HAWKESBURY CENTRE OF EXCELLENCE
[SSD-15001460]

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

16 March 2022

CONTENTS

GLOSSARY

Term	Definition
Approved disturbance area	The area identified as such on the development layout
CEMP	Construction Environmental Management Plan
Conditions of consent	Conditions contained in Schedule 2 of the Development Consent for SSD-15001460
Department	NSW Department of Planning and Environment.
EIA	Environmental impact assessment. This includes the approved documents prepared to support an application for consent or approval of a project, and any subsequent modifications to the application or proposed project, including (as relevant) further environmental impact assessments and responses to submissions.
EIS	Environmental impact statement prepared by the proponent for a state significant project application.
Environmental aspect	As defined by AS/NZS ISO 14001:2015 as an element of an organisation's activities, products or services that can interact with the environment. They can be direct or indirect.
Environmental control map or plan	A plan or map that identifies the location of physical protection measures, work method controls and monitoring requirements to minimise the impact of project activities on the environment and community in and adjoining a specific work area.
Incident	An occurrence or set of circumstances that causes, or threatens to cause, material harm and which may or may not be or cause a non-compliance.
Material harm	Harm that: • involves actual or potential harm to the health or safety of human beings or to the environment that is not trivial • Results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $10,000, (such loss includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good harm to the environment).
Minister	NSW Minister for Planning and Public Spaces (or delegate or nominee, including the Secretary of the Department of Planning and Environment)
Mitigation	Actions or measures to reduce the impacts of a project.
Non-conformance	Failure to comply with an environmental requirement, standard, or procedure.
Non-compliance	An occurrence and/or set of circumstances that breach the conditions of consent and/or any other legal requirement.
Phase	A distinct period in the project (for example construction, operation, decommissioning).
Project (or 'The Project)	The construction process required to complete the works described in the SSD 15001460 Conditions of Consent.
Proponent	The person or entity that is referred to as the proponent in an approval or the applicant in a consent or any other person carrying out any part of the development to which the approval or consent applies.
Planning Secretary	Planning Secretary under the Environmental Planning and Assessment Act 1979, or nominee. (Note references to the Planning Secretary in legislation now refer to the 'Secretary of the Department of Planning and Environment)

PMP	Project Management Plan – RCC internal project management document
RCC	Richard Crookes Constructions Pty Ltd
Stage	A discrete sequence of activities undertaken to complete one or many activities within the project scope. A project can have several stages which can extend throughout multiple phases.
SSD	State Significant Development

REVISION REGISTER

REVISION DATE	REVISION DESCRIPTION	PREPARED BY	APPROVED BY
19/11/2021	Revision 1 – MWO Submission	KT (RCC – Site Engineer)	
02/02/2022	Revision 2 – For Construction (Draft)	KT (RCC – Site Engineer)	
16/03/2022	Revision 3 – For Construction Final		

Project Stage – This CEMP in its current form is issued for Construction in order to satisfy the SSDA Conditions of Consent for COE. Staged construction is not proposed; therefore this CEMP relates to all construction works.

Project Phase – This EMP relates specifically to the Construction phase of the SSD-15001460 – Hawkesbury Centre of Excellence.

CEMP CONDITION COMPLIANCE TABLE

Each Sub-Plan will have an included Condition Compliance Table, with specific section and page number references. The below table is high level, and directs to each appendix/sub-plan.

Condition	Condition Requirements	Document/Sub-Plan Reference
B14	Prior to the commencement of construction, the Applicant must submit a Construction Environmental Management Plan (CEMP) to the Certifier and provide a copy to the Planning Secretary for information. The CEMP must include, but not be limited to, the following:	
	(a) Details of:	Section 2.4
	(i) hours of work;	
	(ii) 24-hour contact details of site manager;	
	(iii) management of dust and odour to protect the amenity of the neighbourhood;	Appendix 6.11
	(iv) external lighting in compliance with AS 4282-2019 Control of the obtrusive effects of outdoor lighting;	Appendix 6.12
	(v) community consultation and complaints handling as set out in the Community Communication Strategy required by condition B7;	Section 3 & Appendix 6.13
	(b) an unexpected finds protocol for contamination and associated communications procedure to ensure that potentially contaminated material is appropriately managed;	Appendix 6.6 & 6.7
	(c) Construction Traffic and Pedestrian Management Sub-Plan (see condition B15);	Appendix 6.8
	(d) Construction Noise and Vibration Management Sub-Plan (see condition B16);	Appendix 6.9
	(e) Construction Waste Management Sub-Plan (see condition B17);	Appendix 6.10
	(f) Construction Soil and Water Management Sub-Plan (see condition B18);	Appendix 6.11
	(g) Biodiversity Management Sub-Plan (see condition B19); and	Appendix 6.12
	(h) Flood Emergency Response (see condition B20)	Appendix 6.13
B15	B15. The Construction Traffic and Pedestrian Management Sub-Plan (CTPMSP) must be prepared to achieve the objective of ensuring safety and efficiency of the road network and address, but not be limited to, the following: (a) be prepared by a suitably qualified and experienced person(s); (b) be prepared in consultation with Council and TfNSW;	Appendix 6.8

