified waste to a licensed waste disposal facility lawfully able to accept the waste.

Disposal dockets for each individual off-site waste disposal load must be provided to the Principal and to the Remediation Consultant by the Contractor to demonstrate appropriate off-site disposal of waste occurred for site validation purposes.

7.5.1 Transport of Asbestos Impacted Materials

As further required to be considered in the requirements of material tracking, transport of materials affected by asbestos will require to be further cognisant of the requirements of *Work Health and Safety Act (2011)* and *Work Health and Safety Regulation (2017)*, *How to Manage and Control*

[8] Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, August 2018)

Asbestos in the Workplace: Code of Practice, October 2018, Safe Work Australia, *Managing Asbestos in or on Soil*, 2014, WorkCover and the EPA (2014b).

Excavation and removal of friable asbestos contaminated soils are required to be conducted by a Class A licensed contractor. Excavation, onsite remediation and offsite removal of non-friable ACM only contaminated soils are to be conducted by at least a Class B Licenced Asbestos Removal Contractor – however, a Class A Licenced Contractor is recommended (**Section 6.1**).

Before starting any affected works, the appointed contractor is required to notify SafeWork NSW at least five days before commencement.

The details of the relevant Class B contractor shall be further advised to the relevant parts of the materials tracking form(s).

7.6 Validation Reporting

At the completion of the remedial works, a validation report will be prepared in general accordance with the *Consultants Reporting on Contaminated Land Contaminated Land Guidelines* (EPA 2020), documenting the works as completed. The report will contain information including:

- Details of the remediation works conducted;
- Information demonstrating that the objectives of this RAP have been achieved, in particular the validation sample results and assessment of the data against both the pre-defined DQO and the remediation acceptance (validation) criteria;
- Information demonstrating compliance with appropriate regulations and guidelines including UPSS infrastructure destruction/disposal documentation;
- Any variations to the strategy undertaken during the implementation of the remedial works;
- Results of all environmental monitoring undertaken during the course of the remedial works;
- Details of any environmental incidents occurring during the course of the remedial works and the actions undertaken in response to these incidents;
- Verification of regulatory compliance;
- Details on waste classification, tracking and off-site disposal including landfill dockets;
- Survey plans as relevant to the site, marker and capping layer extents;
- Photographic records of applicable remediation works;
- The extent of impacted materials as retained with the site and subject to the long-term management provisions; and
- Clear statement of the suitability of the site with respect to permissible land uses with specific reference to the LTEMP to be applied for the ongoing management of the extent of impacted materials as characterised at the completion of the construction works.

The report will serve to document the remediation works for future reference. It is noted that due to site access and/or construction constraints, that the remediation and validation works may occur in stages. Any works that occur at the site following validation of an area will be completed in accordance with the proposed LTEMP as per **Section 7.6.1**.

7.6.1 Long Term Environmental Management Plan

With the proposed on-site containment of impacted soils, a LTEMP will be required. The LTEMP will document provisions for the of long-term management of the marker and capping layers integrity and detail the required controls for future works below the marker layer.

Groundwater monitoring shall continue, following source removal validation, until such a time as it is able to be demonstrated that site attributable groundwater impacts do not pose a potential risk to offsite groundwater receptors. The specific requirements for ongoing MNA shall be determined following receipt of validation data and advised within the LTEMP, as required.

The LTEMP will be made legally enforceable through an appropriate mechanism such as development consent conditions, to give the plan a basis in law.

8. Unexpected Finds

The possibility exists for hazards to be present at the site other than those identified and expected based on previous investigations.

Environmental sampling is based on chemical analytes identified as a potential concern during a documented process of reviewing historical site activities. However, ground conditions between sampling points may vary, and further hazards may arise from unexpected sources and/or in unexpected locations. The nature of any additional hazards which may be present at the site are generally detectable through visual or olfactory means, for example:

- Areas of previously unidentified ACM on the ground surface or within fill material;
- Uncontrolled filling, such as in eroded drainage lines;
- Drums or underground tanks;
- Chemical bottles; and
- Odorous or unusual coloured soils;

As a precautionary measure to ensure the protection of the workforce and surrounding community, if any of the abovementioned substances be identified (or any other unexpected potentially hazardous substance), the procedure summarised in **Flowchart 8.1** and detailed in the following sections is to be followed.

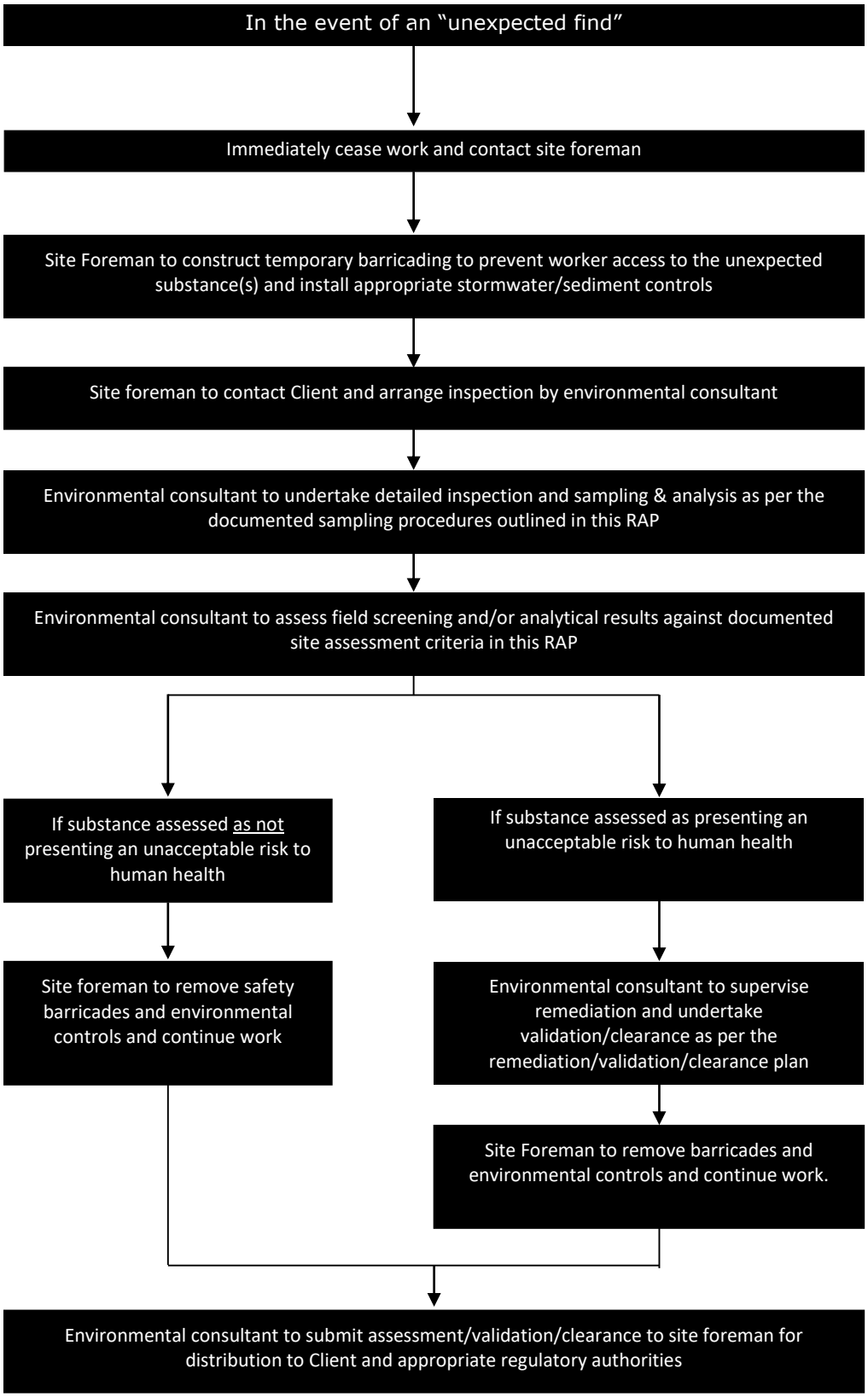
An enlarged version of an unexpected finds protocol, suitable for use on site, should be posted in the Site Office and referred to during the Site Specific Induction by the Principal Contractor.

The sampling strategy for each 'unexpected find' shall be designed by a suitably qualified environmental consultant, in accordance with guidelines made or endorsed by EPA. The strategy will, however, be aimed at determining the nature of the substance – that is, is it hazardous and, if so, is it at concentrations which pose an unacceptable risk to human health or the environment.

The sampling frequency of the identified substance / materials shall meet the requirements the NSW EPA Sampling Design Guidelines (1995).

The assessment criteria shall be determined by the Environmental Consultant, with the subject material to at least meet the criteria nominated in **Section 7.4**, and additional criteria (as necessary) obtained from published national guidance documents.

Flowchart 8.1: Unexpected Finds Protocol



9. Site Management Plan

This section contains procedures and requirements that are to be implemented as a minimum requirement during the remedial works at the site.

9.1 Contact Persons

Contact details for key personnel involved in remediation and validation works are summarised in **Table 9.1.**

Table 9.1 Contact Details

Client's Supervisor/Manager	Details
Name	To be advised
Company	To be advised
Address	To be advised
Contact Phone	To be advised
Remediation Contractor	**Details**
Name	To be advised
Company	To be advised
Contact Phone	To be advised
Environmental Consultant	**Details**
Name	To be advised
Company	To be advised
Address	To be advised
Contact Phone	To be advised

9.2 Hours of Operation

It is understood that the hours of operation for remedial works will be conducted in accordance with the recommended site hours suggested by the EPA[9], however, works hours will be subject to requirements of any development approval conditions provided by Council.

Typical hours of operation for remedial works are:

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

Emergency work is permitted to be completed outside of these hours.

9.3 Soil and Water Management

All works shall be conducted in general accordance with Landcom (2004)[10] guidance (the Blue Book), which outlines the general requirements for the preparation of a soil and water management plan.

All remedial works shall be conducted in accordance with a soil and water management plan, which is to be kept onsite and made available to council officers on request. All erosion and sediment measures must be maintained in a functional condition through the remediation works by the remedial contractor.

To prevent the migration of impacted soil off site, silt fences shall be constructed at the down-gradient site boundaries by the remedial contractor. Any material which is collected behind the sediment control structures shall be removed off site to a licensed waste facility after waste classification.

[9] *Interim Construction Noise Guideline.* Department of Environment & Climate Change NSW. DECC 2009/265. July 2009.
[10] *Managing Urban Stormwater: Soils and Construction*, Landcom 4th Edition, March 2004.

In storm or extended rainfall event, the structures located on site for sediment control shall be monitored and replaced or altered if necessary by the contractor. Collected material shall be managed in accordance with remediation works by the contractor.

9.3.1 Stockpiles / Landfarms

All materials stockpiled onsite (inclusive of the Landfarm) will be managed by the remedial contractor. Unique numbers will be provided for each stockpile, the source of the stockpile, its volume, material characterisation and its location onsite (via GPS) recorded.

The following procedures will be implemented by the remedial contractor:

- No stockpiles of soil or other materials shall be placed on footpaths or nature strips unless prior Council approval has been obtained;
- All stockpiles of soil or other materials shall be placed away from drainage lines gutters or stormwater pits or inlets;
- All stockpiles of soil or other materials likely to generate dust or odours shall be covered (where practical); and
- All stockpiles of contaminated soil shall be placed on plastic sheeting to limit cross contamination of the underlying soils and stored in a secure area.

9.3.2 Site Access

During remediation works, temporary fencing will be installed which will restrict access to remedial areas on the site. Only authorised persons will be permitted to enter the remedial areas.

Vehicle access to the site shall be stabilised to prevent the tracking of materials from the site and the adjoining driveway/access point to the road will be swept or cleaned on an as-needed basis. Any collected materials shall be treated as potentially contaminated and handled as per the classification/reuse/disposal requirements outlined in this RAP.

9.3.3 Excavation Pump-out

Any excavation pump-out water shall be sampled by the environmental consultant for analysis for total suspended solid concentrations, turbidity, pH and the identified contaminants of concern prior to release to stormwater with appropriate documentation indicating that the discharged water is compliant with the ANZG (2018[11]) default guideline values (DGVs) for the 95 % Protection of Marine Water Ecosystems. If not, appropriate waste disposal practices with a suitably licensed and experienced waste contractor.

Excavation pump out is not anticipated with the general remediation works given the general remedial plan of minimising ground disturbance and groundwater being undisturbed. Pump out following accumulation of surface water is the most likely scenario for water disposal.

[11] *Australian and New Zealand Guidelines for Fresh an Marine Water Quality*, August 2018, Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia (ANZG 2018)

9.4 Noise

Remediation work shall not give rise to 'offensive noise' as defined in the POEO Act *1997*. All equipment and machinery associated with the remediation work shall be operated by the Contractor in accordance with *the POEO Act 1997* and the *Noise Control Regulations 2000*.

All machinery and equipment used on site will be in good working order and fitted with appropriate silencers when necessary.

Louder equipment shall be located away from noise sensitive areas. Works shall be staged as required to avoid concurrent operation of multiple pieces of noisy equipment. Works outside of normal hours of operation (**Section 9.2**) shall be avoided.

9.5 Vibration

The use of plant and machinery shall not cause vibrations to be felt or capable to be measured at neighbouring premises.

9.6 Air Quality

During remedial works, dust emissions and any odours will be confined within the site boundary.

9.6.1 Air Monitoring

Perimeter air monitoring will be required during the disturbance of asbestos impacted soils as potentially present across the extent of the site. Air monitoring will be conducted in accordance with the requirements of the National Occupational Health and Safety Commission (NOHSC) *Asbestos Code of Practice and Guidance Notes*, in particular the *Guidance Note on the Membrane Filter Method Estimating Airborne Asbestos Fibres* 2nd Edition [NOHSC 3002:2005].

9.6.2 Dust Control

During the remedial works, as necessary, excavation areas will be wetted down using a water spray to minimise the potential for dust to be generated by the remedial contractor.

Dust shall also be controlled by ensuring vehicles leave via the designated (stabilised) site access and all equipment have dust suppressors fitted by the remedial contractor.

During all remedial works, dust screens will be erected around the perimeter of the site by the remedial contractor. Where significant fugitive emissions are observed from specific site areas, these areas shall be wetted and/or covered by the remedial contractor.

Meteorological conditions will be monitored by the environmental consultant and remedial contractor. Remedial work will be stopped or modified where meteorological conditions are adverse (i.e., dry conditions and strong winds towards sensitive receptors).

Plant and vehicles should limit their speed when working within asbestos exclusion zones and only traverse wetted haul roads.

9.6.3 Odour

Given the nature of some of the material being excavated at the site, namely hydrocarbon impacted soils, there may be some odour issues at the site boundaries.

If odours are detectable at the site boundaries, then appropriate actions will be taken to reduce the odours, which may include: increasing the amount of covering of excavations / stockpiles; mist sprays; odour suppressants; or maintenance of equipment.

Records of volatile emissions and odours shall be kept by the remediation manager. Equipment and machinery will be adequately maintained to minimise exhaust emissions. No materials shall be burnt on the site.

9.7 Groundwater

No groundwater remediation or dewatering is proposed as part of site remediation works. No approvals are required under the *Water Management Act 2000*.

9.8 Material Transporting

Trucks will be loaded in a designated area in a manner designed to minimise noise, vibrations and odour to adjoining premises. The transportation contractor shall ensure that there is no material tracked out onto public roads and that each load is securely covered. Removal and deliveries of soils and materials, equipment and machinery will only occur during the hours of remediation works unless specific approvals are obtained.

All appropriate road rules shall be observed and state roads will be selected as far as practicable over local roads when deciding on the transport route to the off-site material disposal location. In addition, the transport contractor will be required to be appropriately licensed to transport and dispose of the waste identified as requiring removal from the site.

As of 1 July 2015, it will be required under the *Protection of the Environment Operations (Waste) Regulations 2014* (POEO 2014) to record the movement of all loads of more than 100 kg of asbestos waste or more than 10 m^2 of asbestos sheeting. Each load will be assigned a unique consignment code to allow NSW EPA to monitor their movement from site of generation to disposal.

In addition, the proximity principle, under POEO 2014, makes it an offence to transport waste generated in NSW by motor vehicle for disposal more than 150 kilometres from the place of generation, unless the is waste is transported to one of the two nearest lawful disposal facilities to the place of generation.

9.9 Hazardous Materials

Hazardous and / or intractable wastes arising from the remediation work shall be removed and disposed of in accordance with the requirements of NSW EPA, SafeWork NSW and the relevant regulations by the Contractor.

Any hazardous wastes will be transported by a NSW EPA licensed transporter.

9.10 Disposal of Contaminated Soil

All soil will be classified, managed and disposed in accordance with the *Waste Classification Guidelines* (EPA 2014). Documentary evidence for all soil disposal shall be kept for inclusion in the Validation Report.

9.11 Site Signage and Contact Numbers

A sign shall be displayed adjacent to the site access throughout the duration of the works with the contact details of the remediation contractor and project manager.

9.12 Community Relations

Owners and/or occupants of premises adjoining the site will be notified at least seven days prior to the commencement of remedial works.

Any community concerns or queries should be directed to the site manager. The site manager will notify the site owner of any community queries or concerns so that the site owner will direct an appropriate person to address the community query or concern.

9.13 Site Security

The remedial areas shall be secured against unauthorised access by means of an appropriate fence.

9.14 Occupational Health and Safety

It is the employer's responsibility to ensure that all site remediation works comply with all Work Health and Safety and Construction Safety Regulations of NSW SafeWork. A Health and Safety Plan is provided in **Section 10.**

10. Health and Safety

This health and safety plan contains procedures and requirements that are to be implemented as a minimum during the remediation works.

The objectives of the health and safety plan are:

- To apply standard procedures that reduce risks resulting from the above works;
- To ensure all employees are provided with appropriate training, equipment and support to consistently perform their duties in a safe manner; and
- To have procedures to protect other site workers and the general public.
- These objectives will be achieved by:
- Assignment of responsibilities;
- An evaluation of hazards;
- Establishment of personal protection standards and mandatory safety practices and procedures; and
- Provision for contingencies that may arise while operations are being conducted at the site.

This health and safety plan does not provide safety information specific to construction and other demolition or excavation activities carried out by contractors, such as the safe operation, maintenance and inspection of plant, etc. Contractors will be required to prepare their own Safe Work Method Statements for their work activities. All parties working on the site shall comply with all applicable Health and Safety legislation, regulations, codes and guidelines.

10.1 Responsibilities

Remediation Supervisor

The remediation supervisor is responsible for ensuring that the work is carried out in accordance with the health and safety plan. This will include:

- Ensuring a copy of the health and safety plan is available at the site during the remediation/validation activities;
- Ensuring all works are undertaken in accordance with appropriate regulations and standards;
- Confirming individuals are competent in performing allotted tasks;
- Liaison with the contractor representatives, as appropriate, regarding safety matters; and
- Investigation and reporting of incidents and accidents.

Every individual worker is responsible for conducting their allocated tasks in a safe manner and in accordance with their training and experience. They must give due consideration to the safety of all others in their proximity and cooperate in matters of health and safety. All workers must leave their work areas in such a condition that the location will not be hazardous to others at any time.

10.2 Hazards

The known or potential hazards associated with the work activities described in **Section 4** are listed below:

- Inhalation hazards associated with the presence of ACM fragments in/on soil;
- Chemical hazards associated with the presence of potentially contaminated soil inclusive of elevated levels of petroleum hydrocarbons and PCBs;
- Physical hazards, including:
  - work in or near excavations;
  - operating machinery;
  - heat stress and UV exposure;
  - underground (particularly with the presence of UST(s)) or overhead services;
  - manual handling; and
  - noise.

In the event of the discovery of any condition that would suggest the existence of a situation more hazardous than anticipated, or of any new hazard that could potentially cause serious harm to personnel or the environment, work will be suspended until the Project Manager has been notified and appropriate instructions have been provided to field personnel.

10.2.1 Inhalation Hazards

The main inhalation hazards from the remediation/validation works are consequent of the presence of asbestos.

Measures require to be put in place to prevent/ minimise the generation of airborne fibres. These have been described in the environmental controls for the works. Where airborne emissions are likely to be generated, Personal Protective Equipment (PPE) shall be required to be worn to prevent potential exposure, as described in **Section 10.3**.

10.2.2 Chemical Hazards

When working with potentially contaminated materials in general, care must be taken to ensure that the contamination is not introduced to the worker via ingestion, inhalation or absorption. PPE and decontamination requirements related to the remedial works are summarised in **Section 10.3**.

10.2.3 Physical Hazards

Operating Machinery

Heavy plant and equipment operating in the vicinity of field personnel presents a risk of physical injury. Personnel should be cognisant of their position in relation to operating machinery at all times.