Condition	Condition Requirements	Document/Sub-Plan Reference
	(c) detail: (i) measures to ensure road safety and network efficiency during construction in consideration of potential impacts on general traffic, cyclists and pedestrians and bus services; (ii) measures to ensure the safety of vehicles and pedestrians accessing adjoining properties where shared vehicle and pedestrian access occurs; (iii) heavy vehicle routes, access and parking arrangements; (iv) the swept path of the longest construction vehicle entering and exiting the site in association with the new work, as well as manoeuvrability through the site, in accordance with the latest version of AS 2890.2; and (v) arrangements to ensure that construction vehicles enter and leave the site in a forward direction unless in specific exceptional circumstances under the supervision of accredited traffic controller(s).	
B16	B16. The Construction Noise and Vibration Management Sub-Plan must address, but not be limited to, the following: (a) be prepared by a suitably qualified and experienced noise expert; (b) describe procedures for achieving the noise management levels in EPA's Interim Construction Noise Guideline (DECC, 2009); (c) describe the measures to be implemented to manage high noise generating works such as piling, in close proximity to sensitive receivers; (d) include strategies that have been developed with the community for managing high noise generating works; (e) describe the community consultation undertaken to develop the strategies in condition B16(d); (f) include a complaints management system that would be implemented for the duration of the construction; and (g) include a program to monitor and report on the impacts and environmental performance of the development and the effectiveness of the implemented management measures in accordance with the requirements of condition B13.	Appendix 6.9

Condition	Condition Requirements	Document/Sub-Plan Reference
B17	B17. The Construction Waste Management Sub-Plan (CWMSP) must address, but not be limited to, the procedures for the management of waste including the following: (a) the recording of quantities, classification (for materials to be removed) and validation (for materials to remain) of each type of waste generated during construction and proposed use; (b) information regarding the recycling and disposal locations; and (c) confirmation of the contamination status of the development areas of the site based on the validation results.	Appendix 6.10
B18	B18. The Applicant must prepare a Construction Soil and Water Management Sub-Plan (CSWMSP) and the plan must address, but not be limited to the following: (a) be prepared by a suitably qualified expert, in consultation with Council; (b) measures to ensure that sediment and other materials are not tracked onto the roadway by vehicles leaving the site; (c) describe all erosion and sediment controls to be implemented during construction, including as a minimum, measures in accordance with the publication Managing Urban Stormwater: Soils & Construction (4th edition, Landcom 2004) commonly referred to as the 'Blue Book'; (d) provide a plan of how all construction works will be managed in a wet-weather events (i.e. storage of equipment, stabilisation of the Site); (e) detail all off site flows from the site; and (f) describe the measures that must be implemented to manage stormwater and flood flows for small and large sized events, including, but not limited to 1 in 5-year ARI and 1 in 100-year ARI.	Appendix 6.11
B19	B19. The Biodiversity Management Sub-Plan (BMSP) must address, but not be limited to, the following: (a) be prepared by a suitably qualified and experienced person/s; (b) identify areas of land where impacts on biodiversity are to be avoided as outlined in the Biodiversity Development Assessment Report prepared by Narla Environment and dated	Appendix 6.12

Condition	Condition Requirements	Document/Sub-Plan Reference
	14 December 2021 and set out how these areas will be protected from construction impacts; and (c) set out the measures identified in the Biodiversity Development Assessment Report to minimise, mitigate and manage impacts on biodiversity, including timing and responsibility for delivery of the measures.	
B20	B20. The Flood Emergency Response Sub-Plan (FERSP) must address, but not be limited to, the following: (a) be prepared by a suitably qualified and experienced person(s); (b) address the provisions of the Floodplain Risk Management Guidelines (EESG); (c) include details of: (i) the flood emergency responses for both construction phases of the development; (ii) predicted flood levels; (iii) flood warning time and flood notification; (iv) assembly points and evacuation routes; (v) evacuation and refuge protocols; and (vi) awareness training for employees and contractors, and users/visitors.	Appendix 6.13
B21	B21. A Driver Code of Conduct must be prepared and communicated by the Applicant to heavy vehicle drivers and must address the following: (a) minimise the impacts of earthworks and construction on the local and regional road network; (b) minimise conflicts with other road users; (c) minimise road traffic noise; and (d) ensure truck drivers use specified routes.	Appendix 6.14

1. INTRODUCTION

1.1 PURPOSE AND SCOPE

This Construction Environmental Management Plan (CEMP) has been prepared by Richard Crookes Constructions Pty Ltd for the Hawkesbury Centre of Excellence (COE)

This CEMP and its sub-plans will be developed in accordance with the SSD-15001460 Conditions of Consent, Richard Crookes Constructions' environmental management systems, the relevant project approval documentation and the Environmental Management Plan Guideline: Guideline for Infrastructure Projects DPIE April 2020.

The purpose of this Construction Environmental Management Plan is to:

- Identify the environmental issues (aspects and impacts) for this project;
- Maintain Compliance with the SSDA;
- Establish, communicate & implement environmental operational controls to reduce any adverse impacts on the environment from RCC's activities, products and services.
- Implement and Monitor compliance by RCC and its suppliers & subcontractors with the requirements of all relevant environmental legislation, conditions of any applicable licence, approval and permit, regulatory requirements and this EMP.
- Action any outcomes from incidents or accidents, project audits or other identified non-conformances to continually improve the RCC environmental management system.

1.2 OBJECTIVES

The principal objectives of the CEMP are:

- Ensure that the construction works are carried out in accordance with the appropriate environmental statutory requirements
- Ensure that the works are carried out in such a way as to minimise potential environmental degradation by the implementation of environmental best practice
- Ensure that personnel engaged in the work comply with the CEMP
- Respond to changes in environmental conditions during the proposed works through review, monitoring and control programs
- Ensure corrective actions are implemented in a timely manner

This CEMP is the overarching document for environmental management of the Project, with a number of supporting management documents. It is applicable to all personnel associated with the completion of the Project works, including Project Managers, Contractors and Sub-Contractors.

1.3 ENVIRONMENTAL POLICY

Richard Crookes Constructions Pty Ltd implements an Environmental Management System that is certified by Global mark as meeting the requirements of AS/NSW ISO 14001:2016 Environmental Management Systems. RCC's Environmental Policy can be found in Appendix 6.4 of this CEMP. It is provided as an Appendix so that it may be updated in isolation as required.

This CEMP is not staged, as it applies to the entire construction phase of the Project.

2. PROJECT DESCRIPTION

2.1 PROJECT OVERVIEW

This Construction Environmental Management Plan (CEMP) has been prepared to accompany a State Significant Development Application (SSDA) for the new development of the Hawkesbury Centre of Excellence in Agricultural Education, located on Vines Drive in Richmond. The site is located on a broadacre land comprising of 8 buildings.

The works are design and construction of a new Agricultural School comprising of:

- Three academic blocks (Block B, C and D)
- Short-term dormitory site accommodation with capacity for 62 patrons (Block F)
- Dining / Conference Hall and Canteen (Block E)
- Administrative building (Block A)
- Support facilities for management and maintenance of the school.
- External works to accommodate circulation and covered walkways between buildings.
- Green house
- Various agricultural and animal plots and associated agricultural workshop

2.2 SITE LOCATION PLAN

- **Site Context – Site Location and Plan**

- **Site Context – Construction setup**

2.3 SCOPE OF WORKS

Scope of Works

This CEMP will apply to all construction activities relating to the project, including:

- Site establishment and installation of fencing and gates;
- Installation of scaffolding and hoarding
- Earthworks and site remediation
- Construct new school buildings and learning spaces
- Construct car park
- Install services and internal finishes
- Finalise external and internal works and landscape

indicative plant and equipment

- *Excavators*
- *Rollers*
- *Mobile Cranes*
- *Piling machines*
- *Trucks (deliveries, haulage etc.)*
- *Concrete trucks*
- *Concrete pumps*
- *Generators*

The above list is indicative only. All plant and equipment required to complete the Project works will be used.

2.4 TIMING OF ACTIVITIES

Hours of Work

Construction activities will be carried out in accordance with the following approved work hours in accordance with SSDA consent conditions C3 to C7:

C3. Construction, including the delivery of materials to and from the site, may only be carried out between the following hours:

(a) between 7am and 6pm, Mondays to Fridays inclusive; and
(b) between 8am and 1pm, Saturdays.
No work may be carried out on Sundays or public holidays

C4. Notwithstanding condition C4, provided noise levels do not exceed the existing background noise level plus 5dB, works may also be undertaken during the following hours:

(a) between 6pm and 7pm, Mondays to Fridays inclusive; and
(b) between 1pm and 4pm, Saturdays.

C5. Construction activities may be undertaken outside of the hours in condition C4 and C5 if required:

(a) by the Police or a public authority for the delivery of vehicles, plant or materials; or
(b) in an emergency to avoid the loss of life, damage to property or to prevent environmental harm; or
(c) where the works are inaudible at the nearest sensitive receivers; or

(d) where a variation is approved in advance in writing by the Planning Secretary or his nominee if appropriate justification is provided for the works.

C6. Notification of such construction activities as referenced in condition C6 must be given to affected residents before undertaking the activities or as soon as is practical afterwards.

C7. Rock breaking, rock hammering, sheet piling, pile driving and similar activities may only be carried out between the following hours:

(a) 9am to 12pm, Monday to Friday;
(b) 2pm to 5pm Monday to Friday; and
(c) 9am to 12pm, Saturday.

24 hour contact details:

Name	Title	Phone Number
Lucas Rielly	Site Manager	0410 521 986

3. COMMUNITY AND STAKEHOLDER ENGAGEMENT

A Community Communication Strategy will be prepared by SINSW as required by and in accordance with SSD Condition B9

This will be submitted to the Planning Secretary and will be made available on the School Infrastructure NSW website as required.

4. ENVIRONMENTAL MANAGEMENT FRAMEWORK

4.1 RELATIONSHIP TO AN EXISTING ENVIRONMENTAL MANAGEMENT SYSTEM

This CEMP is a supplementary document to RCC's Environmental Management System that is certified by Global mark as meeting the requirements of AS/NSW ISO 14001:2016 Environmental Management Systems.

RCC's Environmental Management Plan itself is included within RCC's Project Management Plan (PMP).

Some information has been copied into this CEMP for clarity, any reference in this CEMP to the PMP, QAP's or various forms is a reference to RCC's internal management system.

4.2 ENVIRONMENTAL MANAGEMENT STRUCTURE AND RESPONSIBILITIES

	Site Responsibility/Management															RCC Business Systems Management									
Project Environmental Roles & Responsibilities *Insert More Roles/Responsibilities as the Project develops*	Project Manager	Site Manager	Engineer	Contract Manager/Administrator	Design Manager	Cadet	Foreman	QA Officer /Finishes Foreman	WHS & Env Coordinator	Leading Hand	Construction worker	Subcontractors				Construction Director//Manager	Business Systems QA.ENV Manager	Human Resources Manager	WHS Manager	Rehabilitation Coordinator	Commercial Manager	External Auditors			
ENVIRONMENTAL MANAGEMENT																									
Identification of project environmental risks (aspects & impacts) and development of the EMP to document controls		•							•																
Planning & conducting training incl. inductions																	•	•	•						
Inspections, monitoring & testing		•							•								•		•						
Compliance with the EMP, corrective & preventative action		•							•								•					•			
Verification of compliance (audits) and review of system effectiveness (i.e. is it working as planned?)	•	•							•								•					•			
Incident management & emergency response		•							•								•		•						
Environmental Policy, objectives & targets		•							•							•	•								
Allocation of resources for Environmental management		•							•							•									
Compliance with legal & other requirements		•							•							•	•								
Keeping abreast of changes in legal & other requirements	•	•							•								•								
Acquire & disseminate environmental management information		•							•								•								
Develop & implement procedures		•							•								•								
Assessing suppliers/subcontractors' abilities to comply with the EMS		•							•								•								
Ensuring compliance with RCC procedures and site rules		•							•			•					•								
Monitoring or technological changes & management practices		•							•							•	•								
Liaise with regulatory authorities (Local Council, Heritage Office, DECCW etc.)	•	•							•								•								
Management of community complaints	•	•							•							•									