Never walk behind or to the side of any operating equipment without the operator's knowledge. Do not assume that the operator knows your position. Personnel should stay at least 1 m from the operational area of heavy equipment and should not stand directly below any load or piece of equipment (e.g. backhoes).

Work in or Near Excavations

All excavations shall be shored, sloped or otherwise constructed so as to minimise the potential for collapse. No excavations greater than 1.5 m depth are anticipated to be created.

Cuts and Abrasions

The manual work associated with the remediation works gives rise to the risk of cuts and abrasions to personnel working in the area. As well as the direct consequences of any cut or abrasion, such injuries can lead to the possibility of exposure to contaminants through the wound as well as diseases such as tetanus. To minimise the risk of direct or indirect injury, personnel will wear the personal protective equipment described in **Section 10.3**.

Heat Stress and UV Exposure

Site personnel may experience heat stress due to a combination of elevated ambient temperatures and the concurrent use of personal protection equipment; this depends in part on the type of work and the time of year.

In addition to heat stress, overexposure to UV radiation in sunlight can result in sunburn to exposed skin. The use of a high protection sunscreen (SPF15 or greater) on all exposed skin is recommended. Hats (including hard hats in specified areas) will also provide additional sun protection during the peak (i.e. 10:00 am to 3:00 PM) sun period. Sunglasses should be worn (where appropriate) to protect eyes from effects of UV exposure.

Underground Services

There is the potential for underground services (electricity, natural gas lines, water, telephone, sewer, and stormwater) to be present beneath the work area. The remediation contractor shall ensure that appropriate procedures will be taken to minimise the risk associated with excavation near services.

It is further noted that the presence of UST(S) will require appropriate decommissioning in which the Remedial Contractor shall ensure that appropriate procedures will be taken to minimise the risk associated with the works.

Aboveground Electrical Hazards

All electrical plant and equipment must comply with the requirements of Australian Standard AS 3000. Hand held portable tools shall comply with AS/NZS 3160 Hand-held Portable Electric Tools and shall be double insulated. Cord connected portable hand lamps shall comply with AS/NZS 3118. A Residual Current Device (RCD) shall protect plug-in portable equipment, which is connected to a supply above Extra Low Voltage - 12-24volts (including equipment supplied from a generator or welding set). RCD protection shall be provided during use of portable electrical equipment at all times while the equipment is connected to a power supply above Extra Low Voltage, irrespective of whether power is switched ON or OFF. RCD's shall comply with AS 3190 and shall be type II units, rated to trip at or below 30 milliamps within 40 milliseconds.

All equipment shall be operated in compliance with the NSW WorkCover (2006) Work Near Overhead Power Lines: Code of Practice. Minimum approach distances for all equipment should exceed:

- 3.0 m for nominal phase to phase ac voltage lines up to 132,000 Volts;
- 6.0 m for 132 000 to 330 000 Volts;
- 8.0 m for greater than 330 000 Volts; and
- 3.0 m for nominal pole to earth dc voltage up to and including 1500 +/- volts.

Manual Handling

When lifting or handling heavy objects, use correct lifting techniques, bending the knees not the back. If the item to be lifted is too heavy or awkward for one person to lift, seek assistance from other company employees or use mechanical help.

Noise

Long-term exposure to high levels of noise is unlikely. However, operating machinery may cause significant noise exposures for short periods. Earplugs or earmuffs should be worn in any situation where noise levels make normal conversation difficult.

10.3 Personal Protective Equipment

All workers who may come into direct contact with contaminated soil will wear the following PPE:

- Overalls or long sleeved collared shirt;
- Heavy duty outer gloves (eg. leather) where there is a risk of cuts or abrasions, otherwise PVC outer gloves if in direct contact with contaminated soil;
- Steel capped boots;
- Safety glasses;
- High visibility vest or jacket; and
- Hard hat.

In addition to the above, the following PPE will be worn by the personnel responsible for handling of fill materials within the extent of the site (i.e. asbestos impacted soils) prior to the installation of the marker layer, or potentially exposed to airborne emissions:

- During any work in which direct contact of personnel to asbestos impacted soils may occur and prior to final clearance / placement of marker layer – overalls, gloves, rubber soled work shoes or gum boots should be work by personnel involved in the work. These shoes will remain inside the work area for the duration of the work.
- Approved respirators shall be worn during direct handling of asbestos impacted soils at all times to provide respiratory protection. The minimum protection is an approved properly fitting P2 disposable respirator or half faced respirator fitted with a particulate cartridge. However, it is expected that the remediation contractor will conduct a risk assessment in relation to the works and should consider the requirement for positive pressure, hood or full-face powered air-purifying respirator fitted with an approved Class M filter.
- The remediation contractor shall supply and keep in good order, two complete sets of protective clothing and respirators for authorised inspection personnel. These will remain the property of the contractor at the end of the contract.
- Respirators should be issued for personal use only and shall be kept in a clean condition. Alcohol based antiseptic swabs should be made available for the cleaning of respirators.
- Any respirator defects should be reported for subsequent repair. They should be maintained in a clean and safe working condition.
- Employees must receive instruction in the correct method of using the respirator and on the importance of correct facial fit and maintenance. No person with a beard shall be allowed within the asbestos work area except using an approved positive pressure continuous airflow hood.

In the event that the PPE detailed above differs from that required by the Class B licensed contractor, the requirements of the licensed contractor will prevail.

Vehicle, Plant and Equipment

All equipment, including personal protective equipment, will be washed or otherwise cleaned to ensure that contaminated soil, water or dust is removed before it leaves the Site. All plant and equipment will have their outer bodies thoroughly cleaned of soil and sediment before moving off the site.

10.4 Emergency Response

The remediation contractor will be responsible for preparing an emergency response plan, which will provide details on appropriate action and evacuation procedures in the event of an emergency.

In the event of an emergency arising on the site, appropriate action should be taken. Site evacuation procedures should be followed, as necessary.

In the event of an accident: evaluate the seriousness of the injury, and contact emergency services, if necessary; provide first aid, as appropriate, and if safe to do so evacuate the injured person via the Decontamination Zone; make the area as safe as possible without jeopardising safety.

If a serious accident occurs, do not disturb the scene, except to make safe and prevent further injury or damage, and keep all unauthorised people out, and report all accidents to the Project Manager.

11. Regulatory Approvals / Licensing

11.1 Protection of the Environment Operations Act 1997 (POEO 1997)

The proposed remediation/validation activities are not required to be licensed under the *Protection of the Environment Operation Act 1997*, which is based on the following:

- The proposed remediation works will not treat more than 1000 m^3 per year of contaminated soil received from off-site.
- The proposed remediation works will not involve the treatment of contaminated soil originating on-site with the capacity: (i) to incinerate more than 1000 m^3 per year of contaminated soil, or (ii) to treat (otherwise than by incineration) and store more than 30 000 m^3 of contaminated soil, or (iii) disturb an aggregate area of 3 hectares of contaminated soil.

11.2 State Environment Planning Policy (Resilience and Hazards) 2021

Development consent for remediation works is addressed by reference to State Environmental Planning Policy 55 – Remediation of Land (SEPP-RH) and associated Planning Guidelines (DUAP 1998).

The proposed remediation works are classified as 'Category 2' Remediation Works – i.e. not requiring consent. The notification requirements of SEPP 55 include notification to council 30 days before Category 2 remediation works commence. The proposed works do not constitute Category 1 works because it is understood that:

- The work is not Designated Development under Schedule 3 of the EPA&A Regulation or under a planning instrument.
- The work proposed is not on land identified as critical habitat under the *Threatened Species Conservation Act 1995*.
- Consideration of s.5A of the EP&A Act indicates the remediation work is not likely to have a significant effect on threatened species, populations, ecological communities or their habitats.
- The work is not proposed in an area or zone to which any classifications to the following effect apply under an environmental planning instrument:
    - coastal protection;
    - conservation or heritage conservation;
    - habitat area, habitat protection area, habitat or wildlife corridor;
    - environmental protection;
    - escarpment, escarpment protection or escarpment preservation;
    - floodway;
    - littoral rainforest;
    - nature reserve;
    - scenic area or scenic protection;
    - wetland, or
    - carried out or to be carried out on any land in a manner that does not comply with a policy made under the contaminated land planning guidelines by the council for any

local government area in which the land is situated (or if the land is within the unincorporated area, the Western Lands Commissioner).

- The work does not require consent under another SEPP or regional environmental plan.

In addition, the notification will also include relevant contact details and a proposed remediation schedule. Notice is also required to be given to Council within 30 days of remediation works completion.

11.3 Protection of the Environment Operations (Waste) Regulation 2014

The regulations make requirements relating to non-licensed waste activities and waste transporting. The proposed works on the site will not require to be licensed. Section 48 of the Reg. requires that wastes are stored in an environmentally safe manner. It also stipulates that vehicles used to transport waste must be covered when loaded.

It will be required under the *Protection of the Environment Operations (Waste) Regulations 2014* (POEO 2014) to record the movement of all loads of more than 100 kg of asbestos waste or more than 10 m^2 of asbestos sheeting. Each load will be assigned a unique consignment code to allow NSW EPA to monitor their movement from site of generation to disposal.

In addition, the proximity principle, under POEO 2014, makes it an offence to transport waste generated in NSW by motor vehicle for disposal more than 150 kilometres from the place of generation, unless the waste is transported to one of the two nearest lawful disposal facilities to the place of generation.

11.4 Waste Classification Guidelines (EPA 2014b)

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

11.5 Asbestos Removal Regulations and Code of Practice

The removal and disposal of asbestos will be managed in accordance with the Work Health and Safety Act (2011) and Work Health and Safety Regulation (2017), *Code of Practice How to Safely Remove Asbestos* (NSW Government 2019), *Code of Practice How to Manage and Control Asbestos in the Workplace* (NSW Government 2019), NSW SafeWork Guidelines, the NSW EPA (2014) *Waste Classification Guidelines*, and requirements under the *Protection of the Environment Operations (Waste) Regulation* (2014) for asbestos waste monitoring (NSW EPA 2015).

Excavation, onsite remediation and removal of asbestos impacted soils are required to be conducted by a Class A (Friable) or B (Bonded) Asbestos Removal licensed contractor.

11.6 City of Sydney (2012) 'Development Control Plan'

The Council DCP provides a number of environmental and site management provisions required to be employed during remediation works. These will require to be adopted as minimum standards for the environmental management of remediation works.

12. Conclusions and Recommendations

With reference to the limitations in **Section 13**, the following conclusions and recommendations are provided.

12.1 Conclusions

It is considered that the proposed actions outlined in this RAP conform to EPA requirements because they are: technically feasible; environmentally justifiable; and consistent with relevant laws, policies and guidelines endorsed by NSW EPA.

Subject to the successful implementation of the measures described in this RAP and the recommendations below, it is concluded that the risks posed by potential direct human contact pathways / potential exposure of contaminated soils can be managed in such a way as to be adequately protective of human health such that the land can be made suitable for the proposed land use. It is further concluded that any potential ecological risks posed by offsite migration of TRH impacted groundwater will be appropriately addressed by the implementation of the remedial works documented herein.

12.2 Recommendations

It is recommended that the processes outlined in this RAP be implemented to ensure the risks and impacts during remediation and construction works are controlled in an appropriate manner.

Upon completion of the remediation works, a Validation Report is required to be prepared to verify remedial works were completed in accordance with the RAP. A LTEMP will further require to be prepared to ensure the ongoing management of the retained impacted soils, and monitor the attenuation of TRHs in groundwater, unless a comprehensive validation assessment is able to be generated otherwise that shows that levels of asbestos and/or other potential contaminants do not pose a potential human health or ecological risk.

13. Limitations

This report has been prepared for use by the client who has commissioned the works in accordance with the project brief only, and has been based in part on information obtained from the client and other parties.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by JBS&G, and should not be relied upon by other parties, who should make their own enquires.

Sampling and chemical analysis of environmental media is based on appropriate guidance documents made and approved by the relevant regulatory authorities. Conclusions arising from the review and assessment of environmental data are based on the sampling and analysis considered appropriate based on the regulatory requirements.

Limited sampling and laboratory analyses were undertaken as part of the investigations undertaken, as described herein. Ground conditions between sampling locations and media may vary, and this should be considered when extrapolating between sampling points. Chemical analytes are based on the information detailed in the site history. Further chemicals or categories of chemicals may exist at the site, which were not identified in the site history and which may not be expected at the site.

Changes to the subsurface conditions may occur subsequent to the investigations described herein, through natural processes or through the intentional or accidental addition of contaminants. The conclusions and recommendations reached in this report are based on the information obtained at the time of the investigations.

This report does not provide a complete assessment of the environmental status of the site, and it is limited to the scope defined herein. Should information become available regarding conditions at the site including previously unknown sources of contamination, JBS&G reserves the right to review the report in the context of the additional information.

Figures

Legend

Approximate Site Boundary

JBS&G

Job No: 63126	
Client: Logos	
Version: R01 Rev A	Date 24/05/2022
Drawn By: AB	Checked By: RH

Scale 1:3,000

0 30 60

metres

Coord. Sys. GDA 1994 MGA Zone 56

28-30 Burrows Rd,
St Peters, NSW

SITE LOCATION

FIGURE 1

File Name: N:\Projects\Logos\63126 St Peters SEARs\GIS\Maps\R01 Rev A\63126_01_SiteLocation.mxd
Reference:

Legend

- Approximate Site Boundary

Site Features

- Oil Staining
- Probable UST
- Shipping Containers - Storage
- Site Features

JBS&G

Job No: 63126

Client: Logos

Version: R01 Rev A	Date 24/05/2022
Drawn By: AB	Checked By: RH

Scale 1:750

0 10 20

metres

Coord. Sys. GDA 1994 MGA Zone 56

28-30 Burrows Rd,
St Peters, NSW

SITE LAYOUT

FIGURE 2

File Name: N:\Projects\Logos\63126 St Peters SEARs\GIS\Maps\R01 Rev A\63126_02_SiteLayout.mxd
Reference:

Legend

- Approximate Site Boundary

Sample Locations

- Borehole / Monitoring Well, SES (2020)
- Borehole, SES (2020)
- Monitoring Well, JBSG (2021)
- Soil Vapour, JBSG (2021)

Site Features

- Shipping Containers - Storage
- Probable UST
- Site Features

JBS&G

Job No: 63126	
Client: Logos	
Version: R01 Rev A	Date 24/05/2022
Drawn By: AB	Checked By: RH

Scale 1:750

0 9 18

metres

Coord. Sys. GDA 1994 MGA Zone 56

28-30 Burrows Rd, St Peters, NSW

ENVIRONMENTAL DATA POINTS

FIGURE 3

File Name: N:\Projects\Logos\63126 St Peters SEARs\GIS\Maps\R01 Rev A\63126_03_EnvironmentalDataPoints.mxd
Reference:

BH16	Depth	Concentration (mg/kg)	Criteria and Value Exceeded (mg/kg)
Analyte			
F1 (C6-C10 minus BTEX)	0.5-0.6	415	NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for

BH13	Depth	Concentration (mg/kg)	Criteria and Value Exceeded (mg/kg)
Analyte			
F1 (C6-C10 minus BTEX)	0.9-1	311	NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for

JBS_MW3	Depth	Concentration (mg/kg)	Criteria and Value Exceeded (mg/kg)
Analyte			
PCBs (Sum of total)	0.2-0.3	18	NEPM 2013 Table 1A(1) HILs Comm/Ind D Soil (7)

BH18	Depth	Concentration (mg/kg)	Criteria and Value Exceeded (mg/kg)
Analyte			
F1 (C6-C10 minus BTEX)	1.1-1.2	373	NEPM 2013 Table 1A(3) Comm/Ind D Soil HSL for

Legend

Approximate Site Boundary

Sample Locations

- Borehole / Monitoring Well, SES (2020)
- Borehole, SES (2020)
- Monitoring Well, JBSG (2021)

Site Features

- Shipping Containers - Storage
- Probable UST
- Site Features

JBS&G

Job No: 63126

Client: Logos

Version: R01 Rev A | Date 24/05/2022

Drawn By: AB | Checked By: RH

Scale 1:800

0 9.5 19

metres

Coord. Sys. GDA 1994 MGA Zone 56

28-30 Burrows Rd, St Peters, NSW

SOIL CRITERIA EXCEEDANCES

FIGURE 4

File Name: N:\Projects\Logos\63126 St Peters SEARs\GIS\Maps\R01 Rev A\63126_04_SoilCriteriaExceedances.mxd
Reference:

Legend

- Approximate Site Boundary

Sample Locations

- Borehole / Monitoring Well, SES (2020)
- Monitoring Well, JBSG (2021)

Site Features

- Shipping Containers - Storage
- Probable UST
- Site Features

JBS&G

Job No: 63126

Client: Logos

Version: R01 Rev A	Date 24/05/2022
Drawn By: AB	Checked By: RH

Scale 1:750

0 9 18

metres

Coord. Sys. GDA 1994 MGA Zone 56

28-30 Burrows Rd, St Peters, NSW

GROUNDWATER TRH IMPACTS

FIGURE 5

File Name: N:\Projects\Logos\63126 St Peters SEARs\GIS\Maps\R01 Rev A\63126_05_GroundwaterTRHImpacts.mxd
Reference:

Legend

- Approximate Site Boundary

Site Features

- Site Features
- Operational Infrastructure Remedial Extents
- PCB Impacted Soil Remedial Extent
- Surficial Hydrocarbon Staining Remedial Extent
- UPSS/UST Remedial Extents

JBS&G

Job No: 63126

Client: Logos

Version: R01 Rev A	Date 7/06/2022
Drawn By: AB	Checked By: RH

Scale 1:800

0 10 20
metres

Coord. Sys. GDA 1994 MGA Zone 56

28-30 Burrows Rd, St Peters, NSW

INDICATIVE REMEDIAL EXTENT

FIGURE 6

File Name: N:\Projects\Logos\63126 St Peters SEARs\GIS\Maps\R01 Rev A\63126_06_IndicativeRemedialExtent.mxd
Reference: www.nearmap.com - 20211006

Legend

- Approximate Site Boundary

Site Features

- Oil Staining
- Probable UST
- Shipping Containers - Storage
- Site Features

X Test-Pit Locations

JBS&G

Job No: 63126	
Client: Logos	
Version: R01 Rev A	Date 24/05/2022
Drawn By: AB	Checked By: RH
Scale 1:750	

0 10 20
metres

Coord. Sys. GDA 1994 MGA Zone 56

28-30 Burrows Rd, St Peters, NSW

JBS_MW4 Delineation Sampling Locations

FIGURE 7

File Name: N:\Projects\Logos\63126 St Peters SEARs\GIS\Maps\R01 Rev A\63126_02_SiteLayout.mxd
Reference:

Legend

Approximate Site Boundary

Site Features

Oil Staining

Probable UST

Shipping Containers - Storage

Site Features

X Monitoring Well Loactions

JBS&G

Job No: 63126

Client: Logos

Version: R01 Rev A	Date 24/05/2022
Drawn By: AB	Checked By: RH

Scale 1:750

0 10 20

metres

Coord. Sys. GDA 1994 MGA Zone 56

28-30 Burrows Rd, St Peters, NSW

Indicative Grondawater MNA Network

FIGURE 7

File Name: N:\Projects\Logos\63126 St Peters SEARs\GIS\Maps\R01 Rev A\63126_02_SiteLayout.mxd
Reference:

Appendix A Proposed Development Plans

1 GROUND FLOOR PLAN

1 : 200 A300

(A)-EASEMENT FOR DRAINAGE OF SEWAGE 1, 4 WIDE & VARIABLE WIDTH (DP1188332)
(B)-RESERVE 0.305 WIDE (DP 32332)
(C)-EASEMENT FOR ACCESS 4.265 WIDE (VIDE BK 1925 No.170)
(D)-EASEMENT FOR DRAINAGE 2.44 WIDE (VIDE BK 2596 No.880)
(E)-EASEMENT FOR ACCESS 4.265 WIDE (BK 1938 No.673)

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PRELIMINARY

REVISION	DESCRIPTION	DATE
1	ISSUED FOR REVIEW	13.05.22
2	ISSUED FOR REVIEW	18.05.22

ARCHITECT: PACE ARCHITECTS
BUILDER / PROJECT MANAGER: LOGOS
CLIENT: CAE

GRAPHIC SCALE: 1:200

purpose PRELIMINARY

GROUND FLOOR PLAN

scale 1 : 200 A1
project no 220507
date 18.05.22
dwn WL
dwg no 220507 - CT101
issue 2

Appendix B Environmental Data

Table A2: PFAS Soil Analytical Results
Project Number: 62110
Project Name: St Peters Due Diligence

	PFAS																																		
	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (NMeFOSA)	N-Ethyl perfluorooctane sulfonamide (NEtFOSA)	N-Methylperfluorooctanesulfonamidoethanol (N-MeFOSE)	N-ethylperfluorooctanesulfonamidoethanol (NEtFOSE)	N-methylperfluorooctane sulfonamidoacetic acid (NMeFOSAA)	N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	Perfluoropropanesulfonic acid (PFPrS)	Perfluorobutanesulfonic acid (PFBS)	Perfluoropentanesulfonic acid (PFPeS)	Perfluorohexanesulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctanesulfonic acid (PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecanesulfonic acid (PFDS)	1H,1H,2H,2H-perfluorohexanesulfonic acid (4:2 FTSA)	1H,1H,2H,2H-perfluorooctanesulfonic acid (6:2 FTSA)	1H,1H,2H,2H-perfluorodecanesulfonic acid (8:2 FTSA)	1H,1H,2H,2H-perfluorododecanesulfonic acid (10:2 FTSA)	Sum of PFHxS and PFOS	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	Sum of US EPA PFAS (PFOS + PFOA)*	Sum of PFAS (WA DER List)	Sum of PFAS
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.01	0.01	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.01	0.005	0.005	0.005	0.005	0.005	0.01	0.05
PFAS NEMP 2020 Table 2 Health Industrial/Commercial					50																	20		20							20				

Field ID	Sampled Date	Lab Report Number																																		
JBS.MW1-1-1.1	12/11/2021	841777	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.05
JBS.MW2-0.2-0.3	12/11/2021	841777	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.05
QSA03 (duplicate of JBS.MW2-0.2-0.3)	12/11/2021	841777	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.05
QSC02 (triplicate of JBS.MW2-0.2-0.3)	12/11/2021	282748	<0.0002	<0.0002	<0.0001	<0.0001	0.0001	<0.0001	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.001	<0.001	<0.001	<0.001	<0.005	<0.0002	<0.0002	-	<0.0001	<0.0001	<0.0001	<0.0001	0.0011	-	0.0003	<0.0001	<0.0001	<0.0002	<0.0002	0.0011	-	0.0012	-	0.0015
JBS.MW3-0.2-0.3	12/11/2021	841777	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.05
JBS.MW4-0.2-0.3	12/11/2021	841777	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.05
JBS.MW5-0.2-0.3	12/11/2021	841777	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.01	<0.05

Table A3: Asbestos Analytical Results
Project Number: 62110
Project Name: St Peters Due Diligence

				Asbestos								
				Approximate Sample Mass	Mass ACM	Mass Asbestos in ACM	Asbestos from ACM in Soil	Mass FA	Mass Asbestos in FA	Mass AF	Mass asbestos in AF	Asbestos from FA & AF in So	Mass Asbestos in FA & AF
				g	g	g	% (w/w)	g	g	g	g	% (w/w)	g
EQL													
NEPM 2013 Table 7 Comm/Ind D Soil HSL for Asbestos in Soil							0.05					0.001	
Field ID	**Sampled Date**	**Lab Report Number**											
JBS.MW1-0.2-0.9	12/11/2021	841777	742	0	0	0	0	0	0	0	0	0	0
QSC01 (triplicate of JBS.MW1-0.2-0.9)	12/11/2021	282748	837	-	-	<0.01	-	-	-	-	-	<0.001	-
JBS.MW2-0.2-0.7	12/11/2021	841777	870	0	0	0	0	0	0	0	0	0	0
JBS.MW3-0.2-0.7	12/11/2021	841777	734	0	0	0	0	0	0	0	0	0	0
JBS.MW4-0.2-0.3	12/11/2021	841777	818	0	0	0	0	0	0	0	0	0	0
JBS.MW5-0.2-0.3	12/11/2021	841777	784	0	0	0	0	0	0	0	0	0	0

Table A4: ASS Analytical Results
Project Number: 62110
Project Name: St Peters Due Diligence

			Liming Rate	pH (KCl)	Titratable Actual Acidity	Titratable Peroxide Acidit	Titratable Sulfidic Acidity	pH (Ox)	SPOS
			kg CaCO3/t	pH Unit	mol H+/t	mole H+/t	mole H+/t	pH Unit	%S
EQL			1	0.1	2	2	2	0.1	0.02
ASSMAC (1998) Action Criteria (Coarse >1000 tonnes disturbed)						18	18		0.03
ASSMAC (1998) Action Criteria (Coarse 1-1000 tonnes disturbed)						18	18		0.03
Field ID	**Sampled Date**	**Lab Report Number**							
JBS.MW1-1-1.1	12/11/2021	841777	2	6.8	<2	<2	<2	5.5	0.11
JBS.MW1-3.9-4	12/11/2021	841777	9	5.5	6	110	100	3	0.19
JBS.MW2-0.2-0.3	12/11/2021	841777	<1	11	<2	<2	<2	9.2	0.05
JBS.MW2-3-3.1	12/11/2021	841777	9	6.7	<2	110	110	3.3	0.18
JBS.MW3-0.2-0.3	12/11/2021	841777	<1	8.6	<2	<2	<2	7.3	0.09
JBS.MW4-0.2-0.3	12/11/2021	841777	2	6.3	3	<2	<2	4.7	0.04
JBS.MW4-2-2.1	12/11/2021	841777	1	6.4	<2	13	13	3.7	0.03

Table A5: TCLP Analytical Results
Project Number: 62110
Project Name: St Peters Due Dillegence

			Heavy Metals		PAHs
			Lead	Nickel	Benzo(a)pyrene
			mg/L	mg/L	mg/L
EQL			0.01	0.01	0.001
NSW EPA (2014) TCLP1			5	2	0.04
Field ID	**Sampled Date**	**Lab Report Number**			
JBS.MW3-0.2-0.3	12/11/2021	844013	6.2	0.06	<0.001
JBS.MW5-0.2-0.3	12/11/2021	844013	0.06	-	-
QSA03 (duplicate of JBS.MW2-0.2-0.3)	12/11/2021	844013	-	-	<0.01

Table B Groundwater Analytical Results
Project Number: 62110
Project Name: St Peters

Metals & Metalloids

Sample ID	Location	Sample Date	Monitoring Round	Arsenic (Filtered)	Cadmium (Filtered)	Chromium (III+VI) (Filtered)	Copper (Filtered)	Lead (Filtered)	Mercury (Filtered)	Nickel (Filtered)	Zinc (Filtered)
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL				0.001	0.0002	0.001	0.001	0.001	0.0001	0.001	0.005
ANZG (2018) Marine water 95% toxicant DGVs					0.0055[#1]	0.0044[#2]	0.0013[#3]	0.0044[#4]	0.0004[#5]	0.07[#5]	0.008[#6]
ANZG (2018) Marine water 99% toxicant DGVs					0.0007[#17]	0.00014[#18]	0.0003[#19]	0.0022[#20]	0.0001[#21]	0.007[#22]	0.0033[#6]
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand											
2-4m											
4-8m											
>8m											
NEPM 2013 Table 1C GILs, Drinking Water				0.01	0.002[#30]	0.05[#31]	2[#30]	0.01[#30]	0.001	0.02[#30]	
PFAS NEMP 2020 Table 1 Health Recreational Water											
PFAS NEMP 2020 Table 5 Interim marine 95%											
JBS-MW01	JBS-MW01	15/11/2021	JBS&G (2022)	0.015	0.012	0.007	<0.001	0.014	<0.0001	0.008	3.1
JBS-MW02	JBS-MW02	15/11/2021	JBS&G (2022)	0.056	0.014	0.004	0.005	0.018	<0.0001	0.016	1.2
JBS-MW03	JBS-MW03	15/11/2021	JBS&G (2022)	0.028	0.0004	0.003	<0.001	0.014	<0.0001	0.006	0.2
JBS-MW04	JBS-MW04	15/11/2021	JBS&G (2022)	0.027	<0.0002	0.002	<0.001	0.001	<0.0001	0.003	0.085
JBS-MW05	JBS-MW05	15/11/2021	JBS&G (2022)	0.053	0.0022	0.006	<0.001	0.005	<0.0001	0.017	0.064
MW01	MW01	13/07/2020	SES (2020)	0.022	<0.0001	<0.001	<0.001	<0.001	<0.0001	0.003	0.005
MW01	MW01	15/11/2021	JBS&G (2022)	0.002	<0.0002	0.002	0.002	0.001	<0.0001	0.002	0.027
MW02	MW02	13/07/2020	SES (2020)	0.005	<0.0001	<0.001	<0.001	<0.001	<0.0001	<0.001	<0.005
MW02	MW02	15/11/2021	JBS&G (2022)	0.02	0.0009	0.004	0.001	0.019	<0.0001	0.009	0.19
QA01	MW02	15/11/2021	JBS&G (2022)	0.001	<0.0001	<0.001	<0.001	<0.001	<0.00005	<0.001	0.002
QC01	MW02	15/11/2021	JBS&G (2022)	0.021	0.0008	0.004	<0.001	0.018	<0.0001	0.008	0.17
MW03	MW03	13/07/2020	SES (2020)	<0.001	0.001	<0.001	0.022	<0.001	<0.0001	<0.001	0.052
FD05	MW03	13/07/2020	SES (2020)	<0.001	0.0009	<0.001	0.022	<0.001	<0.0001	<0.001	0.052
MW03	MW03	15/11/2021	JBS&G (2022)	0.002	0.012	<0.001	0.002	0.003	<0.0001	0.002	0.23
MW04	MW04	13/07/2020	SES (2020)	0.001	<0.0001	0.002	<0.001	<0.001	<0.0001	0.001	<0.005
MW04	MW04	15/11/2021	JBS&G (2022)	0.021	0.001	0.002	0.005	0.004	<0.0001	0.002	0.2
MW05	MW05	13/07/2020	SES (2020)	0.005	<0.0001	0.001	<0.001	<0.001	<0.0001	<0.001	0.006
MW05	MW05	15/11/2021	JBS&G (2022)	0.005	0.0018	0.002	<0.001	0.003	<0.0001	0.002	0.14
Statistical Summary											
Number of Results				18	18	18	18	18	18	18	18
Number of Detects				16	11	12	7	11	0	13	16
Minimum Concentration				<0.001	<0.0001	<0.001	<0.001	<0.001	<0.00005	<0.001	0.002
Maximum Detect				0.056	0.014	0.007	0.022	0.019	ND	0.017	3.1
Average Concentration				0.016	0.0027	0.0025	0.0039	0.0059	0.000097	0.0047	0.32
Median Concentration				0.01	0.00085	0.002	0.001	0.002	0.0001	0.002	0.0745
Standard Deviation				0.017	0.0047	0.0018	0.0067	0.007	0.000012	0.0051	0.75
Number of Guideline Exceedances(Detects Only)				9	10	12	7	9	0	5	15
% of Results at or above the Detect Limit				89	61	67	39	61	0	72	89
% of Results below the Detect Limit				11	39	33	61	39	100	28	11
% of Detects at or above Guidelines				50	56	67	39	50	0	28	83
% of Results Below Guidelines or Non-Detect				50	44	33	61	50	100	72	17

TPHs (NEPC 1999) and TRHs (NEPC 2013)

Sample ID	Location	Sample Date	Monitoring Round	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 Fraction (Sum of Total)	C6-C10	C10-C16	C16-C34	C34-C40	C10-C40 (Sum of total)	F1 (C6-C10 minus BTEX)	F2 (C10-C16 less Naphthalene)
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				20	50	100	100	100	20	50	100	100	100	20	50
ANZG (2018) Marine water 95% toxicant DGVs															
ANZG (2018) Marine water 99% toxicant DGVs															
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand															
2-4m														6000[#28]	NL[#29]
4-8m														6000[#28]	NL[#29]
>8m														7000[#28]	NL[#29]
NEPM 2013 Table 1C GILs, Drinking Water															
PFAS NEMP 2020 Table 1 Health Recreational Water															
PFAS NEMP 2020 Table 5 Interim marine 95%															
JBS-MW01	JBS-MW01	15/11/2021	JBS&G (2022)	<20	<50	<100	<100	<100	<20	<50	200	<100	200	<20	<50
JBS-MW02	JBS-MW02	15/11/2021	JBS&G (2022)	<20	<50	300	<100	300	<20	<50	400	100	500	<20	<50
JBS-MW03	JBS-MW03	15/11/2021	JBS&G (2022)	<20	210	500	<100	710	<20	300	500	100	900	<20	300
JBS-MW04	JBS-MW04	15/11/2021	JBS&G (2022)	30	1300	1400	<100	2700	150	1300	1600	500	3400	140	1300
JBS-MW05	JBS-MW05	15/11/2021	JBS&G (2022)	<20	90	<100	<100	<100	<20	<50	100	<100	100	<20	<50
MW01	MW01	13/07/2020	SES (2020)	<20	<50	<100	<50	<50	<20	<100	<100	<100	<100	<20	<100
MW01	MW01	15/11/2021	JBS&G (2022)	<20	<50	200	<100	200	<20	<50	200	<100	200	<20	<50
MW02	MW02	13/07/2020	SES (2020)	<20	<50	<100	<50	<50	<20	<100	<100	<100	<100	<20	<100
MW02	MW02	15/11/2021	JBS&G (2022)	50	<50	<100	<100	<100	50	<50	<100	<100	<100	30	<50
QA01	MW02	15/11/2021	JBS&G (2022)	-	-	-	-	-	-	-	-	-	-	-	-
QC01	MW02	15/11/2021	JBS&G (2022)	40	<50	<100	<100	<100	40	<50	<100	<100	<100	20	<50
MW03	MW03	13/07/2020	SES (2020)	<20	<50	<100	<50	<50	<20	<100	<100	<100	<100	<20	<100
FD05	MW03	13/07/2020	SES (2020)	<20	<50	<100	<50	<50	<20	<100	<100	<100	<100	<20	<100
MW03	MW03	15/11/2021	JBS&G (2022)	<20	<50	100	<100	100	<20	<50	200	<100	200	<20	<50
MW04	MW04	13/07/2020	SES (2020)	<20	70	120	<50	190	40	<100	110	<100	110	40	<100
MW04	MW04	15/11/2021	JBS&G (2022)	<20	170	400	<100	570	<20	<50	400	100	500	<20	<50
MW05	MW05	13/07/2020	SES (2020)	120	230	240	<50	470	160	280	160	<100	440	160	280
MW05	MW05	15/11/2021	JBS&G (2022)	90	280	700	<100	980	150	340	600	100	1040	150	340
Statistical Summary															
Number of Results				17	17	17	17	17	17	17	17	17	17	17	17
Number of Detects				5	7	9	0	9	6	4	11	5	11	6	4
Minimum Concentration				<20	<50	<100	<50	<50	<20	<50	<100	<100	<100	<20	<50
Maximum Detect				120	1300	1400	ND	2700	160	1300	1600	500	3400	160	1300
Average Concentration				34	168	280	82	401	48	184	298	124	482	45	184
Median Concentration				20	50	100	100	100	20	100	160	100	200	20	100
Standard Deviation				29	302	337	25	651	51	303	371	97	806	51	303
Number of Guideline Exceedances(Detects Only)				0	0	0	0	0	0	0	0	0	0	0	17
% of Results at or above the Detect Limit				29	41	53	0	53	35	24	65	29	65	35	24
% of Results below the Detect Limit				71	59	47	100	47	65	76	35	71	35	65	76
% of Detects at or above Guidelines				0	0	0	0	0	0	0	0	0	0	0	100
% of Results Below Guidelines or Non-Detect				100	100	100	100	100	100	100	100	100	100	100	0

BTEXN

Sample ID	Location	Sample Date	Monitoring Round	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Total BTEX
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				1	1	1	1	2	3	
ANZG (2018) Marine water 95% toxicant DGVs				700[#7]	180[#8]	80[#8]		75[#9]		
ANZG (2018) Marine water 99% toxicant DGVs				500[#23]	110[#10]	50[#10]		50[#9]		
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand										
2-4m				5000	NL	NL			NL	
4-8m				5000	NL	NL			NL	
>8m				5000	NL	NL			NL	
NEPM 2013 Table 1C GILs, Drinking Water				1	800	300			600	
PFAS NEMP 2020 Table 1 Health Recreational Water										
PFAS NEMP 2020 Table 5 Interim marine 95%										
JBS-MW01	JBS-MW01	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<2	<3	-
JBS-MW02	JBS-MW02	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<2	<3	-
JBS-MW03	JBS-MW03	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<2	<3	-
JBS-MW04	JBS-MW04	15/11/2021	JBS&G (2022)	<1	<1	3	5	3	8	-
JBS-MW05	JBS-MW05	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<2	<3	-
MW01	MW01	13/07/2020	SES (2020)	<1	<2	<2	<2	<2	<2	<1
MW01	MW01	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<2	<3	-
MW02	MW02	13/07/2020	SES (2020)	<1	<2	<2	<2	<2	<2	<1
MW02	MW02	15/11/2021	JBS&G (2022)	18	1	<1	<1	<2	<3	-
QA01	MW02	15/11/2021	JBS&G (2022)	19	1	<1	<1	<2	-	-
QC01	MW02	15/11/2021	JBS&G (2022)	17	1	<1	<1	<2	<3	-
MW03	MW03	13/07/2020	SES (2020)	<1	<2	<2	<2	<2	<2	<1
FD05	MW03	13/07/2020	SES (2020)	<1	<2	<2	<2	<2	<2	<1
MW03	MW03	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<2	<3	-
MW04	MW04	13/07/2020	SES (2020)	<1	<2	<2	<2	<2	<2	<1
MW04	MW04	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<2	<3	-
MW05	MW05	13/07/2020	SES (2020)	<1	<2	<2	<2	<2	<2	<1
MW05	MW05	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<2	<3	-
Statistical Summary										
Number of Results				18	18	18	18	18	17	6
Number of Detects				3	3	1	1	1	1	0
Minimum Concentration				<1	<1	<1	<1	<2	<2	<1
Maximum Detect				19	1	3	5	3	8	ND
Average Concentration				3.8	1.3	1.4	1.6	2.1	2.9	1
Median Concentration				1	1	1	1	2	3	1
Standard Deviation				6.5	0.49	0.62	0.98	0.24	1.4	0
Number of Guideline Exceedances(Detects Only)				3	0	0	0	0	0	0
% of Results at or above the Detect Limit				17	17	6	6	6	6	0
% of Results below the Detect Limit				83	83	94	94	94	94	100
% of Detects at or above Guidelines				17	0	0	0	0	0	0
% of Results Below Guidelines or Non-Detect				83	100	100	100	100	100	100

PAH

Sample ID	Location	Sample Date	Monitoring Round	2-Methylnaphthalene	3-Methylcholanthrene	7,12-Dimethylbenz(a)anthracene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(a)pyrene TEQ calc (Half)	Benzo(b+j)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(g,h,i)perylene
				mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	µg/L
EQL				0.005	0.005	0.005	1	1	1	1	1		1	0.004	1
ANZG (2018) Marine water 95% toxicant DGVs									0.4[#10]		0.2[#10]				
ANZG (2018) Marine water 99% toxicant DGVs									0.01[#24]		0.1[#24]				
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand															
2-4m															
4-8m															
>8m															
NEPM 2013 Table 1C GILs, Drinking Water											0.01				
PFAS NEMP 2020 Table 1 Health Recreational Water															
PFAS NEMP 2020 Table 5 Interim marine 95%															
JBS-MW01	JBS-MW01	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	<1	<1	<1	1	<1	-	<1	-	<1
JBS-MW02	JBS-MW02	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	<1	<1	<1	<2	<1	-	<1	-	<1
JBS-MW03	JBS-MW03	15/11/2021	JBS&G (2022)	<0.05	<0.005	<0.005	1	<1	<1	1	<1	-	<1	-	<1
JBS-MW04	JBS-MW04	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	<1	<1	<1	<1	<1	-	<1	-	<1
JBS-MW05	JBS-MW05	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	<1	<1	<1	1	<1	-	<1	-	<1
MW01	MW01	13/07/2020	SES (2020)	<0.002	<0.002	<0.002	<2	<2	<2	<2	<2	<0.002	-	-	<2
MW01	MW01	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	<1	<1	<1	<1	<1	-	<1	-	<1
MW02	MW02	13/07/2020	SES (2020)	<0.002	<0.002	<0.002	<2	<2	<2	<2	<2	<0.002	-	-	<2
MW02	MW02	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	<1	<1	<1	<1	<1	-	<1	-	<1
QA01	MW02	15/11/2021	JBS&G (2022)	<0.002	<0.002	<0.002	<2	<2	<2	<2	<2	-	-	<0.004	<2
QC01	MW02	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	<1	<1	<1	<1	<1	-	<1	-	<1
MW03	MW03	13/07/2020	SES (2020)	<0.002	<0.002	<0.002	<2	<2	<2	<2	<2	<0.002	-	-	<2
FD05	MW03	13/07/2020	SES (2020)	-	-	-	<2	<2	<2	<2	<2	<0.002	-	-	<2
MW03	MW03	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	<1	<1	<1	<1	<1	-	<1	-	<1
MW04	MW04	13/07/2020	SES (2020)	<0.002	<0.002	<0.002	<2	<2	<2	<2	<2	<0.002	-	-	<2
MW04	MW04	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	<1	<1	<1	<1	<1	-	<1	-	<1
MW05	MW05	13/07/2020	SES (2020)	0.006	<0.002	<0.002	9	<2	<2	<2	<2	<0.002	-	-	<2
MW05	MW05	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	<20	<1	<1	<1	<1	-	<1	-	<1
Statistical Summary															
Number of Results				17	17	17	18	18	18	18	18	6	11	1	18
Number of Detects				1	0	0	2	0	0	3	0	0	0	0	0
Minimum Concentration				<0.002	<0.002	<0.002	<1	<1	<1	<1	<1	<0.002	<1	<0.004	<1
Maximum Detect				0.006	ND	ND	9	ND	ND	1	ND	ND	ND	ND	ND
Average Concentration				0.0068	0.0039	0.0039	2.8	1.4	1.4	1.4	1.4	0.002	1		1.4
Median Concentration				0.005	0.005	0.005	1	1	1	1	1	0.002	1	0.004	1
Standard Deviation				0.011	0.0015	0.0015	4.7	0.5	0.5	0.51	0.5	0	0		0.5
Number of Guideline Exceedances(Detects Only)				0	0	0	0	0	0	0	0	0	0	0	0
% of Results at or above the Detect Limit				6	0	0	11	0	0	17	0	0	0	0	0
% of Results below the Detect Limit				94	100	100	89	100	100	83	100	100	100	100	100
% of Detects at or above Guidelines				0	0	0	0	0	0	0	0	0	0	0	0
% of Results Below Guidelines or Non-Detect				100	100	100	100	100	100	100	100	100	100	100	100