4.3 LEGAL AND COMPLIANCE REQUIREMENTS

Legislation	Objectives & Application	Relevance
Federal		
Environment Protection and Biodiversity Conservation Act 1999	The Environment Protection and Biodiversity Conservation Act (EPBC) 1999 aims to: • Provide for the protection of the environment, especially matters of national environmental significance • Conserve Australia's biodiversity • Protect biodiversity internationally by controlling the international movement of wildlife • Provide a streamlined environmental assessment and approvals process where matters of national environmental significance are involved • Protect our world and national heritage • Promote ecologically sustainable development.	The Project has a consent requirement to purchase biodiversity offset credits, see Conditions B27, B28 & B29
Aboriginal and Torres Strait Islander Heritage Protection Act 1984	The purposes of this Act are the preservation and protection from injury or desecration of areas and objects in Australia and in Australian waters, being areas and objects that are of particular significance to Aboriginals in accordance with Aboriginal tradition.	This Act is applicable to the Project in the event of an Unexpected Find of an Aboriginal object.
National Environmental Protection Council Act 1994	The object of this Act is to ensure that, by means of the establishment and operation of the National Environment Protection Council: • People enjoy the benefit of equivalent protection from air, water, or soil pollution and from noise, wherever they live in Australia; and • Decisions of the business community are not distorted, and markets are not fragmented, by variations between participating jurisdictions in relation to the adoption or implementation of major environment protection measures.	The Council may make national environment protection measures that will influence the completion of the Project. See Act for further detail.

Legislation	Objectives & Application	Relevance
Federal		
National environmental Protection measures (Implementation) Act 1998	The objects of this Act are: • to make provision for the implementation of national environment protection measures in respect of certain activities carried on by or on behalf of the Commonwealth and Commonwealth authorities; and • to protect, restore and enhance the quality of the environment in Australia, having regard to the need to maintain ecologically sustainable development; and • to ensure that the community has access to relevant and meaningful information about pollution.	Under this Act, the Environment Minister may (subject to considerations of national interest or administrative efficiency): • Apply State laws to the activities of the Commonwealth or Commonwealth authorities in Commonwealth places • Apply State or Territory laws to the activities of the Commonwealth or Commonwealth authorities in other places.
NTC Brochure: Load Restraint Guide 2004	The Load Restraint Guide 2018 provides truck drivers, operators, and everyone in the transport chain of responsibility with basic safety principles for the safe carriage of loads.	All drivers (where relevant) must follow this guide when transporting goods to and from the Project.

Legislation	Objectives & Application	Relevance
State		
Waste Avoidance and Resource Recovery Act 2001	The objects of this Act are as follows: • To encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of • ecologically sustainable development, • To ensure that resource management options are considered against a hierarchy of the following order: (i) Avoidance of unnecessary resource consumption, (ii) Resource recovery (including reuse, reprocessing, recycling and energy recovery), (iii) Disposal, • To provide for the continual reduction in waste generation, • To minimise the consumption of natural resources and the final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste, • To ensure that industry shares with the community the responsibility for reducing and dealing with waste, • To ensure the efficient funding of waste and resource management planning, programs and service delivery, • To achieve integrated waste and resource management planning, programs and service delivery on a State-wide basis, • To assist in the achievement of the objectives of the Protection of the Environment Operations Act 1997.	Waste Avoidance and Resource Recovery Act 2001 Establishes the waste hierarchy. Promotes waste avoidance and resource recovery by developing waste avoidance and resource recovery strategies. Provides requirements for waste avoidance and resource recovery

Legislation	Objectives & Application	Relevance
State		
State Environmental Planning Policy No 55 - Remediation of Land	The object of this Policy is; • To provide for a State-wide planning approach to the remediation of contaminated land. In particular, this Policy aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment: • By specifying when consent is required, and when it is not required, for a remediation work, and • By specifying certain considerations that are relevant in rezoning land and in determining development applications in general and development applications for consent to carry out a remediation work in particular, and • By requiring that a remediation work meet certain standards and notification requirements.	The site is to be remediated in accordance with State Environmental Planning Policy 55 – Remediation of Land (SEPP 55).

Legislation	Objectives & Application	Relevance
State		
Protection of the Environmental Operations Act 1997	An Act to protect, restore and enhance the environment in NSW and to promote public access to information and involvement in environment protection. The Act: - Designates the EPA (Environment Protection Authority) as the regulatory authority. See epa.nsw.gov.au for further information. Objectives of the Act are: • To protect, restore and enhance the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development, • To provide increased opportunities for public involvement and participation in environment protection, • To ensure that the community has access to relevant and meaningful information about pollution, • To reduce risks to human health and prevent the degradation of the environment by the use of mechanisms that promote the following: • Pollution prevention and cleaner production, • The reduction to harmless levels of the discharge of substances likely to cause harm to the environment, • The elimination of harmful wastes, • The reduction in the use of materials and the re-use, recovery or recycling of materials, • The making of progressive environmental improvements, including the reduction of pollution at source, • The monitoring and reporting of environmental quality on a regular basis, • To rationalise, simplify and strengthen the regulatory framework for environment protection, • To improve the efficiency of administration of the environment protection legislation, • To assist in the achievement of the objectives of the Waste Avoidance and Resource Recovery Act 2001.	There is a duty to report pollution incidents under section 148 of the Protection of the Environment Operations Act 1997 (POEO Act). Schedule 1 of the POEO defines activities that require an Environmental Protection Licence. The POEO Act Classifies Environmental Offences and Penalties.

Legislation	Objectives & Application	Relevance
State		
Protection of the Environment Operations (Noise Control) Regulation 2017	The object of this Regulation is to repeal and remake, with minor amendments, the provisions of the Protection of the Environment Operations (Noise Control) Regulation 2000. This Regulation creates offences (maximum penalty $11,000 for corporations and $5,500 for individuals) for selling or driving a vehicle with a temporary noise reduction device or with temporary noise reduction packing or for modifying or repairing a vehicle so as to include any such device or packing. A person is not guilty of any such offence if the conduct alleged to give rise to the offence occurs within 6 months after the commencement of this Regulation. This Regulation also makes provision with respect to the following: a) the selling or using of certain classes of motor vehicles and motor vehicle accessories that are capable of emitting noise levels above a prescribed level, b) the use of motor vehicle horns and motor vehicle intruder alarms, c) the times during which it is not permissible to use certain motor vehicles if they emit noise that can be heard in other residential premises, d) the sounding of sirens and similar devices and the use of sound systems on vessels, e) the emission of noise from the engines or exhausts of motor vehicles and vessels, f) the maintenance of noise control equipment on motor vehicles and vessels, g) the issue of defective vehicle notices and defective vessel notices, h) the prohibition on selling certain articles that are capable of emitting noise levels above a prescribed level, i) the obligation to label certain articles, j) the times during which it is not permissible to use certain articles (including musical instruments) if they emit noise that can be heard in any residential premises, k) the inspection and testing procedures for the purpose of determining noise emission levels of certain motor vehicles, motor vehicle accessories, vessels, articles or equipment. See epa.nsw.gov.au for further information.	Equipment used during the Project construction works must be in compliance with this regulation.

Legislation	Objectives & Application	Relevance
State		
Protection of the Environment Operations (Waste) Regulation 2014	The Waste Regulation improves the EPA's ability to protect human health and the environment, and paves the way for a modern and fair waste industry in NSW. See epa.nsw.gov.au for further information.	Construction waste must be managed in accordance with this regulation.
Protection of the Environment Operations (Clean air) Regulations 2010	This Regulation: • Provides for the certification of domestic solid fuel heaters; • Controls burning generally by imposing an obligation to prevent or minimise emissions, by prohibiting the burning of certain articles and requiring approval for certain fires/incinerators; • Requires the fitting of anti-pollution devices to certain motor vehicles and prescribes an offence of emitting excessive air impurities; • Imposes certain requirements and standards on the supply of petrol; • Prescribes standards for certain groups of plant and premises to regulate industry's air impurity emissions; and • Imposes requirements on the control, storage and transport of volatile organic liquids. See epa.nsw.gov.au for further information.	The construction works associated with the project must be conducted in such a way that does not contravene this regulation. Regulates atmospheric pollutants including dust and odour onsite

Legislation	Objectives & Application	Relevance
State		
Crown Lands Act 2016	For the purposes of this Act, the principles of Crown land management are— (a) that environmental protection principles be observed in relation to the management and administration of Crown land; (b) that the natural resources of Crown land (including water, soil, flora, fauna and scenic quality) be conserved wherever possible; (c) that public use and enjoyment of appropriate Crown land be encouraged; (d) that, where appropriate, multiple use of Crown land be encouraged; (e) that, where appropriate, Crown land should be used and managed in such a way that both the land and its resources are sustained in perpetuity; and (f) that Crown land be occupied, used, sold, leased, licensed or otherwise dealt with in the best interests of the State consistent with the above principles.	The Project site is Crown Land, which influences the management of works, certification, and applicability of legislation.
Fire Brigades Act 1989	This Act applies to; • Land-based hazardous material incidents (and to any fires that may result from them) that occur anywhere in the State except on State waters, as defined in the Marine Pollution Act 2012. • A hazardous material incident that occurs in or on a building, bridge or other structure or on any body of water (not being part of State waters) is taken to be land-based.	Applies to emergency incidents and accidents involving hazardous materials
Local Government Act 1993	The purposes of this Act are as follows: • To provide the legal framework for an effective, efficient, environmentally responsible and open system of local government in New South Wales, • To regulate the relationships between the people and bodies comprising the system of local government in New South Wales, • To encourage and assist the effective participation of local communities in the affairs of local government,	Referenced and assessed during Approval Process

Legislation	Objectives & Application	Relevance
State		
Contaminated Land Management Act 1997	Objects of this Act: • The general object of this Act is to establish a process for investigating and (where appropriate) remediating land that the EPA considers to be contaminated significantly enough to require regulation under Division 2 of Part 3. • Particular objects of this Act are: • To set out accountabilities for managing contamination if the EPA considers the contamination is significant enough to require regulation under Division 2 of Part 3, and • To set out the role of the EPA in the assessment of contamination and the supervision of the investigation and management of contaminated sites, and • To provide for the accreditation of site auditors of contaminated land to ensure appropriate standards of auditing in the management of contaminated land, and • To ensure that contaminated land is managed with regard to the principles of ecologically sustainable development	Contamination on site must be assessed and managed in accordance with this act

Legislation	Objectives & Application	Relevance
State		
Environmental Planning and Assessment Act 1979	The objectives of this Act are to encourage: • The proper management, development, and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment, • The promotion and co-ordination of the orderly and economic use and development of land, • The protection, provision and co-ordination of communication and utility services, • The provision of land for public purposes, • The provision and co-ordination of community services and facilities, and • The protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and • Ecologically sustainable development, and • The provision and maintenance of affordable housing, and to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and • To provide increased opportunity for public involvement and participation in environmental planning and assessment.	Planning approval for the project is regulated by the DPE under the Environmental Planning and Assessment Act 1979.