PAH (continued)

Sample ID	Location	Sample Date	Monitoring Round	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	2-(acetylamino) fluorene	Benzo(b,j+k)fluoranthene
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L
EQL				1	1	1	1	1	1	1	1	1	0.002	
ANZG (2018) Marine water 95% toxicant DGVs							1.4[#10]			70[#11]	2[#10]			
ANZG (2018) Marine water 99% toxicant DGVs							1[#24]			50[#23]	0.6[#24]			
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand														
2-4m										NL				
4-8m										NL				
>8m										NL				
NEPM 2013 Table 1C GILs, Drinking Water														
PFAS NEMP 2020 Table 1 Health Recreational Water														
PFAS NEMP 2020 Table 5 Interim marine 95%														
JBS-MW01	JBS-MW01	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
JBS-MW02	JBS-MW02	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
JBS-MW03	JBS-MW03	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<2	<1	<2	1	<1	-	-
JBS-MW04	JBS-MW04	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	1	<1	<5	<1	<1	-	-
JBS-MW05	JBS-MW05	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
MW01	MW01	13/07/2020	SES (2020)	-	<2	<2	<2	<2	<2	<5	<2	<2	<0.002	<4
MW01	MW01	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
MW02	MW02	13/07/2020	SES (2020)	-	<2	<2	<2	<2	<2	<5	<2	<2	<0.002	<4
MW02	MW02	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
QA01	MW02	15/11/2021	JBS&G (2022)	-	<2	<2	<2	<2	<2	<2	<2	<2	<0.002	-
QC01	MW02	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
MW03	MW03	13/07/2020	SES (2020)	-	<2	<2	<2	<2	<2	<5	<2	<2	<0.002	<4
FD05	MW03	13/07/2020	SES (2020)	-	<2	<2	<2	<2	<2	<5	<2	<2	<0.002	<4
MW03	MW03	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
MW04	MW04	13/07/2020	SES (2020)	-	<2	<2	<2	<2	<2	<5	<2	<2	<0.002	<4
MW04	MW04	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-
MW05	MW05	13/07/2020	SES (2020)	-	<2	<2	<2	4	<2	<5	<2	<2	<0.002	<4
MW05	MW05	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<5	<1	<1	<1	<1	-	-
Statistical Summary														
Number of Results				11	18	18	18	18	18	29	18	18	7	6
Number of Detects				0	0	0	0	2	0	0	1	0	0	0
Minimum Concentration				<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.002	<4
Maximum Detect				ND	ND	ND	ND	4	ND	ND	1	ND	ND	ND
Average Concentration				1	1.4	1.4	1.4	1.8	1.4	5.4	1.4	1.4	0.002	4
Median Concentration				1	1	1	1	1.5	1	5	1	1	0.002	4
Standard Deviation				0	0.5	0.5	0.5	1.1	0.5	3.9	0.5	0.5	0	0
Number of Guideline Exceedances(Detects Only)				0	0	0	0	0	0	0	1	0	0	0
% of Results at or above the Detect Limit				0	0	0	0	11	0	0	6	0	0	0
% of Results below the Detect Limit				100	100	100	100	89	100	100	94	100	100	100
% of Detects at or above Guidelines				0	0	0	0	0	0	0	6	0	0	0
% of Results Below Guidelines or Non-Detect				100	100	100	100	100	100	100	94	100	100	100

Table B Groundwater Analytical Results
Project Number: 62110
Project Name: St Peters

Metals & Metalloids

	Arsenic (Filtered)	Cadmium (Filtered)	Chromium (III+VI) (Filtered)	Copper (Filtered)	Lead (Filtered)	Mercury (Filtered)	Nickel (Filtered)	Zinc (Filtered)
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL	0.001	0.0002	0.001	0.001	0.001	0.0001	0.001	0.005
ANZG (2018) Marine water 95% toxicant DGVs		**0.0055**[#1]	**0.0044**[#2]	**0.0013**[#3]	**0.0044**[#4]	**0.0004**[#5]	**0.07**[#5]	**0.008**[#6]
ANZG (2018) Marine water 99% toxicant DGVs		**0.0007**[#17]	**0.00014**[#18]	**0.0003**[#19]	**0.0022**[#20]	**0.0001**[#21]	**0.007**[#22]	**0.0033**[#6]
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand								
2-4m								
4-8m								
>8m								
NEPM 2013 Table 1C GILs, Drinking Water	**0.01**	**0.002**[#30]	**0.05**[#31]	**2**[#30]	**0.01**[#30]	**0.001**	**0.02**[#30]	
PFAS NEMP 2020 Table 1 Health Recreational Water								
PFAS NEMP 2020 Table 5 Interim marine 95%								

TPHs (NEPC 1999) / TRHs (NEPC 2013)

	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 Fraction (Sum of Total)	C6-C10	C10-C16	C16-C34	C34-C40	C10-C40 (Sum of total)	F1 (C6-C10 minus BTEX)	F2 (C10-C16 less Naphthalene)
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	20	50	100	100	100	20	50	100	100	100	20	50
ANZG (2018) Marine water 95% toxicant DGVs												
ANZG (2018) Marine water 99% toxicant DGVs												
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand												
2-4m											**6000**[#28]	**NL**[#29]
4-8m											**6000**[#28]	**NL**[#29]
>8m											**7000**[#28]	**NL**[#29]
NEPM 2013 Table 1C GILs, Drinking Water												
PFAS NEMP 2020 Table 1 Health Recreational Water												
PFAS NEMP 2020 Table 5 Interim marine 95%												

BTEXN

	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Total BTEX
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	1	1	1	1	2	3	
ANZG (2018) Marine water 95% toxicant DGVs	**700**[#7]	**180**[#8]	**80**[#8]		**75**[#9]		
ANZG (2018) Marine water 99% toxicant DGVs	**500**[#23]	**110**[#10]	**50**[#10]		**50**[#9]		
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand							
2-4m	**5000**	**NL**	**NL**			**NL**	
4-8m	**5000**	**NL**	**NL**			**NL**	
>8m	**5000**	**NL**	**NL**			**NL**	
NEPM 2013 Table 1C GILs, Drinking Water	**1**	**800**	**300**			**600**	
PFAS NEMP 2020 Table 1 Health Recreational Water							
PFAS NEMP 2020 Table 5 Interim marine 95%							

PAH

	2-Methylnaphthalene	3-Methylcholanthrene	7,12-Dimethylbenz(a)anthracene	Acenaphthene	Acenaphthylene	Anthracene	Benz(a)anthracene	Benzo(a)pyrene	Benzo(a)pyrene TEQ calc (Half)	Benzo(b+j)fluoranthene	Benzo(b+j+k)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	2-(acetylamino) fluorene	Benzo(b,j+k)fluoranthene
	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L
EQL	0.005	0.005	0.005	1	1	1	1	1		1	0.004	1	1	1	1	1	1	1	1	1	1	0.002	
ANZG (2018) Marine water 95% toxicant DGVs						**0.4**[#10]		**0.2**[#10]								**1.4**[#10]			**70**[#11]	**2**[#10]			
ANZG (2018) Marine water 99% toxicant DGVs						**0.01**[#24]		**0.1**[#24]								**1**[#24]			**50**[#23]	**0.6**[#24]			
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, Sand																							
2-4m																			**NL**				
4-8m																			**NL**				
>8m																			**NL**				
NEPM 2013 Table 1C GILs, Drinking Water								**0.01**															
PFAS NEMP 2020 Table 1 Health Recreational Water																							
PFAS NEMP 2020 Table 5 Interim marine 95%																							

Sample ID **Location** **Sample Date** **Monitoring Round**

Env Stds Comments

#1:Very High Reliability DGV may not protect key test species from chronic toxicity (this refers to experimental chronic values or geometric mean for species). Check the resources listed in Read the detail, below, for spread of data and its significance.
#2:Very High Reliability Recommended for application for slightly to moderately disturbed ecosystems. Adopted from Chromium (CrVI)
#3:Very High Reliability Recommended for application for slightly to moderately disturbed ecosystems.
#4:Low Reliability Recommended for application for slightly to moderately disturbed ecosystems.
#5:Very High Reliability DGV may not protect key test species from chronic toxicity. Check toxicant DGV technical brief the resources listed in Read the detail, below, for spread of data and its significance.
#6:Very High Reliability. The DGVs apply to water with salinity 25–36 ppt and pH 6.5–8.0.
#7:Moderate Reliability DGV may not protect key test species from chronic toxicity (this refers to experimental chronic values or geometric mean for species). Check the resources listed in Read the detail, below, for spread of data and its significance.
#8:Unknown Reliability Recommended for application for slightly to moderately disturbed ecosystems.
#9:Adopted from m-Xylene
#10:Unknown Reliability
#11:Moderate Reliability DGV may not protect key test species from chronic toxicity. Check toxicant DGV technical brief the resources listed in Read the detail, below, for spread of data and its significance.
#12:Moderate Reliability
#13:Low Reliability. Check guidelines for more details.
#14:Very Low Reliability Recommended for application for slightly to moderately disturbed ecosystems.
#15:Moderate Reliability Recommended for application for slightly to moderately disturbed ecosystems.
#16:Unknown Reliability DGV may not protect key test species from chronic toxicity. Check toxicant DGV technical brief and Read the detail, below, for spread of data and its significance.
#17:Very High Reliability To account for the bioaccumulating nature of this toxicant, it is recommended that the 99% species protection level DGV is used for slightly to moderately disturbed systems. Also see General comments.
#18:Very High Reliability Adopted from Chromium (CrVI)
#19:Very High Reliability
#20:Low Reliability
#21:Very High Reliability To account for the bioaccumulating nature of this toxicant, it is recommended that the 99% species protection level DGV is used for slightly to moderately disturbed systems. Also see General comments.
#22:Very High Reliability Recommended for application for slightly to moderately disturbed ecosystems (to protect key species from chronic toxicity).
#23:Moderate Reliability. Check guidelines for more details.
#24:Unknown Reliability To account for the bioaccumulating nature of this toxicant, it is recommended that the 99% species protection level DGV is used for slightly to moderately disturbed systems. Also see General comments.
#25:Moderate Reliability To account for the bioaccumulating nature of this toxicant, it is recommended that the 99% species protection level DGV is used for slightly to moderately disturbed systems. Also see General comments.
#26:Very Low Reliability
#27:Unknown Reliability Recommended for application for slightly to moderately disturbed ecosystems (to protect key species from chronic toxicity). See Technical Brief and Read the detail, below, for details.
#28:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C10 fraction.
#29:To obtain F2 subtract napthalene from the >C10 - C16 fraction.
#30:Values calculated using hardness of 30 mg/L CaCO3. Refer ANZECC & ARMCANZ (2000) for site specific hardness guidance
#31:Trigger value adopted from Chromium VI
#32:Source: NHMRC 2019

Data Comments

#1 Quantification of linear and branched isomers has been conducted as a single total response using the relative response factor for the corresponding linear/branched standard.

Table B Groundwater Analytical Results
Project Number: 62110
Project Name: St Peters

	Organochlorine Pesticides																							
	Pentachlorophenol	4,4-DDE	a-BHC	b-BHC	d-BHC	g-BHC (Lindane)	Aldrin	Dieldrin	Aldrin + Dieldrin	Chlordane (cis)	Chlordane (trans)	DDT	DDD	DDT+DDE+DDD	Endosulfan	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor Epoxide	Methoxychlor
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL	0.01	0.005	0.005	0.005	0.005	0.005	0.005	0.005		2	0.002	0.005	0.005			0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
ANZG (2018) Marine water 95% toxicant DGVs	**0.022**[#12]														**0.01**[#12]				**0.000008**[#12]					
ANZG (2018) Marine water 99% toxicant DGVs	**0.011**[#25]														**0.005**[#25]				**0.000004**[#25]					
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, San																								
2-4m																								
4-8m																								
>8m																								
NEPM 2013 Table 1C GILs, Drinking Water	**0.01**					**0.01**			**0.0003**			**0.009**			**20**								**0.0003**	
PFAS NEMP 2020 Table 1 Health Recreational Water																								
PFAS NEMP 2020 Table 5 Interim marine 95%																								
Sample ID	**Location**	**Sample Date**	**Monitoring Round**																						
JBS-MW01	JBS-MW01	15/11/2021	JBS&G (2022)	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<0.005	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
JBS-MW02	JBS-MW02	15/11/2021	JBS&G (2022)	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<0.005	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
JBS-MW03	JBS-MW03	15/11/2021	JBS&G (2022)	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<0.005	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
JBS-MW04	JBS-MW04	15/11/2021	JBS&G (2022)	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<0.005	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
JBS-MW05	JBS-MW05	15/11/2021	JBS&G (2022)	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<0.005	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
MW01	MW01	13/07/2020	SES (2020)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	-	-	<0.004	<0.002	<0.004	<2	<0.002	<0.002	-	<0.002	-	-	<0.002	-	-
MW01	MW01	15/11/2021	JBS&G (2022)	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<0.005	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
MW02	MW02	13/07/2020	SES (2020)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	-	-	<0.004	<0.002	<0.004	<2	<0.002	<0.002	-	<0.002	-	-	<0.002	-	-
MW02	MW02	15/11/2021	JBS&G (2022)	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<0.005	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
QA01	MW02	15/11/2021	JBS&G (2022)	<0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<2	<0.002	<0.002	<0.002	-	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
QC01	MW02	15/11/2021	JBS&G (2022)	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<0.005	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
MW03	MW03	13/07/2020	SES (2020)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	-	-	<0.004	<0.002	<0.004	<2	<0.002	<0.002	-	<0.002	-	-	<0.002	-	-
FD05	MW03	13/07/2020	SES (2020)	<0.002	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03	MW03	15/11/2021	JBS&G (2022)	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<0.005	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
MW04	MW04	13/07/2020	SES (2020)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	-	-	<0.004	<0.002	<0.004	<2	<0.002	<0.002	-	<0.002	-	-	<0.002	-	-
MW04	MW04	15/11/2021	JBS&G (2022)	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<0.005	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
MW05	MW05	13/07/2020	SES (2020)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	-	-	<0.004	<0.002	<0.004	<2	<0.002	<0.002	-	<0.002	-	-	<0.002	-	-
MW05	MW05	15/11/2021	JBS&G (2022)	<0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<0.005	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Statistical Summary																									
Number of Results	18	17	17	17	17	17	17	17	5	1	1	17	17	5	5	17	17	12	17	12	12	17	12	12	
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Minimum Concentration	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.004	<2	<0.002	<0.002	<0.002	<0.004	<2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Average Concentration	0.0073	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.0039	0.004			0.0045	0.0039	0.004	2	0.0039	0.0039	0.0048	0.0039	0.0048	0.0048	0.0039	0.0048	0.0048	
Median Concentration	0.01	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.004	2	0.002	0.005	0.005	0.004	2	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	
Standard Deviation	0.0039	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0			0.0008	0.0015	0	0	0.0015	0.0015	0.00087	0.0015	0.00087	0.00087	0.0015	0.00087	0.00087	
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% of Results at or above the Detect Limit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% of Results below the Detect Limit	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
% of Detects at or above Guidelines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% of Results Below Guidelines or Non-Detect	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	

Table B Groundwater Analytical Results
Project Number: 62110
Project Name: St Peters

	Organochlorine Pesticides																							
	Pentachlorophenol	4,4-DDE	a-BHC	b-BHC	d-BHC	g-BHC (Lindane)	Aldrin	Dieldrin	Aldrin + Dieldrin	Chlordane (cis)	Chlordane (trans)	DDT	DDD	DDT+DDE+DDD	Endosulfan	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	Heptachlor	Heptachlor Epoxide	Methoxychlor
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL	0.01	0.005	0.005	0.005	0.005	0.005	0.005	0.005		2	0.002	0.005	0.005			0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
ANZG (2018) Marine water 95% toxicant DGVs	**0.022**[#12]														**0.01**[#12]				**0.000008**[#12]					
ANZG (2018) Marine water 99% toxicant DGVs	**0.011**[#25]														**0.005**[#25]				**0.000004**[#25]					
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, San																								
2-4m																								
4-8m																								
>8m																								
NEPM 2013 Table 1C GILs, Drinking Water	**0.01**					**0.01**			**0.0003**			**0.009**			**20**								**0.0003**	
PFAS NEMP 2020 Table 1 Health Recreational Water																								
PFAS NEMP 2020 Table 5 Interim marine 95%																								

Sample ID Location Sample Date Monitoring Round

Env Stds Comments
#1:Very High Reliability DGV may not protect key test species from chro
#2:Very High Reliability Recommended for application for slightly to mo
#3:Very High Reliability Recommended for application for slightly to mo
#4:Low Reliability Recommended for application for slightly to moderate
#5:Very High Reliability DGV may not protect key test species from chro
#6:Very High Reliability. The DGVs apply to water with salinity 25–36 ppt
#7:Moderate Reliability DGV may not protect key test species from chro
#8:Unknown Reliability Recommended for application for slightly to mo
#9:Adopted from m-Xylene
#10:Unknown Reliability
#11:Moderate Reliability DGV may not protect key test species from chr
#12:Moderate Reliability
#13:Low Reliability. Check guidelines for more details.
#14:Very Low Reliability Recommended for application for slightly to mo
#15:Moderate Reliability Recommended for application for slightly to m
#16:Unknown Reliability DGV may not protect key test species from chr
#17:Very High Reliability To account for the bioaccumulating nature of th
#18:Very High Reliability Adopted from Chromium (CrVI)
#19:Very High Reliability
#20:Low Reliability
#21:Very High Reliability To account for the bioaccumulating nature of th
#22:Very High Reliability Recommended for application for slightly to mo
#23:Moderate Reliability. Check guidelines for more details.
#24:Unknown Reliability To account for the bioaccumulating nature of th
#25:Moderate Reliability To account for the bioaccumulating nature of th
#26:Very Low Reliability
#27:Unknown Reliability Recommended for application for slightly to mo
#28:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C
#29:To obtain F2 subtract napthalene from the >C10 - C16 fraction.
#30:Values calculated using hardness of 30 mg/L CaCO3. Refer ANZECC &
#31:Trigger value adopted from Chromium VI
#32:Source: NHMRC 2019

Data Comments
#1 Quantification of linear and branched isomers has been conducted as

Table B Groundwater Analytical Results
Project Number: 62110
Project Name: St Peters

	Organophosphorus Pesticides																								
	Azinophos methyl	Bromophos-ethyl	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Diazinon	Dichlorvos	Dimethoate	Disulfoton	Ethion	Ethyl methanesulfonate	Fenitrothion	Fenthion	Malathion	Methidathion	Methyl parathion	Mevinphos (Phosdrin)	Phorate	Prothiofos	Ronnel	Safrole	Fenamiphos	Parathion	Pirimphos-ethyl
	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L
EQL	0.002	0.002			0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.005	0.002	0.002	0.002	0.002	0.002	0.002	0.002		0.002	0.005	2	0.002	
ANZG (2018) Marine water 95% toxicant DGVs				**0.009**[#13]																					
ANZG (2018) Marine water 99% toxicant DGVs				**0.0005**[#20]																					
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, San																									
2-4m																									
4-8m																									
>8m																									
NEPM 2013 Table 1C GILs, Drinking Water	**0.03**		**0.002**	**10**			**0.004**	**0.005**	**0.007**	**0.004**	**0.004**		**0.007**	**0.007**	**0.07**	**0.006**	**0.0007**	**0.006**					**0.5**	**0.02**	
PFAS NEMP 2020 Table 1 Health Recreational Water																									
PFAS NEMP 2020 Table 5 Interim marine 95%																									