4.4 TRAINING AND AWARENESS

Project specific environmental training and awareness will be conducted/enforced throughout the duration of construction. The key avenues for the implementation of this training and awareness are **Site Inductions**, **Toolbox Talks**, **Pre-Start Meetings** and **General Awareness** measures.

Additional training may be conducted on an as-required basis as the works progress.

Site Inductions

All workers will complete a Project specific induction prior to accessing site/commencing works. In addition to the compulsory WHS information, this induction will provide all construction personnel with site specific environmental training. The training will include environmental concerns, management measures and other protocols in place to satisfy the Conditions of Consent and other environmental obligations.

Toolbox Talks

Tool box talks will be conducted regularly by RCC and sub-contractors, to address specific WHS and environmental concerns. These toolbox talks will address specific activities, the hazards associated with them, and the management measures required to be put in place to maintain compliance and minimise/eliminate environmental harm.

Examples of specific environmental issues that will be addressed in tool box talks include:

- Erosion and sediment control
- Hours of work
- Emergency and spill response
- Noise
- Housekeeping and waste
- Dust control
- Construction traffic management

Tool box talk attendance is mandatory and all those in attendance will be required to sign in to the discussion and outcomes on an attendance form. RCC will maintain records of all Toolbox talks.

Pre-Start Meetings

Pre-start meetings are a daily training and awareness protocol that will be implemented to inform the daily activities of the construction workforce.

The upcoming construction activities will be reviewed daily, and prior to the day commencing, the pre-start meeting will review and inform the required WHS practices, environmental management measures, work area hazards and other task specific concerns.

The pre-start meeting will be conducted by an RCC representative responsible for the work area that is being discussed. Sub-contractors will be encouraged to share and discuss WHS and environmental concerns in relation to their specific works for that day.

Attendance is mandatory and all in attendance will be required to sign into the discussion and outcomes on an attendance form. RCC will maintain records of all pre-start topics, dates and attendees.

General Awareness Training

General awareness of environmental obligations, risks and management measures will be enforced through site notice boards, posters, environmental bulletins and sub-contractor engagement (i.e. contractual) information packages.

4.5 ENVIRONMENTAL RISK MATRIX/ASSESSMENT

A copy of the Environmental Risk Matrix/Assessment has been included as an appendix to this CEMP. This is a live document that will be continuously revised as the Project progresses.

It will be supplementary to a monthly High Risk Project Assessment, that will be completed and provided to all construction workers.

4.6 HOLD POINTS

Other than the specific requirements of the SSD-15001460 Conditions of Consent, there are no additional hold points applicable to the construction works of the Project.

The key hold points from the consent are:

- Unexpected Finds Procedure for contamination.
- Unexpected Finds procedure for Aboriginal Heritage.
- Unexpected Finds procedure for Non-Aboriginal Heritage.

Specific unexpected finds protocols for these hold points have been completed and are supplied with this CEMP as required by the Conditions of Consent.

4.7 ENVIRONMENTAL MANAGEMENT MEASURES, INSPECTIONS AND MONITORING

The following table outlines the environmental management measures, inspection and monitoring process that will be followed as part of RCC's existing Environmental Management System.

This is a live document that will be continuously updated as required throughout the duration of construction works.

Environmental Aspect		Environmental Actions, Controls and Criteria	Operational Controls				Effectiveness of Controls			Checking, Corrective & Preventative Action		Resp.
1	Dust Generation Particulate Emissions (General)	• Install shade cloth on perimeter fencing • Vehicle corridors will be clearly identified and restricted to control vehicle access onsite. • Limit vehicle speed onsite to 20km/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)	✓	✓	✓		Daily	Weekly		As required		SS
1	Dust Generation (Demolition)	Breakers and crushing equipment to be fitted with dust filtration equipment or water sprays to control dust emissions.			✓		Daily	Weekly during works	✓	As required		SS
1	Dust Generation (Construction)	• Minimise areas of site disturbed, and stage works where possible. • Dust suppression strategies to be used, i.e., water sprays, soil binders, hydro mulching, controlled speed onsite, road base + shaker grids. • Stockpiled topsoils and rubble will be restricted to 4m high. Stabilise if in-situ for >4-6months. On site drilling or coring operations will be undertaken by equipment fitted with air filtration equipment.	✓	✓			Daily	Weekly		As required		SS
2	Odour	• If odorous materials uncovered, recover immediately. • Seek advice from consultant regarding soil /materials management.		✓		✓	Daily	Weekly		As required		SS
3	Greenhouse	• Ensure purchased electrical products/whitegoods products comply with specification for CFCS & energy ratings • Low solvent paints to be used as a priority • Building to conform to AGBR or Green Star performance criteria • Deliveries / transport from site effectively planned to limit inefficient transport, assist back loading etc		✓						As required	✓	CA SS

Environmental Aspect		Environmental Actions, Controls and Criteria	Operational Controls				Effectiveness of Controls			Checking, Corrective & Preventative Action		Resp.
4	Stormwater (Discharge from sedimentation basins, flooding)	• Water quality to meet ANZECC Water Quality Guidelines. → Conduct water quality test (external test company) NTU and TSS to determine the best treatment and acceptable levels – (Generally) 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.	✓	EP-001		✓	Daily during discharge	Weekly		As required	✓	SS
5	Adjoining waterways (dewatering, soil erosion & runoff)	• 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. • Concrete Bunded washouts plastic lined • Inspect at least weekly & after rainfall.		EP-001		✓	Daily during discharge	Weekly		As required	✓	SS
5	Adjoining waterways (dewatering, soil erosion & runoff)	• Maintain and/or replace as required. • Refer NSW Department of Housing's Managing Urban Stormwater (2004). • Street sweepers will be employed on regular basis.										
6	Sewer (Trade waste)	• No paints or other chemical to be poured down drains. • If required, obtain trade waste licence for discharge or local council approval.		EP-001		✓				As required	✓	SS
7	Land (Acid sulphate soils, contaminated soils, imported fill)	• Stop work if unexpected potentially contaminated soils are encountered. • Obtain waste classification from consultant in accordance with EPA guidelines Environmental Guidelines: Assessment, Classification & Management of Liquid & Non-Liquid Wastes (June 2004) www.environment.nsw.gov.au/waste/envguidlns/index.htm.	✓		✓	✓	Daily	Weekly	✓	As required	✓	SS