Sample ID	Location	Sample Date	Monitoring Round																							
JBS-MW01	JBS-MW01	15/11/2021	JBS&G (2022)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JBS-MW02	JBS-MW02	15/11/2021	JBS&G (2022)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JBS-MW03	JBS-MW03	15/11/2021	JBS&G (2022)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JBS-MW04	JBS-MW04	15/11/2021	JBS&G (2022)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
JBS-MW05	JBS-MW05	15/11/2021	JBS&G (2022)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW01	MW01	13/07/2020	SES (2020)	-	-	<0.002	<2	<0.002	-	<0.002	<0.002	<0.002	-	<0.002	-	-	<0.002	<0.002	-	-	-	-	<0.002	-	-	-	-	<0.002
MW01	MW01	15/11/2021	JBS&G (2022)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW02	MW02	13/07/2020	SES (2020)	-	-	<0.002	<2	<0.002	-	<0.002	<0.002	<0.002	-	<0.002	-	-	<0.002	<0.002	-	-	-	-	<0.002	-	-	-	-	<0.002
MW02	MW02	15/11/2021	JBS&G (2022)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QA01	MW02	15/11/2021	JBS&G (2022)	<0.002	<0.002	-	-	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.005	<2	<0.002	-
QC01	MW02	15/11/2021	JBS&G (2022)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03	MW03	13/07/2020	SES (2020)	-	-	<0.002	<2	<0.002	-	<0.002	<0.002	<0.002	-	<0.002	-	-	<0.002	<0.002	-	-	-	-	<0.002	-	-	-	-	<0.002
FD05	MW03	13/07/2020	SES (2020)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03	MW03	15/11/2021	JBS&G (2022)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW04	MW04	13/07/2020	SES (2020)	-	-	<0.002	<2	<0.002	-	<0.002	<0.002	<0.002	-	<0.002	-	-	<0.002	<0.002	-	-	-	-	<0.002	-	-	-	-	<0.002
MW04	MW04	15/11/2021	JBS&G (2022)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW05	MW05	13/07/2020	SES (2020)	-	-	<0.002	<2	<0.002	-	<0.002	<0.002	<0.002	-	<0.002	-	-	<0.002	<0.002	-	-	-	-	<0.002	-	-	-	-	<0.002
MW05	MW05	15/11/2021	JBS&G (2022)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Statistical Summary

Number of Results	1	1	5	5	6	1	6	6	6	1	6	1	1	6	6	1	1	1	1	5	1	1	1	1	5
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<0.002	<0.002	<0.002	<2	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005	<2	<0.002	<0.002
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration			0.002	2	0.002		0.002	0.002	0.002		0.002			0.002	0.002					0.002					0.002
Median Concentration	0.002	0.002	0.002	2	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.005	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.005	2	0.002	0.002
Standard Deviation			0	0	0		0	0	0		0			0	0					0					0
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Results at or above the Detect Limit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Results below the Detect Limit	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
% of Detects at or above Guidelines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Results Below Guidelines or Non-Detect	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table B Groundwater Analytical Results
Project Number: 62110
Project Name: St Peters

	Organophosphorus Pesticides																									
	Azinophos methyl	Bromophos-ethyl	Chlorfenvinphos	Chlorpyrifos	Chlorpyrifos-methyl	Coumaphos	Diazinon	Dichlorvos	Dimethoate	Disulfoton	Ethion	Ethyl methanesulfonate	Fenitrothion	Fenthion	Malathion	Methidathion	Methyl parathion	Mevinphos (Phosdrin)	Phorate	Prothiofos	Ronnel	Safrole	Tetramiphos	Parathion	Pirimphos-ethyl
	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L
EQL	0.002	0.002			0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.005	0.002	0.002	0.002	0.002	0.002	0.002	0.002		0.002	0.005	2	0.002	
ANZG (2018) Marine water 95% toxicant DGVs				**0.009**[#13]																					
ANZG (2018) Marine water 99% toxicant DGVs				**0.0005**[#20]																					
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, San																									
2-4m																									
4-8m																									
>8m																									
NEPM 2013 Table 1C GILs, Drinking Water	**0.03**		**0.002**	**10**			**0.004**	**0.005**	**0.007**	**0.004**	**0.004**		**0.007**	**0.007**	**0.07**	**0.006**	**0.0007**	**0.006**					**0.5**	**0.02**	
PFAS NEMP 2020 Table 1 Health Recreational Water																									
PFAS NEMP 2020 Table 5 Interim marine 95%																									

Sample ID	Location	Sample Date	Monitoring Round

Env Stds Comments

#1:Very High Reliability DGV may not protect key test species from chro
#2:Very High Reliability Recommended for application for slightly to mo
#3:Very High Reliability Recommended for application for slightly to mo
#4:Low Reliability Recommended for application for slightly to moderate
#5:Very High Reliability DGV may not protect key test species from chro
#6:Very High Reliability. The DGVs apply to water with salinity 25–36 ppt
#7:Moderate Reliability DGV may not protect key test species from chro
#8:Unknown Reliability Recommended for application for slightly to mo
#9:Adopted from m-Xylene
#10:Unknown Reliability
#11:Moderate Reliability DGV may not protect key test species from chr
#12:Moderate Reliability
#13:Low Reliability. Check guidelines for more details.
#14:Very Low Reliability Recommended for application for slightly to mo
#15:Moderate Reliability Recommended for application for slightly to m
#16:Unknown Reliability DGV may not protect key test species from chr
#17:Very High Reliability To account for the bioaccumulating nature of th
#18:Very High Reliability Adopted from Chromium (CrVI)
#19:Very High Reliability
#20:Low Reliability
#21:Very High Reliability To account for the bioaccumulating nature of th
#22:Very High Reliability Recommended for application for slightly to mo
#23:Moderate Reliability. Check guidelines for more details.
#24:Unknown Reliability To account for the bioaccumulating nature of th
#25:Moderate Reliability To account for the bioaccumulating nature of th
#26:Very Low Reliability
#27:Unknown Reliability Recommended for application for slightly to mo
#28:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C
#29:To obtain F2 subtract napthalene from the >C10 - C16 fraction.
#30:Values calculated using hardness of 30 mg/L CaCO3. Refer ANZECC &
#31:Trigger value adopted from Chromium VI
#32:Source: NHMRC 2019

Data Comments

#1 Quantification of linear and branched isomers has been conducted as

Table B Groundwater Analytical Results
Project Number: 62110
Project Name: St Peters

				Chlorinated Alkanes																						Chlorinated Alkenes														
				1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,2,3-trichloropropane	1,2-dibromo-3-chloropropane	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	2,2-dichloropropane	Bromochloromethane	Carbon tetrachloride	Chloroethane	Chloromethane	Dichlorodifluoromethane	Dichloromethane	Hexachloroethane	Pentachloroethane	Trichlorofluoromethane	1,1-dichloroethene	1,1-dichloropropene	2-chlorotoluene	3-chloropropene	4-chlorotoluene	cis-1,2-dichloroethene	cis-1,3-dichloropropene	cis-1,4-Dichloro-2-butene	Tetrachloroethene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	trans-1,4-Dichloro-2-butene	Trichloroethene	Vinyl Chloride
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				1	1	1	1	1	1	1	1	1	1	1	0.001	1	5	5	5	0.005	0.005	2	5	1	1	1	0.001	1	1	1		1	1	1		1	5
ANZG (2018) Marine water 95% toxicant DGVs					270[#8]	400[#8]	1900[#14]				1900[#8]	900[#8]	1100[#8]			240[#8]				4[#8]		80[#8]		700[#8]									70[#8]				330[#8]	100[#8]
ANZG (2018) Marine water 99% toxicant DGVs					130[#10]	200[#10]	140[#26]				1000[#10]	600[#10]	700[#10]			150[#10]				3[#10]		30[#10]		500[#10]									40[#10]				220[#10]	70[#10]
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, San																																							
2-4m																																							
4-8m																																							
>8m																																							
NEPM 2013 Table 1C GILs, Drinking Water											3					3				0.004				30									50					0.3
PFAS NEMP 2020 Table 1 Health Recreational Water																																							
PFAS NEMP 2020 Table 5 Interim marine 95%																																							
Sample ID	**Location**	**Sample Date**	**Monitoring Round**																																					
JBS-MW01	JBS-MW01	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<0.001	<1	<5	<5	<5	<0.005	<0.005	-	<5	<1	-	-	<0.001	<1	<1	<1	-	<1	<1	<1	-	<1	<5
JBS-MW02	JBS-MW02	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<0.001	<1	<5	<5	<5	<0.005	<0.005	-	<5	<1	-	-	<0.001	<1	<1	<1	-	<1	<1	<1	-	<1	<5
JBS-MW03	JBS-MW03	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<0.001	<1	<5	<5	<5	<0.005	<0.005	-	<5	<1	-	-	<0.001	<1	<1	<1	-	<1	<1	<1	-	<1	<5
JBS-MW04	JBS-MW04	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<0.001	<1	<5	<5	<5	<0.005	<0.005	-	<5	<1	-	-	<0.001	<1	<1	<1	-	<1	<1	<1	-	<1	<5
JBS-MW05	JBS-MW05	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<0.001	<1	<5	<5	<5	<0.005	<0.005	-	<5	<1	-	-	<0.001	<1	<1	<1	-	<1	<1	<1	-	<1	<5
MW01	MW01	13/07/2020	SES (2020)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	-	-	<5	<50	<50	<50	-	<0.002	<5	<50	<5	<5	<5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<50
MW01	MW01	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<0.001	<1	<5	<5	<5	<0.005	<0.005	-	<5	<1	-	-	<0.001	<1	<1	<1	-	<1	<1	<1	-	<1	<5
MW02	MW02	13/07/2020	SES (2020)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	-	-	<5	<50	<50	<50	-	<0.002	<5	<50	<5	<5	<5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<50
MW02	MW02	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<0.001	<1	<5	<5	<5	<0.005	<0.005	-	<5	<1	-	-	<0.001	<1	<1	<1	-	<1	<1	<1	-	<1	<5
QA01	MW02	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	<0.001	<1	<10	<10	<10	-	<0.002	<2	<10	<1	<1	<1	-	<1	<1	<1	-	<1	<1	<1	-	<1	<10
QC01	MW02	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<0.001	<1	<5	<5	<5	<0.005	<0.005	-	<5	<1	-	-	<0.001	<1	<1	<1	-	<1	<1	<1	-	<1	<5
MW03	MW03	13/07/2020	SES (2020)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	-	-	<5	<50	<50	<50	-	<0.002	<5	<50	<5	<5	<5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<50
FD05	MW03	13/07/2020	SES (2020)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03	MW03	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<0.001	<1	<5	<5	<5	<0.005	<0.005	-	<5	<1	-	-	<0.001	<1	<1	<1	-	<1	<1	<1	-	<1	<5
MW04	MW04	13/07/2020	SES (2020)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	-	-	<5	<50	<50	<50	-	<0.002	<5	<50	<5	<5	<5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<50
MW04	MW04	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<0.001	<1	<5	<5	<5	<0.005	<0.005	-	<5	<1	-	-	<0.001	<1	<1	<1	-	<1	<1	<1	-	<1	<5
MW05	MW05	13/07/2020	SES (2020)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	-	-	<5	<50	<50	<50	-	<0.002	<5	<50	<5	<5	<5	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<50
MW05	MW05	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	-	<0.001	<1	<5	<5	<5	<0.005	<0.005	-	<5	<1	-	-	<0.001	<1	<1	<1	-	<1	<1	<1	-	<1	<5

Statistical Summary

Number of Results				17	17	17	17	17	17	6	17	17	17	6	12	17	17	17	17	11	17	6	17	17	6	6	11	17	17	17	5	17	17	17	5	17	17
Number of Detects				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration				<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.001	<1	<5	<5	<5	<0.005	<0.002	<2	<5	<1	<1	<1	<0.001	<1	<1	<1	<5	<1	<1	<1	<5	<1	<5
Maximum Detect				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration				2.2	2.2	2.2	2.2	2.2	2.2	4.3	2.2	2.2	2.2	4.3	0.001	2.2	19	19	19	0.005	0.0039	4.5	19	2.2	4.3	4.3	0.001	2.2	2.2	2.2	5	2.2	2.2	2.2	5	2.2	19
Median Concentration				1	1	1	1	1	1	5	1	1	1	5	0.001	1	5	5	5	0.005	0.005	5	5	1	5	5	0.001	1	1	1	5	1	1	1	5	1	5
Standard Deviation				1.9	1.9	1.9	1.9	1.9	1.9	1.6	1.9	1.9	1.9	1.6	0	1.9	21	21	21	0	0.0015	1.2	21	1.9	1.6	1.6	0	1.9	1.9	1.9	0	1.9	1.9	1.9	0	1.9	21
Number of Guideline Exceedances(Detects Only)				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Results at or above the Detect Limit				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Results below the Detect Limit				100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
% of Detects at or above Guidelines				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Results Below Guidelines or Non-Detect				100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table B Groundwater Analytical Results
Project Number: 62110
Project Name: St Peters

	Chlorinated Alkanes																				Chlorinated Alkenes											
	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,2,3-trichloropropane	1,2-dibromo-3-chloropropane	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	2,2-dichloropropane	Bromochloromethane	Carbon tetrachloride	Chloroethane	Chloromethane	Dichlorodifluoromethane	Dichloromethane	Hexachloroethane	Pentachloroethane	Trichlorofluoromethane	1,1-dichloroethene	1,1-dichloropropene	2-chlorotoluene	3-chloropropene	4-chlorotoluene	cis-1,2-dichloroethene	cis-1,3-dichloropropene	cis-1,4-Dichloro-2-butene	Tetrachloroethene	trans-1,2-dichloroethene	trans-1,3-dichloropropene	trans-1,4-Dichloro-2-butene	Trichloroethene	Vinyl Chloride
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	1	1	1	1	1	1	1	1	1	1	1	0.001	1	5	5	5	0.005	0.005	2	5	1	1	1	0.001	1	1	1	1	1	1	1	1	1	5
ANZG (2018) Marine water 95% toxicant DGVs		270[#8]	400[#8]	1900[#14]				1900[#8]	900[#8]	1100[#8]			240[#8]				4[#8]		80[#8]		700[#8]								70[#8]				330[#8]	100[#8]
ANZG (2018) Marine water 99% toxicant DGVs		130[#10]	200[#10]	140[#26]				1000[#10]	600[#10]	700[#10]			150[#10]				3[#10]		30[#10]		500[#10]								40[#10]				220[#10]	70[#10]
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, San																																		
2-4m																																		
4-8m																																		
>8m																																		
NEPM 2013 Table 1C GILs, Drinking Water								3					3				0.004				30								50					0.3
PFAS NEMP 2020 Table 1 Health Recreational Water																																		
PFAS NEMP 2020 Table 5 Interim marine 95%																																		

Sample ID Location Sample Date Monitoring Round

Env Stds Comments
#1:Very High Reliability DGV may not protect key test species from chro
#2:Very High Reliability Recommended for application for slightly to mo
#3:Very High Reliability Recommended for application for slightly to mo
#4:Low Reliability Recommended for application for slightly to moderate
#5:Very High Reliability DGV may not protect key test species from chro
#6:Very High Reliability. The DGVs apply to water with salinity 25–36 ppt
#7:Moderate Reliability DGV may not protect key test species from chro
#8:Unknown Reliability Recommended for application for slightly to mo
#9:Adopted from m-Xylene
#10:Unknown Reliability
#11:Moderate Reliability DGV may not protect key test species from chr
#12:Moderate Reliability
#13:Low Reliability. Check guidelines for more details.
#14:Very Low Reliability Recommended for application for slightly to mo
#15:Moderate Reliability Recommended for application for slightly to m
#16:Unknown Reliability DGV may not protect key test species from chr
#17:Very High Reliability To account for the bioaccumulating nature of th
#18:Very High Reliability Adopted from Chromium (CrVI)
#19:Very High Reliability
#20:Low Reliability
#21:Very High Reliability To account for the bioaccumulating nature of th
#22:Very High Reliability Recommended for application for slightly to mo
#23:Moderate Reliability. Check guidelines for more details.
#24:Unknown Reliability To account for the bioaccumulating nature of th
#25:Moderate Reliability To account for the bioaccumulating nature of th
#26:Very Low Reliability
#27:Unknown Reliability Recommended for application for slightly to mo
#28:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C
#29:To obtain F2 subtract napthalene from the >C10 - C16 fraction.
#30:Values calculated using hardness of 30 mg/L CaCO3. Refer ANZECC &
#31:Trigger value adopted from Chromium VI
#32:Source: NHMRC 2019

Data Comments
#1 Quantification of linear and branched isomers has been conducted as

Table B Groundwater Analytical Results
Project Number: 62110
Project Name: St Peters

	Semivolatile Organic Compounds																																		Solvents		
	1-Chloronaphthalene	2-Chloronaphthalene	Bis(2-chloroethoxy) methane	Hexachloropropene	Dibenz[a,j]acridine	Acetophenone	Bis(2-chloroethyl)ether	Bis(2-chloroisopropyl) ether	4-Bromophenyl phenyl ether	4-Chlorophenyl phenyl ether	2,6-dinitrotoluene	2-Picoline	4-Aminobiphenyl	N-Nitrosomorpholine	N-Nitrosopiperidine	N-Nitrosopyrrolidine	2-methyl-5-nitroaniline	N-Nitrosodiethylamine	N-nitrosodi-n-butylamine	N-nitrosodi-n-propylamine	N-Nitrosomethylethylamine	1-Naphthylamine	2-Naphthylamine	3,3-Dichlorobenzidine	4-(dimethylamino) azobenzene	Azobenzene	Diphenylamine	N-Nitrosodiphenyl & Diphenylamine	Carbazole	Butyl benzyl phthalate	4-Nitroquinoline-N-oxide	Dibenzofuran	Isosafrole	Methapyrilene	Phenacetin	Acetone	Isophorone	Benzyl chloride
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL	0.005	0.005	0.005	0.002	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005		0.005		0.005	0.005		0.005	0.005	0.005	0.005	0.005	0.005		0.005	0.005		0.005	0.005	0.01	0.005	0.005	0.005	0.005
ANZG (2018) Marine water 95% toxicant DGVs																																					
ANZG (2018) Marine water 99% toxicant DGVs																																					
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, San																																					
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PFAS NEMP 2020 Table 1 Health Recreational Water																																					
PFAS NEMP 2020 Table 5 Interim marine 95%																																					

Sample ID	Location	Sample Date	Monitoring Round																																				
JBS-MW01	JBS-MW01	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	-	-	-	<0.005	-	<0.005
JBS-MW02	JBS-MW02	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	-	-	-	<0.005	-	<0.005
JBS-MW03	JBS-MW03	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	-	-	-	<0.005	-	<0.005
JBS-MW04	JBS-MW04	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	-	-	-	<0.005	-	<0.005
JBS-MW05	JBS-MW05	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	-	-	-	<0.005	-	<0.005
MW01	MW01	13/07/2020	SES (2020)	-	<0.002	<0.002	<0.002	-	<0.002	<0.002	-	<0.002	<0.002	<0.004	<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.002	-	<0.004	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.002	-	-	<0.002	-	-	-	-	<0.002	-
MW01	MW01	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	-	-	-	<0.005	-	<0.005
MW02	MW02	13/07/2020	SES (2020)	-	<0.002	<0.002	<0.002	-	<0.002	<0.002	-	<0.002	<0.002	<0.004	<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.002	-	<0.004	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.002	-	-	<0.002	-	-	-	-	<0.002	-
MW02	MW02	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	-	-	-	<0.005	-	<0.005
QA01	MW02	15/11/2021	JBS&G (2022)	-	<0.002	<0.005	<0.002	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	-	<0.005	<0.005	<0.005	-	<0.005	<0.005	<0.01	-	<0.005	<0.005	<0.01	<0.005	-	<0.005	-	-	-	-	<0.005	-
QC01	MW02	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	-	-	-	<0.005	-	<0.005
MW03	MW03	13/07/2020	SES (2020)	-	<0.002	<0.002	<0.002	-	<0.002	<0.002	-	<0.002	<0.002	<0.004	<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.002	-	<0.004	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.002	-	-	<0.002	-	-	-	-	<0.002	-
FD05	MW03	13/07/2020	SES (2020)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03	MW03	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	-	-	-	<0.005	-	<0.005
MW04	MW04	13/07/2020	SES (2020)	-	<0.002	<0.002	<0.002	-	<0.002	<0.002	-	<0.002	<0.002	<0.004	<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.002	-	<0.004	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.002	-	-	<0.002	-	-	-	-	<0.002	-
MW04	MW04	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	-	-	-	<0.005	-	<0.005
MW05	MW05	13/07/2020	SES (2020)	-	<0.002	<0.002	<0.002	-	<0.002	<0.002	-	<0.002	<0.002	<0.004	<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.002	-	<0.004	<0.002	<0.002	<0.002	<0.002	-	<0.002	<0.002	-	-	<0.002	-	-	-	-	<0.002	-
MW05	MW05	15/11/2021	JBS&G (2022)	<0.005	<0.005	<0.005	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	-	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	-	<0.005	-	-	<0.005	-	<0.005	-	<0.005	-	<0.005	<0.005	-	<0.005	-	-	-	<0.005	-	<0.005