Environmental Aspect		Environmental Actions, Controls and Criteria	Operational Controls				Effectiveness of Controls			Checking, Corrective & Preventative Action		Resp.
		• Where required a Remediation Action Plan will be developed and implemented. • Sign off by Site Auditor may be required to validate clean-up. • 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.	✓	EP-002	✓	✓	Daily	Weekly	✓	As required	✓	SS
7	Land	• 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 25.08 - Product Identification & Traceability. • Mark up locations where fill compacted in site plan. Survey if required.										
8	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.		✓		✓					✓	PM
9	Noise	• Refer to SSD for noise restrictions and working hours. Approved working hours are reflected in Section 2.4. • 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.	✓		✓	✓	Daily	Weekly	✓	As required	✓	SS

Environmental Aspect		Environmental Actions, Controls and Criteria	Operational Controls				Effectiveness of Controls			Checking, Corrective & Preventative Action		Resp.
10	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.	✓		✓	✓	Daily	Weekly	✓	As required	✓	SS
11	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.	✓				Daily	Weekly		As required		PM SS
12	Flora	• Review planning documentation to determine the presence of any protected, threatened or significant flora. Obtain approvals as required. • Engage arborist to develop tree management plan or refer DA and arborist reports. • Education and training at site toolbox meetings and induction. • Report all sightings to the site manager. • 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.	✓	✓		✓	Daily	Weekly		As required	✓	SS
13	Fauna	• 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	✓	✓		✓	Daily	Weekly	✓	As required	✓	SS

Environmental Aspect		Environmental Actions, Controls and Criteria	Operational Controls				Effectiveness of Controls			Checking, Corrective & Preventative Action		Resp.
14 15	Waste Litter	• Hazardous materials surveys to be completed. • Materials to be removed prior to demolition • Registers and waste disposal requirements as per Work Cover and 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.	✓	EP-002	✓	✓	Daily	Weekly	✓	As required	✓	SS
16	Landfilling	• Reduce, reuse and then dispose • Landfill space scare leading to increased tipping costs • 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 consultant's advice. • Consideration should be given to chipping of the vegetation and reuse • Reuse packaging to protect works		EP-002			Daily	Weekly		As required	✓	SS

Environmental Aspect		Environmental Actions, Controls and Criteria	Operational Controls				Effectiveness of Controls			Checking, Corrective & Preventative Action		Resp.
17	Chemicals	• 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, 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 workover Code of Practice 2005– refer p. 86 • EPA requirements http://www.environment.nsw.gov.au/mao/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.	✓	EP-002 EP-005 EP-006	✓		Daily	Weekly	✓	As required		SS
	Chemicals	• 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 Site supervisor prior to a chemical being received on site and by subcontractors using chemicals/products.	✓	EP-002 EP-005 EP-006	✓		Daily	Weekly	✓	As required		SS

Environmental Aspect		Environmental Actions, Controls and Criteria	Operational Controls				Effectiveness of Controls			Checking, Corrective & Preventative Action		Resp.
18	Traffic	• 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. • All loads of soil, demolition wastes, general wastes etc are to be tarped.	✓	TMPs		✓	Daily	Weekly		As required		SS
19	Aboriginal heritage	• 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 NSW Heritage Office. • 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.	✓	✓		✓	Daily	Weekly		As required	✓	SS
20	European heritage	• Education and training at site toolbox meetings and induction. • It is illegal to destroy heritage items. • Check the Aboriginal Heritage Information Management System (AHIMS). • Also check the register of the National Estate. • Obtain approval from NPWS (Section 90 consent).	✓	✓		✓	Daily	Weekly		As required	✓	SS

Environmental Aspect		Environmental Actions, Controls and Criteria	Operational Controls				Effectiveness of Controls			Checking, Corrective & Preventative Action		Resp.
21	Emergency Preparedness:	• Spill kit onsite. • Refer to the MSDS for advice and procedures. • All spills must be reported to the FM & cleaned up. Complete RCC Accident /Incident report. • Sed 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.	✓	✓			Daily	Weekly		As required		SS

4.8 ENVIRONMENTAL CONTROL MAPS OR PLANS

The environmental control maps and/or plans that are relevant to the Project construction works are:

- Site context plans provided within this CEMP.
- Tree protection zones, shown within the arborist report.
- Sensitive receivers relating to the noise and vibration impacts of the construction works, presented in the Construction Noise & Vibration Management Sub-Plan.
- Erosion and sediment control measures, shown on the erosion and sediment control plans within the Construction Soil & Water Management Sub-Plan.

4.9 ENVIRONMENTAL MANAGEMENT DOCUMENTS

The environmental management documents that will be implemented as part of the environmental management system include:

- Environmental Site Inspection Checklist
- Complaints Register
- Hazardous substances register
- Waste register
- High Risk Works Project Assessment
- Asbestos (Hazmat) Register
- Imported/Exported Materials Register
- Sub-Contractor high risk safe work method statement (where environmental risks are present)

4.10 COMPLIANCE MONITORING AND REPORTING

As this EMP is a CEMP, and only applicable to the construction phase of the development, the post approval compliance monitoring and reporting requirements (which apply to operation/occupation) do not apply.