Statistical Summary

Number of Results	11	17	17	6	11	17	6	12	17	17	17	16	16	6	17	5	6	5	17	17	5	17	12	16	17	6	12	5	6	17	5	17	1	6	6	11	6	11
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Minimum Concentration	<0.005	<0.002	<0.002	<0.002	<0.005	<0.002	<0.002	<0.005	<0.002	<0.002	<0.004	<0.002	<0.002	<0.002	<0.002	<0.004	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.005	<0.002	<0.002	<0.002	<0.005	<0.004	<0.002	<0.002	<0.002	<0.002	<0.005	<0.002	<0.002	<0.005	<0.002	<0.005
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.003	ND	ND	ND	ND	ND	ND
Average Concentration	0.005	0.0039	0.0041	0.002	0.005	0.0041	0.0025	0.005	0.0041	0.0041	0.0047	0.0041	0.0041	0.0025	0.0041	0.004	0.0025	0.002	0.0041	0.0041	0.002	0.0041	0.005	0.0041	0.0041	0.0025	0.005	0.004	0.0025	0.0044	0.002	0.0042		0.0033	0.0025	0.005	0.0025	0.005
Median Concentration	0.005	0.005	0.005	0.002	0.005	0.005	0.002	0.005	0.005	0.005	0.005	0.005	0.005	0.002	0.005	0.004	0.002	0.002	0.005	0.005	0.002	0.005	0.005	0.005	0.005	0.002	0.005	0.004	0.002	0.005	0.002	0.005	0.005	0.002	0.002	0.005	0.002	0.005
Standard Deviation	0	0.0015	0.0014	0	0	0.0014	0.0012	0	0.0014	0.0014	0.00047	0.0014	0.0014	0.0012	0.0014	0	0.0012	0	0.0014	0.0014	0	0.0014	0	0.0014	0.0014	0.0012	0	0	0.0012	0.002	0	0.0013		0.0033	0.0012	0	0.0012	0
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Results at or above the Detect Limit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0
% of Results below the Detect Limit	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	94	100	100	100	100	100	100
% of Detects at or above Guidelines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Results Below Guidelines or Non-Detect	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table B Groundwater Analytical Results
Project Number: 62110
Project Name: St Peters

	Semivolatile Organic Compounds																																					Solvents		
	1-Chloronaphthalene	2-Chloronaphthalene	Bis(2-chloroethoxy) methane	Hexachloropropene	Dibenz[a,j]acridine	Acetophenone	Bis(2-chloroethyl)ether	Bis(2-chloroisopropyl) ether	4-Bromophenyl phenyl ether	4-Chlorophenyl phenyl ether	2,6-dinitrotoluene	2-Picoline	4-Aminobiphenyl	N-Nitrosomorpholine	N-Nitrosopiperidine	N-Nitrosopyrrolidine	2-methyl-5-nitroaniline	N-Nitrosodiethylamine	N-nitrosodi-n-butylamine	N-nitrosodi-n-propylamine	N-Nitrosomethylethylamine	1-Naphthylamine	2-Naphthylamine	3,3-Dichlorobenzidine	4-(dimethylamino) azobenzene	Azobenzene	Diphenylamine	N-Nitrosodiphenyl & Diphenylamine	Carbazole	Butyl benzyl phthalate	4-Nitroquinoline-N-oxide	Dibenzofuran	Isosafrole	Methapyrilene	Phenacetin	Acetone	Isophorone	Benzyl chloride
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL	0.005	0.005	0.005	0.002	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005		0.005		0.005	0.005		0.005	0.005	0.005	0.005	0.005	0.005		0.005	0.005		0.005	0.005	0.01	0.005	0.005	0.005	0.005
ANZG (2018) Marine water 95% toxicant DGVs																																						
ANZG (2018) Marine water 99% toxicant DGVs																																						
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, San																																						
2-4m																																						
4-8m																																						
>8m																																						
NEPM 2013 Table 1C GILs, Drinking Water																																						
PFAS NEMP 2020 Table 1 Health Recreational Water																																						
PFAS NEMP 2020 Table 5 Interim marine 95%																																						

Sample ID Location Sample Date Monitoring Round

Env Stds Comments
#1:Very High Reliability DGV may not protect key test species from chro
#2:Very High Reliability Recommended for application for slightly to mo
#3:Very High Reliability Recommended for application for slightly to mo
#4:Low Reliability Recommended for application for slightly to moderate
#5:Very High Reliability DGV may not protect key test species from chro
#6:Very High Reliability. The DGVs apply to water with salinity 25–36 ppt
#7:Moderate Reliability DGV may not protect key test species from chro
#8:Unknown Reliability Recommended for application for slightly to mo
#9:Adopted from m-Xylene
#10:Unknown Reliability
#11:Moderate Reliability DGV may not protect key test species from chr
#12:Moderate Reliability
#13:Low Reliability. Check guidelines for more details.
#14:Very Low Reliability Recommended for application for slightly to mo
#15:Moderate Reliability Recommended for application for slightly to m
#16:Unknown Reliability DGV may not protect key test species from chr
#17:Very High Reliability To account for the bioaccumulating nature of th
#18:Very High Reliability Adopted from Chromium (CrVI)
#19:Very High Reliability
#20:Low Reliability
#21:Very High Reliability To account for the bioaccumulating nature of th
#22:Very High Reliability Recommended for application for slightly to mo
#23:Moderate Reliability. Check guidelines for more details.
#24:Unknown Reliability To account for the bioaccumulating nature of th
#25:Moderate Reliability To account for the bioaccumulating nature of th
#26:Very Low Reliability
#27:Unknown Reliability Recommended for application for slightly to mo
#28:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C
#29:To obtain F2 subtract napthalene from the >C10 - C16 fraction.
#30:Values calculated using hardness of 30 mg/L CaCO3. Refer ANZECC &
#31:Trigger value adopted from Chromium VI
#32:Source: NHMRC 2019

Data Comments
#1 Quantification of linear and branched isomers has been conducted as

Table B Groundwater Analytical Results
Project Number: 62110
Project Name: St Peters

				Phenols														
				2,3,4,6-tetrachlorophenol	2,4,5-trichlorophenol	2,4,6-trichlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	2,4-dinitrophenol	2,6-dichlorophenol	2-chlorophenol	2-Methylphenol	2-nitrophenol	3&4-Methylphenol (m&p-cresol)	4,6-Dinitro-2-methylphenol	4-Chloro-3-Methylphenol	4-nitrophenol	Phenol
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L
EQL				0.01	0.01	0.01	0.003	0.003	0.03	0.003	0.003	0.003	0.01	0.006	0.03	0.01	30	0.003
ANZG (2018) Marine water 95% toxicant DGVs																		**0.4[#15]**
ANZG (2018) Marine water 99% toxicant DGVs																		**0.27[#12]**
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, San																		
2-4m																		
4-8m																		
>8m																		
NEPM 2013 Table 1C GILs, Drinking Water						**0.02**	**0.2**				**0.3**							
PFAS NEMP 2020 Table 1 Health Recreational Water																		
PFAS NEMP 2020 Table 5 Interim marine 95%																		
Sample ID	**Location**	**Sample Date**	**Monitoring Round**															
JBS-MW01	JBS-MW01	15/11/2021	JBS&G (2022)	<0.01	<0.01	<0.01	<0.003	<0.003	<0.03	<0.003	<0.003	<0.003	<0.01	<0.006	<0.03	<0.01	<30	<0.003
JBS-MW02	JBS-MW02	15/11/2021	JBS&G (2022)	<0.01	<0.01	<0.01	<0.003	<0.003	<0.03	<0.003	<0.003	<0.003	<0.01	<0.006	<0.03	<0.01	<30	<0.005
JBS-MW03	JBS-MW03	15/11/2021	JBS&G (2022)	<0.01	<0.01	<0.01	<0.003	<0.003	<0.03	<0.003	<0.003	<0.003	<0.01	<0.006	<0.03	<0.01	<30	<0.003
JBS-MW04	JBS-MW04	15/11/2021	JBS&G (2022)	<0.01	<0.01	<0.01	<0.003	<0.003	<0.03	<0.003	<0.003	<0.003	<0.01	<0.006	<0.03	<0.01	<30	<0.003
JBS-MW05	JBS-MW05	15/11/2021	JBS&G (2022)	<0.01	<0.01	<0.01	<0.003	<0.003	<0.03	<0.003	<0.003	<0.003	<0.01	<0.006	<0.03	<0.01	<30	<0.003
MW01	MW01	13/07/2020	SES (2020)	-	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.002	-	<0.001	-	<0.001
MW01	MW01	15/11/2021	JBS&G (2022)	<0.01	<0.01	<0.01	<0.003	<0.003	<0.03	<0.003	<0.003	<0.003	<0.01	<0.006	<0.03	<0.01	<30	<0.003
MW02	MW02	13/07/2020	SES (2020)	-	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.002	-	<0.001	-	<0.001
MW02	MW02	15/11/2021	JBS&G (2022)	<0.01	<0.01	<0.01	<0.003	<0.003	<0.03	<0.003	<0.003	<0.003	<0.01	<0.006	<0.03	<0.01	<30	<0.003
QA01	MW02	15/11/2021	JBS&G (2022)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.02	<0.002	<0.002	<0.002	<0.002	<0.004	<0.02	<0.01	<20	<0.002
QC01	MW02	15/11/2021	JBS&G (2022)	<0.01	<0.01	<0.01	<0.003	<0.003	<0.03	<0.003	<0.003	<0.003	<0.01	<0.006	<0.03	<0.01	<30	<0.003
MW03	MW03	13/07/2020	SES (2020)	-	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.002	-	<0.001	-	<0.001
FD05	MW03	13/07/2020	SES (2020)	-	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.002	-	<0.001	-	<0.001
MW03	MW03	15/11/2021	JBS&G (2022)	<0.01	<0.01	<0.01	<0.003	<0.003	<0.03	<0.003	<0.003	<0.003	<0.01	<0.006	<0.03	<0.01	<30	<0.003
MW04	MW04	13/07/2020	SES (2020)	-	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.002	-	<0.001	-	<0.001
MW04	MW04	15/11/2021	JBS&G (2022)	<0.01	<0.01	<0.01	<0.003	<0.003	<0.03	<0.003	<0.003	<0.003	<0.01	<0.006	<0.03	<0.01	<30	<0.003
MW05	MW05	13/07/2020	SES (2020)	-	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001	<0.001	<0.001	<0.002	-	<0.001	-	<0.001
MW05	MW05	15/11/2021	JBS&G (2022)	<0.01	<0.01	<0.01	<0.003	<0.003	<0.03	<0.003	<0.003	<0.003	<0.01	<0.006	<0.03	<0.01	<30	<0.003
Statistical Summary																		
Number of Results				12	18	18	18	18	12	18	18	18	18	18	12	18	12	18
Number of Detects				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration				<0.002	<0.001	<0.001	<0.001	<0.001	<0.02	<0.001	<0.001	<0.001	<0.001	<0.002	<0.02	<0.001	<20	<0.001
Maximum Detect				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration				0.0093	0.0066	0.0066	0.0023	0.0023	0.029	0.0023	0.0023	0.0023	0.0066	0.0046	0.029	0.007	29	0.0024
Median Concentration				0.01	0.01	0.01	0.003	0.003	0.03	0.003	0.003	0.003	0.01	0.006	0.03	0.01	30	0.003
Standard Deviation				0.0023	0.0044	0.0044	0.00096	0.00096	0.0029	0.00096	0.00096	0.00096	0.0044	0.0019	0.0029	0.0044	2.9	0.0011
Number of Guideline Exceedances(Detects Only)				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Results at or above the Detect Limit				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Results below the Detect Limit				100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
% of Detects at or above Guidelines				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Results Below Guidelines or Non-Detect				100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

		PFAS																	
		Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (NMeFOSA)	N-Ethyl perfluorooctane sulfonamide (NEtFOSA)	N-Methylperfluorooctanesulfonamidoethanol (N-MeFOSE)	N-ethylperfluorooctanesulfonamidoethanol (NEtFOSE)	N-methylperfluorooctane sulfonamidoacetic acid (NMeFOSAA)	N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.05
ANZG (2018) Marine water 95% toxicant DGVs																			
ANZG (2018) Marine water 99% toxicant DGVs																			
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, San																			
2-4m																			
4-8m																			
>8m																			
NEPM 2013 Table 1C GILs, Drinking Water																			
PFAS NEMP 2020 Table 1 Health Recreational Water						**10[#32]**													
PFAS NEMP 2020 Table 5 Interim marine 95%						**220**													
Sample ID	**Sample Date**																		
JBS-MW01	15/11/2021	<0.05	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
JBS-MW02	15/11/2021	<0.05	0.02	0.03	<0.01	0.02[#1]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
JBS-MW03	15/11/2021	<0.05	0.02	0.04	0.01	0.02[#1]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
JBS-MW04	15/11/2021	<0.05	0.06	0.06	0.02	0.01[#1]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
JBS-MW05	15/11/2021	<0.05	0.02	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW01	13/07/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW01	15/11/2021	<0.1	0.09	0.09	0.02	0.01[#1]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW02	13/07/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW02	15/11/2021	<0.1	0.03	0.05	<0.01	0.02[#1]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
QA01	15/11/2021	-	-	-	-	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-
QC01	15/11/2021	<0.1	0.03	0.05	<0.01	0.01[#1]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW03	13/07/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FD05	13/07/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03	15/11/2021	<0.05	0.02	0.03	<0.01	0.01[#1]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW04	13/07/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW04	15/11/2021	<0.05	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW05	13/07/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW05	15/11/2021	<0.05	0.02	0.04	<0.01	0.01[#1]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Statistical Summary																			
Number of Results		11	11	11	11	12	11	11	11	11	11	11	11	11	11	11	11	11	11
Number of Detects		0	9	11	3	9	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration		<0.05	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Maximum Detect		ND	0.09	0.09	0.02	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration		0.064	0.03	0.041	0.012	0.013	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Median Concentration		0.05	0.02	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Standard Deviation		0.023	0.024	0.022	0.004	0.0045	0	0	0	0	0	0	0	0	0	0	0	0	0
Number of Guideline Exceedances(Detects Only)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Results at or above the Detect Limit		0	82	100	27	75	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Results below the Detect Limit		100	18	0	73	25	100	100	100	100	100	100	100	100	100	100	100	100	100
% of Detects at or above Guidelines		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Results Below Guidelines or Non-Detect		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

		PFAS																
		Perfluoropropanesulfonic acid (PFPrS)	Perfluorobutanesulfonic acid (PFBS)	Perfluoropentanesulfonic acid (PFPeS)	Perfluorohexanesulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctanesulfonic acid (PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecanesulfonic acid (PFDS)	1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	Sum of PFHxS and PFOS	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	Sum of US EPA PFAS (PFOS + PFOA)*	Sum of PFAS (WA DER List)	Sum of PFAS
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.05	0.1
ANZG (2018) Marine water 95% toxicant DGVs																		
ANZG (2018) Marine water 99% toxicant DGVs																		
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, San																		
2-4m																		
4-8m																		
>8m																		
NEPM 2013 Table 1C GILs, Drinking Water																		
PFAS NEMP 2020 Table 1 Health Recreational Water					**2[#32]**		**2[#32]**							**2[#32]**				
PFAS NEMP 2020 Table 5 Interim marine 95%							**0.13**											
Sample ID	**Sample Date**																	
JBS-MW01	15/11/2021	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.1
JBS-MW02	15/11/2021	<0.01	<0.01	<0.01	<0.01	<0.01	0.02[#1]	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	0.02	0.04	0.04	0.09	<0.1
JBS-MW03	15/11/2021	<0.01	<0.01	<0.01	0.03[#1]	<0.01	0.02[#1]	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	0.05	0.07	0.04	0.14	0.14
JBS-MW04	15/11/2021	<0.01	<0.01	<0.01	0.01[#1]	<0.01	0.02[#1]	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	0.03	0.04	0.03	0.18	0.18
JBS-MW05	15/11/2021	<0.01	<0.01	<0.01	0.01[#1]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	0.01	0.01	<0.01	0.06	<0.1
MW01	13/07/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW01	15/11/2021	<0.01	<0.01	<0.01	0.02[#1]	<0.01	0.01[#1]	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	0.03	0.04	0.02	0.24	0.24
MW02	13/07/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW02	15/11/2021	<0.01	<0.01	<0.01	0.03[#1]	<0.01	0.01[#1]	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	0.04	0.06	0.03	0.14	0.14
QA01	15/11/2021	-	-	-	0.03	-	0.02	-	-	-	<0.01	<0.02	-	0.05	-	0.03	-	0.06
QC01	15/11/2021	<0.01	<0.01	<0.01	0.03[#1]	<0.01	0.01[#1]	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	0.04	0.05	0.02	0.13	0.13
MW03	13/07/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
FD05	13/07/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03	15/11/2021	<0.01	0.01	<0.01	0.03[#1]	<0.01	0.01[#1]	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	0.04	0.05	0.02	0.11	0.11
MW04	13/07/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW04	15/11/2021	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	<0.1
MW05	13/07/2020	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW05	15/11/2021	<0.01	<0.01	<0.01	0.03[#1]	<0.01	0.02[#1]	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	0.05	0.06	0.03	0.12	0.12
Statistical Summary																		
Number of Results		11	11	11	12	11	12	11	11	11	12	12	11	12	11	12	11	12
Number of Detects		0	1	0	9	0	9	0	0	0	0	0	0	10	9	9	9	8
Minimum Concentration		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.05	0.06
Maximum Detect		ND	0.01	ND	0.03	ND	0.02	ND	ND	ND	ND	ND	ND	0.05	0.07	0.04	0.24	0.24
Average Concentration		0.01	0.01	0.01	0.021	0.01	0.014	0.01	0.01	0.01	0.047	0.011	0.01	0.032	0.04	0.024	0.12	0.13
Median Concentration		0.01	0.01	0.01	0.025	0.01	0.01	0.01	0.01	0.01	0.05	0.01	0.01	0.035	0.04	0.025	0.12	0.115
Standard Deviation		0	0	0	0.01	0	0.0051	0	0	0	0.012	0.0029	0	0.016	0.021	0.011	0.058	0.046
Number of Guideline Exceedances(Detects Only)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Results at or above the Detect Limit		0	9	0	75	0	75	0	0	0	0	0	0	83	82	75	82	67
% of Results below the Detect Limit		100	91	100	25	100	25	100	100	100	100	100	100	17	18	25	18	33
% of Detects at or above Guidelines		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% of Results Below Guidelines or Non-Detect		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table B Groundwater Analytical Results
Project Number: 62110
Project Name: St Peters

	Phenols														
	2,3,4,6-tetrachlorophenol	2,4,5-trichlorophenol	2,4,6-trichlorophenol	2,4-dichlorophenol	2,4-dimethylphenol	2,4-dinitrophenol	2,6-dichlorophenol	2-chlorophenol	2-Methylphenol	2-nitrophenol	3&4-Methylphenol (m&p-cresol)	4,6-Dinitro-2-methylphenol	4-Chloro-3-Methylphenol	4-nitrophenol	Phenol
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L
EQL	0.01	0.01	0.01	0.003	0.003	0.03	0.003	0.003	0.003	0.01	0.006	0.03	0.01	30	0.003
ANZG (2018) Marine water 95% toxicant DGVs															**0.4[#15]**
ANZG (2018) Marine water 99% toxicant DGVs															**0.27[#12]**
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, San															
2-4m															
4-8m															
>8m															
NEPM 2013 Table 1C GILs, Drinking Water			**0.02**	**0.2**				**0.3**							
PFAS NEMP 2020 Table 1 Health Recreational Water															
PFAS NEMP 2020 Table 5 Interim marine 95%															

	PFAS																																		
	Perfluorobutanoic acid (PFBA)	Perfluoropentanoic acid (PFPeA)	Perfluorohexanoic acid (PFHxA)	Perfluoroheptanoic acid (PFHpA)	Perfluorooctanoic acid (PFOA)	Perfluorononanoic acid (PFNA)	Perfluorodecanoic acid (PFDA)	Perfluoroundecanoic acid (PFUnDA)	Perfluorododecanoic acid (PFDoDA)	Perfluorotridecanoic acid (PFTrDA)	Perfluorotetradecanoic acid (PFTeDA)	Perfluorooctane sulfonamide (FOSA)	N-Methyl perfluorooctane sulfonamide (NMeFOSA)	N-Ethyl perfluorooctane sulfonamide (NEtFOSA)	N-Methylperfluorooctanesulfonamidoethanol (N-MeFOSE)	N-ethylperfluorooctanesulfonamidoethanol (NEtFOSE)	N-methylperfluorooctane sulfonamidoacetic acid (NMeFOSAA)	N-ethyl-perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	Perfluoropropanesulfonic acid (PFPrS)	Perfluorobutanesulfonic acid (PFBS)	Perfluoropentanesulfonic acid (PFPeS)	Perfluorohexanesulfonic acid (PFHxS)	Perfluoroheptane sulfonic acid (PFHpS)	Perfluorooctanesulfonic acid (PFOS)	Perfluorononanesulfonic acid (PFNS)	Perfluorodecanesulfonic acid (PFDS)	1H.1H.2H.2H-perfluorohexanesulfonic acid (4:2 FTSA)	1H.1H.2H.2H-perfluorooctanesulfonic acid (6:2 FTSA)	1H.1H.2H.2H-perfluorodecanesulfonic acid (8:2 FTSA)	1H.1H.2H.2H-perfluorododecanesulfonic acid (10:2 FTSA)	Sum of PFHxS and PFOS	Sum of enHealth PFAS (PFHxS + PFOS + PFOA)*	Sum of US EPA PFAS (PFOS + PFOA)*	Sum of PFAS (WA DER List)	Sum of PFAS
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.05	0.1
ANZG (2018) Marine water 95% toxicant DGVs																																			
ANZG (2018) Marine water 99% toxicant DGVs																																			
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, San																																			
2-4m																																			
4-8m																																			
>8m																																			
NEPM 2013 Table 1C GILs, Drinking Water																																			
PFAS NEMP 2020 Table 1 Health Recreational Water					**10[#32]**																	**2[#32]**		**2[#32]**							**2[#32]**				
PFAS NEMP 2020 Table 5 Interim marine 95%					**220**																			**0.13**											

Sample ID **Location** **Sample Date** **Monitoring Round**

Env Stds Comments
#1:Very High Reliability DGV may not protect key test species from chroı
#2:Very High Reliability Recommended for application for slightly to moı
#3:Very High Reliability Recommended for application for slightly to moı
#4:Low Reliability Recommended for application for slightly to moderate
#5:Very High Reliability DGV may not protect key test species from chroı
#6:Very High Reliability. The DGVs apply to water with salinity 25–36 ppt
#7:Moderate Reliability DGV may not protect key test species from chro
#8:Unknown Reliability Recommended for application for slightly to moı
#9:Adopted from m-Xylene
#10:Unknown Reliability
#11:Moderate Reliability DGV may not protect key test species from chr
#12:Moderate Reliability
#13:Low Reliability. Check guidelines for more details.
#14:Very Low Reliability Recommended for application for slightly to mc
#15:Moderate Reliability Recommended for application for slightly to m
#16:Unknown Reliability DGV may not protect key test species from chrc
#17:Very High Reliability To account for the bioaccumulating nature of tł
#18:Very High Reliability Adopted from Chromium (CrVI)
#19:Very High Reliability
#20:Low Reliability
#21:Very High Reliability To account for the bioaccumulating nature of tł
#22:Very High Reliability Recommended for application for slightly to mc
#23:Moderate Reliability. Check guidelines for more details.
#24:Unknown Reliability To account for the bioaccumulating nature of tł
#25:Moderate Reliability To account for the bioaccumulating nature of tl
#26:Very Low Reliability
#27:Unknown Reliability Recommended for application for slightly to mc
#28:To obtain F1 subtract the sum of BTEX concentrations from the C6 - (
#29:To obtain F2 subtract napthalene from the >C10 - C16 fraction.
#30:Values calculated using hardness of 30 mg/L CaCO3. Refer ANZECC &
#31:Trigger value adopted from Chromium VI
#32:Source: NHMRC 2019

Data Comments
#1 Quantification of linear and branched isomers has been conducted as

Table B Groundwater Analytical Results
Project Number: 62110
Project Name: St Peters

Sample ID	Location	Sample Date	Monitoring Round	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	n-butylbenzene	n-propylbenzene	p-isopropyltoluene	sec-butylbenzene	Styrene	tert-butylbenzene	Total MAH	Bromobenzene	Isopropylbenzene	1,2-dibromoethane	Bromomethane	Cyclohexane	Dibromomethane	Iodomethane	Vinyl Acetate	2-Hexanone (MBK)	4-Methyl-2-pentanone	Methyl Ethyl Ketone
				MAH											Miscellaneous Hydrocarbons								
				µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				1	1	1	1	1	1	1	1	0.003	1	1	1	5	0.001	1	1			5	5
ANZG (2018) Marine water 95% toxicant DGVs														30[#8]									
ANZG (2018) Marine water 99% toxicant DGVs														20[#10]									
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, San																							
2-4m																							
4-8m																							
>8m																							
NEPM 2013 Table 1C GILs, Drinking Water										30						1							
PFAS NEMP 2020 Table 1 Health Recreational Water																							
PFAS NEMP 2020 Table 5 Interim marine 95%																							
JBS-MW01	JBS-MW01	15/11/2021	JBS&G (2022)	<1	<1	-	-	-	-	<1	-	<0.003	<1	<1	<1	<5	-	<1	<1	-	-	<5	<5
JBS-MW02	JBS-MW02	15/11/2021	JBS&G (2022)	<1	<1	-	-	-	-	<1	-	<0.003	<1	<1	<1	<5	-	<1	<1	-	-	<5	<5
JBS-MW03	JBS-MW03	15/11/2021	JBS&G (2022)	<1	<1	-	-	-	-	<1	-	<0.003	<1	<1	<1	<5	-	<1	<1	-	-	<5	<5
JBS-MW04	JBS-MW04	15/11/2021	JBS&G (2022)	32	5	-	-	-	-	<1	-	0.017	<1	6	<1	<5	-	<1	<1	-	-	<5	<5
JBS-MW05	JBS-MW05	15/11/2021	JBS&G (2022)	<1	<1	-	-	-	-	<1	-	<0.003	<1	<1	<1	<5	-	<1	<1	-	-	<5	<5
MW01	MW01	13/07/2020	SES (2020)	<5	<5	<5	<5	<5	<5	<5	<5	-	<5	<5	<5	<50	-	<5	<5	<50	<50	<50	<50
MW01	MW01	15/11/2021	JBS&G (2022)	<1	<1	-	-	-	-	<1	-	<0.003	<1	<1	<1	<5	-	<1	<1	-	-	<5	<5
MW02	MW02	13/07/2020	SES (2020)	<5	<5	<5	<5	<5	<5	<5	<5	-	<5	<5	<5	<50	-	<5	<5	<50	<50	<50	<50
MW02	MW02	15/11/2021	JBS&G (2022)	<1	<1	-	-	-	-	<1	-	0.019	<1	<1	<1	<5	-	<1	<1	-	-	<5	<5
QA01	MW02	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<1	<1	<1	<1	-	<1	<1	<1	<10	0.003	<1	-	-	-	-	-
QC01	MW02	15/11/2021	JBS&G (2022)	<1	<1	-	-	-	-	<1	-	0.018	<1	<1	<1	<5	-	<1	<1	-	-	<5	<5
MW03	MW03	13/07/2020	SES (2020)	<5	<5	<5	<5	<5	<5	<5	<5	-	<5	<5	<5	<50	-	<5	<5	<50	<50	<50	<50
FD05	MW03	13/07/2020	SES (2020)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW03	MW03	15/11/2021	JBS&G (2022)	<1	<1	-	-	-	-	<1	-	<0.003	<1	<1	<1	<5	-	<1	<1	-	-	<5	<5
MW04	MW04	13/07/2020	SES (2020)	<5	<5	<5	8	<5	<5	<5	<5	-	<5	<5	<5	<50	-	<5	<5	<50	<50	<50	<50
MW04	MW04	15/11/2021	JBS&G (2022)	<1	<1	-	-	-	-	<1	-	<0.003	<1	2	<1	<5	-	<1	<1	-	-	<5	<5
MW05	MW05	13/07/2020	SES (2020)	<5	<5	<5	31	<5	<5	<5	<5	-	<5	**21**	<5	<50	-	<5	<5	<50	<50	<50	<50
MW05	MW05	15/11/2021	JBS&G (2022)	<1	<1	-	-	-	-	<1	-	0.021	<1	**21**	<1	<5	-	<1	<1	-	-	<5	<5
Statistical Summary																							
Number of Results				17	17	6	6	6	6	17	6	11	17	17	17	17	1	17	16	5	5	16	16
Number of Detects				1	1	0	2	0	0	0	0	4	0	4	0	0	1	0	0	0	0	0	0
Minimum Concentration				<1	<1	<1	<1	<1	<1	<1	<1	<0.003	<1	<1	<1	<5	0.003	<1	<1	<50	<50	<5	<5
Maximum Detect				32	5	ND	31	ND	ND	ND	ND	0.021	ND	21	ND	ND	0.003	ND	ND	ND	ND	ND	ND
Average Concentration				4	2.4	4.3	9.2	4.3	4.3	2.2	4.3	0.0087	2.2	4.6	2.2	19		2.2	2.3	50	50	19	19
Median Concentration				1	1	5	5	5	5	1	5	0.003	1	1	1	5	0.003	1	1	50	50	5	5
Standard Deviation				7.4	2	1.6	11	1.6	1.6	1.9	1.6	0.008	1.9	6.4	1.9	21		1.9	1.9	0	0	22	22
Number of Guideline Exceedances(Detects Only)				0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
% of Results at or above the Detect Limit				6	6	0	33	0	0	0	0	36	0	24	0	0	100	0	0	0	0	0	0
% of Results below the Detect Limit				94	94	100	67	100	100	100	100	64	100	76	100	100	0	100	100	100	100	100	100
% of Detects at or above Guidelines				0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0
% of Results Below Guidelines or Non-Detect				100	100	100	100	100	100	100	100	100	100	88	100	100	100	100	100	100	100	100	100

Sample ID	Location	Sample Date	Monitoring Round	1,2,3,4-tetrachlorobenzene	1,2,3,5-tetrachlorobenzene	1,2,3-trichlorobenzene	1,2,4,5-tetrachlorobenzene	1,2,4-trichlorobenzene	1,2-Dichlorobenzene	1,3,5-trichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	Chlorobenzene	Hexachlorobenzene	Pentachlorobenzene
				Chlorinated Benzenes											
				mg/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L
EQL				0.005	0.005	5	0.005	5	1	5	1	1	1	0.005	0.005
ANZG (2018) Marine water 95% toxicant DGVs				0.004[#10]	0.005[#10]		0.005[#10]	80[#12]		13[#10]			55[#8]	0.0001[#10]	0.002[#10]
ANZG (2018) Marine water 99% toxicant DGVs				0.002[#24]	0.003[#24]		0.003[#24]	20[#23]		8[#24]			15[#10]	0.00005[#24]	0.0015[#24]
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, San															
2-4m															
4-8m															
>8m															
NEPM 2013 Table 1C GILs, Drinking Water						30		30	1500	30		40	300		
PFAS NEMP 2020 Table 1 Health Recreational Water															
PFAS NEMP 2020 Table 5 Interim marine 95%															
JBS-MW01	JBS-MW01	15/11/2021	JBS&G (2022)	<0.005	<0.005	<5	<0.005	<5	<1	<5	<1	<1	<1	<0.005	<0.005
JBS-MW02	JBS-MW02	15/11/2021	JBS&G (2022)	<0.005	<0.005	<5	<0.005	<5	<1	<5	<1	<1	<1	<0.005	<0.005
JBS-MW03	JBS-MW03	15/11/2021	JBS&G (2022)	<0.005	<0.005	<5	<0.005	<5	<1	<5	<1	<1	<1	<0.005	<0.005
JBS-MW04	JBS-MW04	15/11/2021	JBS&G (2022)	<0.005	<0.005	<5	<0.005	<5	<50 - 42	<5	<1	<10 - 7	**22**	<0.005	<0.005
JBS-MW05	JBS-MW05	15/11/2021	JBS&G (2022)	<0.005	<0.005	<5	<0.005	<5	<1	<5	<1	<1	<1	<0.005	<0.005
MW01	MW01	13/07/2020	SES (2020)	-	-	<5	-	<2	<2	-	<2	<2	<5	<0.004	<0.002
MW01	MW01	15/11/2021	JBS&G (2022)	<0.005	<0.005	<5	<0.005	<5	<1	<5	<1	<1	<1	<0.005	<0.005
MW02	MW02	13/07/2020	SES (2020)	-	-	<5	-	<2	<2	-	<2	<2	<5	<0.004	<0.002
MW02	MW02	15/11/2021	JBS&G (2022)	<0.005	<0.005	<5	<0.005	<5	<1	<5	<1	<1	<1	<0.005	<0.005
QA01	MW02	15/11/2021	JBS&G (2022)	-	-	<1	<0.002	<1	<1	-	<1	<1	<1	<0.002	<0.002
QC01	MW02	15/11/2021	JBS&G (2022)	<0.005	<0.005	<5	<0.005	<5	<1	<5	<1	<1	<1	<0.005	<0.005
MW03	MW03	13/07/2020	SES (2020)	-	-	<5	-	<2	<2	-	<2	<2	<5	<0.004	<0.002
FD05	MW03	13/07/2020	SES (2020)	-	-	-	-	-	-	-	-	-	-	-	-
MW03	MW03	15/11/2021	JBS&G (2022)	<0.005	<0.005	<5	<0.005	<5	<1	<5	<1	<1	<1	<0.005	<0.005
MW04	MW04	13/07/2020	SES (2020)	-	-	<5	-	<2	<2	-	<2	<2	<5	<0.004	<0.002
MW04	MW04	15/11/2021	JBS&G (2022)	<0.005	<0.005	<5	<0.005	<5	<1	<5	<1	<1	<1	<0.005	<0.005
MW05	MW05	13/07/2020	SES (2020)	-	-	<5	-	<2	<2	-	<2	<2	<5	<0.004	<0.002
MW05	MW05	15/11/2021	JBS&G (2022)	<0.005	<0.005	<5	<0.005	<5	<1	<5	<1	<1	<1	<0.005	<0.005
Statistical Summary															
Number of Results				11	11	17	12	17	17	11	17	17	17	17	17
Number of Detects				0	0	0	0	0	1	0	0	1	1	0	0
Minimum Concentration				<0.005	<0.005	<1	<0.002	<1	<1	<5	<1	<1	<1	<0.002	<0.002
Maximum Detect				ND	ND	ND	ND	ND	42	ND	ND	7	22	ND	ND
Average Concentration				0.005	0.005	4.8	0.0048	3.9	3.9	5	1.3	1.7	3.4	0.0045	0.0039
Median Concentration				0.005	0.005	5	0.005	5	1	5	1	1	1	0.005	0.005
Standard Deviation				0	0	0.97	0.00087	1.6	11	0	0.47	1.8	5.1	0.0008	0.0015
Number of Guideline Exceedances(Detects Only)				0	0	0	0	0	0	0	0	0	1	0	0
% of Results at or above the Detect Limit				0	0	0	0	0	6	0	0	6	6	0	0
% of Results below the Detect Limit				100	100	100	100	100	94	100	100	94	94	100	100
% of Detects at or above Guidelines				0	0	0	0	0	0	0	0	0	6	0	0
% of Results Below Guidelines or Non-Detect				100	100	100	100	100	100	100	100	100	94	100	100

Sample ID	Location	Sample Date	Monitoring Round	Dibromochloromethane	Chloroform	Tribromomethane	Bromodichloromethane	Dinoseb	Pronamide	Trifluralin	Bis(2-ethylhexyl) phthalate	Diethylphthalate	Dimethyl phthalate	Di-n-butyl phthalate	Di-n-octyl phthalate
				Trihalomethanes				Herbicides & Fungicides			Phthalates				
				µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL				1	5	1	1	0.01	0.005	0.005	0.005	0.005	0.005	0.005	0.005
ANZG (2018) Marine water 95% toxicant DGVs					770[#16]										
ANZG (2018) Marine water 99% toxicant DGVs					370[#27]										
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, San															
2-4m															
4-8m															
>8m															
NEPM 2013 Table 1C GILs, Drinking Water									0.07	0.09	0.01				
PFAS NEMP 2020 Table 1 Health Recreational Water															
PFAS NEMP 2020 Table 5 Interim marine 95%															
JBS-MW01	JBS-MW01	15/11/2021	JBS&G (2022)	<1	<5	<1	<1	-	<0.005	<0.005	<0.01	<0.005	<0.005	<0.01	<0.005
JBS-MW02	JBS-MW02	15/11/2021	JBS&G (2022)	<1	<5	<1	<1	-	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005
JBS-MW03	JBS-MW03	15/11/2021	JBS&G (2022)	<1	<5	<1	<1	-	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005
JBS-MW04	JBS-MW04	15/11/2021	JBS&G (2022)	<1	<5	<1	<1	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
JBS-MW05	JBS-MW05	15/11/2021	JBS&G (2022)	<1	<5	<1	<1	-	<0.005	<0.005	<0.01	<0.005	<0.005	<0.005	<0.005
MW01	MW01	13/07/2020	SES (2020)	<5	<5	<5	<5	-	<0.002	-	<0.01	<0.002	<0.002	<0.002	<0.002
MW01	MW01	15/11/2021	JBS&G (2022)	<1	<5	<1	<1	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
MW02	MW02	13/07/2020	SES (2020)	<5	<5	<5	<5	-	<0.002	-	<0.01	<0.002	<0.002	<0.002	<0.002
MW02	MW02	15/11/2021	JBS&G (2022)	<1	<5	<1	<1	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
QA01	MW02	15/11/2021	JBS&G (2022)	<1	<1	<1	<1	<0.01	-	-	<0.05	<0.01	<0.01	<0.01	<0.01
QC01	MW02	15/11/2021	JBS&G (2022)	<1	<5	<1	<1	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
MW03	MW03	13/07/2020	SES (2020)	<5	<5	<5	<5	-	<0.002	-	<0.01	<0.002	<0.002	<0.002	<0.002
FD05	MW03	13/07/2020	SES (2020)	-	-	-	-	-	-	-	-	-	-	-	-
MW03	MW03	15/11/2021	JBS&G (2022)	<1	<5	<1	<1	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
MW04	MW04	13/07/2020	SES (2020)	<5	<5	<5	<5	-	<0.002	-	<0.01	<0.002	<0.002	<0.002	<0.002
MW04	MW04	15/11/2021	JBS&G (2022)	<1	<5	<1	<1	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
MW05	MW05	13/07/2020	SES (2020)	<5	<5	<5	<5	-	<0.002	-	<0.01	<0.002	<0.002	<0.002	<0.002
MW05	MW05	15/11/2021	JBS&G (2022)	<1	<5	<1	<1	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Statistical Summary															
Number of Results				17	17	17	17	1	16	11	17	17	17	17	17
Number of Detects				0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration				<1	<1	<1	<1	<0.01	<0.002	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002
Maximum Detect				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration				2.2	4.8	2.2	2.2		0.0041	0.005	0.01	0.0044	0.0044	0.0047	0.0044
Median Concentration				1	5	1	1	0.01	0.005	0.005	0.01	0.005	0.005	0.005	0.005
Standard Deviation				1.9	0.97	1.9	1.9		0.0014	0	0.011	0.002	0.002	0.0024	0.002
Number of Guideline Exceedances(Detects Only)				0	0	0	0	0	0	0	0	0	0	0	0
% of Results at or above the Detect Limit				0	0	0	0	0	0	0	0	0	0	0	0
% of Results below the Detect Limit				100	100	100	100	100	100	100	100	100	100	100	100
% of Detects at or above Guidelines				0	0	0	0	0	0	0	0	0	0	0	0
% of Results Below Guidelines or Non-Detect				100	100	100	100	100	100	100	100	100	100	100	100

Table B Groundwater Analytical Results
Project Number: 62110
Project Name: St Peters

	MAH											Miscellaneous Hydrocarbons									Chlorinated Benzenes													Trihalomethanes				Herbicides & Fungicides			Phthalates					
	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	n-butylbenzene	n-propylbenzene	p-Isopropyltoluene	sec-butylbenzene	Styrene	tert-butylbenzene	Total MAH	Bromobenzene	Isopropylbenzene	1,2-dibromoethane	Bromomethane	Cyclohexane	Dibromomethane	Iodomethane	Vinyl Acetate	2-Hexanone (MBK)	4-Methyl-2-pentanone	Methyl Ethyl Ketone	1,2,3,4-tetrachlorobenzene	1,2,3,5-tetrachlorobenzene	1,2,3-trichlorobenzene	1,2,4,5-tetrachlorobenzene	1,2,4-trichlorobenzene	1,2-Dichlorobenzene	1,3,5-trichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	Chlorobenzene	Hexachlorobenzene	Pentachlorobenzene	Dibromochloromethane	Chloroform	Tribromomethane	Bromodichloromethane	Dinoseb	Pronamide	Trifluralin	Bis(2-ethylhexyl) phthalate	Diethylphthalate	Dimethyl phthalate	Di-n-butyl phthalate	Di-n-octyl phthalate
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL	1	1	1	1	1	1	1	1	0.003	1	1	1	5	0.001	1	1			5	5	0.005	0.005	5	0.005	5	1	5	1	1	1	0.005	0.005	1	5	1	1	0.01	0.005	0.005	0.005	0.005	0.005	0.005	0.005
ANZG (2018) Marine water 95% toxicant DGVs											**30**[#8]										**0.004**[#10]	**0.005**[#10]		**0.005**[#10]	**80**[#12]		**13**[#10]			**55**[#8]	**0.0001**[#10]	**0.002**[#10]		**770**[#16]									
ANZG (2018) Marine water 99% toxicant DGVs											**20**[#10]										**0.002**[#24]	**0.003**[#24]		**0.003**[#24]	**20**[#23]		**8**[#24]			**15**[#10]	**0.00005**[#24]	**0.0015**[#24]		**370**[#27]									
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, San																																											
2-4m																																											
4-8m																																											
>8m																																											
NEPM 2013 Table 1C GILs, Drinking Water							**30**						**1**										**30**		**30**	**1500**	**30**		**40**	**300**							**0.07**	**0.09**	**0.01**					
PFAS NEMP 2020 Table 1 Health Recreational Water																																											
PFAS NEMP 2020 Table 5 Interim marine 95%																																											

Sample ID Location Sample Date Monitoring Round

Env Stds Comments
#1:Very High Reliability DGV may not protect key test species from chro
#2:Very High Reliability Recommended for application for slightly to mo
#3:Very High Reliability Recommended for application for slightly to mo
#4:Low Reliability Recommended for application for slightly to moderate
#5:Very High Reliability DGV may not protect key test species from chro
#6:Very High Reliability. The DGVs apply to water with salinity 25–36 ppt
#7:Moderate Reliability DGV may not protect key test species from chro
#8:Unknown Reliability Recommended for application for slightly to mo
#9:Adopted from m-Xylene
#10:Unknown Reliability
#11:Moderate Reliability DGV may not protect key test species from chr
#12:Moderate Reliability
#13:Low Reliability. Check guidelines for more details.
#14:Very Low Reliability Recommended for application for slightly to mo
#15:Moderate Reliability Recommended for application for slightly to m
#16:Unknown Reliability DGV may not protect key test species from chr
#17:Very High Reliability To account for the bioaccumulating nature of th
#18:Very High Reliability Adopted from Chromium (CrVI)
#19:Very High Reliability
#20:Low Reliability
#21:Very High Reliability To account for the bioaccumulating nature of th
#22:Very High Reliability Recommended for application for slightly to mo
#23:Moderate Reliability. Check guidelines for more details.
#24:Unknown Reliability To account for the bioaccumulating nature of th
#25:Moderate Reliability To account for the bioaccumulating nature of th
#26:Very Low Reliability
#27:Unknown Reliability Recommended for application for slightly to mo
#28:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C
#29:To obtain F2 subtract napthalene from the >C10 - C16 fraction.
#30:Values calculated using hardness of 30 mg/L CaCO3. Refer ANZECC &
#31:Trigger value adopted from Chromium VI
#32:Source: NHMRC 2019

Data Comments
#1 Quantification of linear and branched isomers has been conducted as

Table B Groundwater Analytical Results
Project Number: 62110
Project Name: St Peters

			Nitrobenzenes				Nitrotoluenes	Anilines					Organic Sulfur Compounds	Organic Alcohols	inated Hydrocar		Other		Pesticides
			1,3,5-trinitrobenzene	1,3-dinitrobenzene	Nitrobenzene	Pentachloronitrobenzene	2,4-dinitrotoluene	2-Nitroaniline	3-Nitroaniline	4-Chloroaniline	4-Nitroaniline	Aniline	Carbon disulfide	Benzyl Alcohol	Hexachlorocyclopentadiene	Hexachlorobutadiene	Low Molecular Weight PAHs	Phosalone	Chlorobenzilate
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L
EQL				0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	1	0.005	0.005	5		0.002	
ANZG (2018) Marine water 95% toxicant DGVs																			
ANZG (2018) Marine water 99% toxicant DGVs																			
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, San																			
2-4m																			
4-8m																			
>8m																			
NEPM 2013 Table 1C GILs, Drinking Water						**0.03**										**0.7**			
PFAS NEMP 2020 Table 1 Health Recreational Water																			
PFAS NEMP 2020 Table 5 Interim marine 95%																			
Sample ID	**Location**	**Sample Date**	**Monitoring Round**																
JBS-MW01	JBS-MW01	15/11/2021	JBS&G (2022)	-	-	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<1	-	<0.005	<5	-	-	-
JBS-MW02	JBS-MW02	15/11/2021	JBS&G (2022)	-	-	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	2	-	<0.005	<5	-	-	-
JBS-MW03	JBS-MW03	15/11/2021	JBS&G (2022)	-	-	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<1	-	<0.005	<5	-	-	-
JBS-MW04	JBS-MW04	15/11/2021	JBS&G (2022)	-	-	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<1	-	<0.005	<5	-	-	-
JBS-MW05	JBS-MW05	15/11/2021	JBS&G (2022)	-	-	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	2	-	<0.005	<5	-	-	-
MW01	MW01	13/07/2020	SES (2020)	<0.002	-	<0.002	<0.002	<0.004	<0.004	<0.004	<0.002	<0.002	<0.002	<5	-	<0.01	<2	<0.002	-	<0.002
MW01	MW01	15/11/2021	JBS&G (2022)	-	-	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	1	-	<0.005	<5	-	-	-
MW02	MW02	13/07/2020	SES (2020)	<0.002	-	<0.002	<0.002	<0.004	<0.004	<0.004	<0.002	<0.002	<0.002	<5	-	<0.01	<2	<0.002	-	<0.002
MW02	MW02	15/11/2021	JBS&G (2022)	-	-	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<1	-	<0.005	<5	-	-	-
QA01	MW02	15/11/2021	JBS&G (2022)	-	<0.005	<0.005	<0.005	-	<0.005	<0.005	<0.005	<0.005	<0.005	-	<0.005	<0.005	<1	-	<0.002	-
QC01	MW02	15/11/2021	JBS&G (2022)	-	-	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<1	-	<0.005	<5	-	-	-
MW03	MW03	13/07/2020	SES (2020)	<0.002	-	<0.002	<0.002	<0.004	<0.004	<0.004	<0.002	<0.002	<0.002	<5	-	<0.01	<2	<0.002	-	<0.002
FD05	MW03	13/07/2020	SES (2020)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.002	-	-
MW03	MW03	15/11/2021	JBS&G (2022)	-	-	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<1	-	<0.005	<5	-	-	-
MW04	MW04	13/07/2020	SES (2020)	<0.002	-	<0.002	<0.002	<0.004	<0.004	<0.004	<0.002	<0.002	<0.002	<5	-	<0.01	<2	<0.002	-	<0.002
MW04	MW04	15/11/2021	JBS&G (2022)	-	-	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<1	-	<0.005	<5	-	-	-
MW05	MW05	13/07/2020	SES (2020)	<0.002	-	<0.002	<0.002	<0.004	<0.004	<0.004	<0.002	<0.002	<0.002	<5	-	<0.01	<2	0.013	-	<0.002
MW05	MW05	15/11/2021	JBS&G (2022)	-	-	<0.005	<0.005	<0.005	<0.005	-	-	-	<0.005	<1	-	<0.005	<5	-	-	-

Statistical Summary

Number of Results	5	1	17	17	16	17	6	6	6	17	16	1	17	17	6	1	5	
Number of Detects	0	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	
Minimum Concentration	<0.002	<0.005	<0.002	<0.002	<0.004	<0.004	<0.004	<0.002	<0.002	<0.002	<1	<0.005	<0.005	<1	<0.002	<0.002	<0.002	
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	0.013	ND	ND	
Average Concentration	0.002		0.0041	0.0041	0.0047	0.0047	0.0042	0.0025	0.0025	0.0041	2.4		0.0065	3.9	0.0038		0.002	
Median Concentration	0.002	0.005	0.005	0.005	0.005	0.005	0.004	0.002	0.002	0.005	1	0.005	0.005	5	0.002	0.002	0.002	
Standard Deviation	0		0.0014	0.0014	0.00048	0.00047	0.00041	0.0012	0.0012	0.0014	1.9		0.0023	1.6	0.0045		0	
Number of Guideline Exceedances(Detects Only)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% of Results at or above the Detect Limit	0	0	0	0	0	0	0	0	0	0	19	0	0	0	17	0	0	
% of Results below the Detect Limit	100	100	100	100	100	100	100	100	100	100	81	100	100	100	83	100	100	
% of Detects at or above Guidelines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% of Results Below Guidelines or Non-Detect	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	

Table B Groundwater Analytical Results
Project Number: 62110
Project Name: St Peters

	Nitrobenzenes				Nitrotoluenes	Anilines					Organic Sulfur Compounds	Organic Alcohols	inated Hydrocar		Other		Pesticides
	1,3,5-trinitrobenzene	1,3-dinitrobenzene	Nitrobenzene	Pentachloronitrobenzene	2,4-dinitrotoluene	2-Nitroaniline	3-Nitroaniline	4-Chloroaniline	4-Nitroaniline	Aniline	Carbon disulfide	Benzyl Alcohol	Hexachlorocyclopentadiene	Hexachlorobutadiene	Low Molecular Weight PAHss	Phosalone	Chlorobenzilate
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	mg/L	µg/L	mg/L	mg/L	mg/L
EQL		0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	1	0.005	0.005	5		0.002	
ANZG (2018) Marine water 95% toxicant DGVs																	
ANZG (2018) Marine water 99% toxicant DGVs																	
NEPM 2013 Table 1A(4) Comm/Ind HSL D GW for Vapour Intrusion, San																	
2-4m																	
4-8m																	
>8m																	
NEPM 2013 Table 1C GILs, Drinking Water				**0.03**										**0.7**			
PFAS NEMP 2020 Table 1 Health Recreational Water																	
PFAS NEMP 2020 Table 5 Interim marine 95%																	

Sample ID Location Sample Date Monitoring Round

Env Stds Comments
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#5:Very High Reliability DGV may not protect key test species from chro
#6:Very High Reliability. The DGVs apply to water with salinity 25–36 ppt
#7:Moderate Reliability DGV may not protect key test species from chro
#8:Unknown Reliability Recommended for application for slightly to mo
#9:Adopted from m-Xylene
#10:Unknown Reliability
#11:Moderate Reliability DGV may not protect key test species from chr
#12:Moderate Reliability
#13:Low Reliability. Check guidelines for more details.
#14:Very Low Reliability Recommended for application for slightly to mo
#15:Moderate Reliability Recommended for application for slightly to m
#16:Unknown Reliability DGV may not protect key test species from chr
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#28:To obtain F1 subtract the sum of BTEX concentrations from the C6 - C
#29:To obtain F2 subtract napthalene from the >C10 - C16 fraction.
#30:Values calculated using hardness of 30 mg/L CaCO3. Refer ANZECC &
#31:Trigger value adopted from Chromium VI
#32:Source: NHMRC 2019

Data Comments
#1 Quantification of linear and branched isomers has been conducted as

Table C: Soil Vapour Analytical Results
Project Number: 62110
Project Name: St Peters Due Diligence

			TRHs (NEPC 2013)	BTEXN							Chlorinated Alkanes														
			C6-C10	Benzene	Toluene	Ethylbenzene	Xylene (o)	Xylene (m & p)	Xylene Total	Naphthalene	Epichlorohydrin	Nonane	1,1,1,2-tetrachloroethane	1,1,1-trichloroethane	1,1,2,2-tetrachloroethane	1,1,2-trichloroethane	1,1-dichloroethane	1,2,3-trichloropropane	1,2-dibromo-3-chloropropan	1,2-dichloroethane	1,2-dichloropropane	1,3-dichloropropane	2,2-dichloropropane	Bromochloromethane	Carbon tetrachloride	Trichlorofluoromethane
			mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3
EQL			8.335	0.0833335	0.0833335	0.0833335	0.8335	1.667	0.2500005	0.0833335	0.8335	0.8335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335
NEPM 2013 Table 1A(2) Comm/Ind D Soil Vap VOCC HILs														230												
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand 0-1m				4	4800	1300			840	3																
Field ID	**Sampled Date**	**Lab Report Number**																								
SV1	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
QVA02 (duplicate of SV01)	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
QVC02 (triplicate of SV01)	10/11/2021	282748-A	<8.34	<0.33	<0.83	<0.83	<0.83	<1.67	-	<0.83	<0.83	<0.83	-	-	-	-	-	-	-	<0.83	-	-	-	-	<0.83	-
SV2	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV3	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV4	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV5	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV6	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV7	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV8	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
QVA01 (duplicate of SV08)	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
QVC01 (triplicate of SV08)	10/11/2021	282748-A	<8.34	<0.33	<0.83	<0.83	<0.83	<1.67	-	<0.83	<0.83	<0.83	-	-	-	-	-	-	-	<0.83	-	-	-	-	<0.83	-
SV9	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV10	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV11	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV12	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV13	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	0.63	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV14	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV15	10/11/2021	842602	-	0.23	<0.08	0.25	-	-	0.87	0.3	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV16	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV17	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV18	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV19	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV20	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV21	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV22	10/11/2021	842602	-	0.13	<0.08	<0.08	-	-	1.02	0.25	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV23	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV24	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV25	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV26	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV27	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV28	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV29	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV30	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV31	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV33	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV35	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV36	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV37	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV38	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV39	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV40	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV41	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
SV42	10/11/2021	842602	-	<0.08	<0.08	<0.08	-	-	<0.25	0.12	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08

Table C: Soil Vapour Analytical Results
Project Number: 62110
Project Name: St Peters Due Diligence

			Chlorinated Alkenes										Solvents								MAH							
			1,1-dichloroethene	1,1-dichloropropene	2-chlorotoluene	4-chlorotoluene	cis-1,2-dichloroethene	cis-1,3-dichloropropene	Tetrachloroethene	trans-1,3-dichloropropene	Trichloroethene	Vinyl Chloride	Decane	Hexane	Cyclohexanone	Acetone	1,4-Dioxane	Ethyl Acetate	Acrylonitrile	Benzyl chloride	1,2,4-trimethylbenzene	1,3,5-trimethylbenzene	n-butylbenzene	n-propylbenzene	p-isopropyltoluene	sec-butylbenzene	Styrene	tert-butylbenzene
			mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3
EQL			0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.8335	0.8335	0.8335	0.8335	0.8335	0.8335	0.8335	0.8335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.833335	0.0833335
NEPM 2013 Table 1A(2) Comm/Ind D Soil Vap VOCC HILs							0.3		8		0.08	0.1																
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand 0-1m																												
Field ID	**Sampled Date**	**Lab Report Number**																										
SV1	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
QVA02 (duplicate of SV01)	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
QVC02 (triplicate of SV01)	10/11/2021	282748-A	-	-	-	-	-	-	<0.83	-	<0.83	-	<0.83	<0.83	<0.83	<0.83	<0.83	<0.83	<0.83	<0.83	-	-	-	-	-	-	<0.83	-
SV2	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV3	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV4	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV5	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV6	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV7	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV8	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
QVA01 (duplicate of SV08)	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
QVC01 (triplicate of SV08)	10/11/2021	282748-A	-	-	-	-	-	-	<0.83	-	<0.83	-	<0.83	<0.83	<0.83	<0.83	<0.83	<0.83	<0.83	<0.83	-	-	-	-	-	-	<0.83	-
SV9	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV10	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV11	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV12	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV13	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	0.1	<0.08	0.1	<0.08	<0.08	<0.83	<0.08
SV14	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV15	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	0.12	0.32	1.65	<0.08	0.17	<0.83	<0.08
SV16	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	0.12	3.5	<0.08	0.33	<0.83	<0.08
SV17	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV18	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV19	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV20	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV21	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV22	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	0.38	<0.08	0.083	0.4	<0.08	<0.08	<0.83	<0.08
SV23	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV24	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	0.1500003	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV25	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV26	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV27	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	0.166667	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV28	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV29	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV30	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV31	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV33	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV35	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV36	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV37	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV38	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV39	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV40	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV41	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08
SV42	10/11/2021	842602	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	-	-	-	-	-	-	-	-	<0.08	0.1	<0.08	<0.08	<0.08	<0.08	<0.83	<0.08

Table C: Soil Vapour Analytical Results
Project Number: 62110
Project Name: St Peters Due Diligence

			Miscellaneous Hydrocarbons						Chlorinated Benzenes							Trihalomethanes											
			Isopropylbenzene	1,2-dibromoethane	Cyclohexane	Dibromomethane	4-Methyl-2-pentanone	Methyl Ethyl Ketone	1,2,3-trichlorobenzene	1,2,4-trichlorobenzene	1,2-Dichlorobenzene	1,3-dichlorobenzene	1,4-dichlorobenzene	Chlorobenzene	Dibromochloromethane	Chloroform	Tribromomethane	Bromodichloromethane	2-Propanol	Hexachlorobutadiene	Ethyl acrylate	Methyl styrene (alpha)	1,2-butylacetate	Di-isobutyl Ketone	Dodecane	Propylene oxide
			mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3	mg/m3
EQL			0.0833335	0.0833335	0.8335	0.0833335	0.8335	0.8335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	0.0833335	1.66667	0.0833335	0.8335	0.8335	0.8335	0.8335	0.8335	1.667
NEPM 2013 Table 1A(2) Comm/Ind D Soil Vap VOCC HILs																										
NEPM 2013 Table 1A(5) Comm/Ind D Soil Vapour HSL for Vapour Intrusion, Sand 0-1m																										
Field ID	**Sampled Date**	**Lab Report Number**																								
SV1	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
QVA02 (duplicate of SV01)	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
QVC02 (triplicate of SV01)	10/11/2021	282748-A	<0.83	-	<0.83	-	<0.83	<0.83	-	-	-	-	-	<0.83	-	-	-	-	-	-	<0.83	<0.83	<0.83	<0.83	<0.83	<1.67
SV2	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV3	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV4	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV5	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV6	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV7	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV8	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
QVA01 (duplicate of SV08)	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
QVC01 (triplicate of SV08)	10/11/2021	282748-A	<0.83	-	<0.83	-	<0.83	<0.83	-	-	-	-	-	<0.83	-	-	-	-	-	-	<0.83	<0.83	<0.83	<0.83	<0.83	<1.67
SV9	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV10	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV11	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV12	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV13	10/11/2021	842602	0.2	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV14	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV15	10/11/2021	842602	0.68	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV16	10/11/2021	842602	2.17	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV17	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV18	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV19	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV20	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV21	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV22	10/11/2021	842602	0.37	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	0.48	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV23	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV24	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV25	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV26	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV27	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV28	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV29	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV30	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV31	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV33	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV35	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV36	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV37	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV38	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV39	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV40	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV41	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-
SV42	10/11/2021	842602	<0.08	<0.08	-	<0.08	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<1.67	<0.08	-	-	-	-	-	-

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Document Status

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2	Chris Bielby	Matthew Parkinson			19/09/2022
3	Chris Bielby	Matthew Parkinson			19/09/2022

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APPENDIX H – PROJECT TEAM SIGN OFF

Construction Environment Management Plan

Name	Responsibility	Signature
Joshua Basso	Cadet	Joshua Basso Digitally signed by Joshua Basso Date: 2023.06.08 10:30:36 +10'00'
Callum Baxter	Contract Administrator	Callum Baxter Digitally signed by Callum Baxter Date: 2023.06.08 10:35:19 +10'00'
William Picone	Project Engineer	Will Picone Digitally signed by Will Picone Date: 2023.06.08 10:53:25 +10'00'
Ben Friend	Sub-Foreman	8.6.23
Mitch Wray	Structure Foreman (Site Manager)	Mitchell Wray Digitally signed by Mitchell Wray Date: 2023.06.08 11:25:26 +10'00'
Steve O'Connor	Site Manager	8/6/23
Andrew Rigden	Project Manager	Date: 2023.06.08 10:47:57 +10'00'
Daniel Faulkner	Project Director	