4.11 ENVIRONMENTAL AUDITING

This development will be audited in accordance with the Department's Independent Audit Post Approval Requirements.

4.12 ENVIRONMENTAL INCIDENT AND EMERGENCY PLANNING, PREPAREDNESS AND RESPONSE

Project Personnel Responsible for Managing Environmental Incidents and Emergencies

- Project Manager

- Site Manager
- WHS&E Manager
- Business Systems & Environmental Manager

Contact Details for Emergency Services (ambulance, fire brigade, police, spill clean-up services and others if relevant)

ORGANISATION	NAME	PHONE (W)	PHONE (M)
WorkCover	-	Hotline for incident reporting 13 10 50	
Fire Brigade/HAZMAT	Emergency	000	
Police	Emergency	000	
Environment Protection Authority (EPA)	-	02 9211 4723 Head Office 02 9995 5000 Parramatta	After Hours Pollution line 131 555
SSD – Dept of Planning Compliance contact	-	1300 482 651	

Location of On-Site information on hazardous materials, including safety data sheets and spill containment materials

Information on hazardous materials, including safety data sheets and spill containment materials will be located in or adjacent to the project first aid shed. This will be located in the location deemed most suitable for the progress/status of works at any time.

4.13 CORRECTIVE AND PREVENTATIVE ACTIONS

incident management and reporting

Incident reporting and Investigation refer to internal management system.

Definitions:

Class 1: Dangerous occurrence, or actual harm to an ecosystem, property loss or clean up exceeds $10,000 (as prescribed in 2.1.) Class 1 incidents and some cases Class 2 (as determined by senior management) will be investigated, as directed by BS Environmental Manager, WHS Head of Safety and/or where required initiate the RCC Business Continuity Plan

Form 03 0 Investigation Report will be completed by the BS Environmental Manager or Senior Safety Advisors and the original forwarded to the Project Manager and reviewed by the BS Environmental Manager WHS Head of Safety and reported to Senior management and Executives/Board.

Class 2: Major Leak, spill or escape off site of liquids, near miss/dangerous occurrence i.e. plant/equip damage, disruption to services. Note: Some Class 2 will be investigated at the discretion of the BSM / WHS Head of Safety

Class 3: Minor Leak, spill or escape off site of liquids all less than >10lts, Dust, Vibration

The Site Manager/Supervisor will ensure that all Class 2 and Class 3 incidents in or around the site, involving RCC personnel, subcontractors, visitors or passers-by, external authorities, Unions etc. are reported regardless of how minor they appear at the time of the occurrence.

Duty to Notify Environment Protection Authority (EPA) of Pollution Incident – notifiable incident

Pollution Incident means an incident or set of circumstances during or as a consequence of which there is or is likely to be a leak, spill or other escape or deposit of a substance, as a result of which pollution has occurred, is occurring or is likely to occur. It includes an incident or set of circumstances in which a substance has been placed or disposed on the premises, but it does not include an incident or set of circumstances involving only the emission of noise.

Incidents that require a (Duty to Notify) to the regulatory authorities EPA Pollution line (phone 131 555) under section 148 of the Protection of the Environmental Operations Act 1997 (POEO Act) are:

- If the actual or potential harm to the health or safety of human beings or ecosystems is not trivial,
- If actual or potential loss or property damage (including clean-up costs) associated with a pollution incident may exceed $10,000

  For all Notifiable Incidents, the following activities should be undertaken:

- The incident site must not be disturbed until an inspector arrives at the scene or directs otherwise, this may include plant, substance, structure or thing associated with the incident. The person with management or control of the workplace is responsible for preserving the incident site, so far as reasonably practicable
- The incident site will be preserved unless it prevents any action needed to:
  - minimise the risk of further notifiable incident
  - facilitate a EPA investigation

For Regulator "reportable incidents", the Supervisor will notify the Project Manager, Business Systems Environmental Manager and or WHS Head of Safety to seek advice, then immediately prepare the submission of Notification to the regulator and in accordance with the consent conditions.

Business Systems Environmental Manager and or WHS Head of Safety will confirm and organise legal representation to assist in the preparation of the reports and initiate the RCC Business Continuity Plan

In some contracts it is a requirement to notify the Client's Representative immediately e.g. GC21 Contracts and relevant DPIE SSD reportable incidents as per the consent conditions.

Incident debrief / closure

Where an investigation is undertaken and it is determined that an "incident debrief " is to be carried out using Form 04.10, the Incident debrief will be distributed to all relevant stakeholders and Senior / Executive Management.

Outcomes of Investigations / findings may initiate an internal Alert for distribution.

Non Conformance

In the event of breach in the requirements of the EMP, such as:

- Non compliance with the RCC/ subcontractors SWMS or other environmental procedures;
- Non complying activities noted during site inspections (high risk or potential for legal breach);

- Following concerns regarding potential breaches in environmental legislation raised by RCC, the client or other stakeholders such as local council or the EPA;
- Changes to the RCC system or subcontractors procedures, as a result of corrective or preventative action following and environmental incident, inspection or external audit.

Form 31.1 – Non Conformance Report or via Aconex will be completed and issued to the offending party.

Non Conformances will be registered in Form 31.2 Non Conformance Report Register or on soft copy.

A copy of the Non Conformance Notice will be forwarded to the Project Manager and the subcontractor, who will implement appropriate corrective action.

Additionally Contractors Notices or Main Contractor Notices may be issued in certain circumstances, as described in Section 2 of the PMP.

5. CEMP REVIEW AND REVISION PROCESS

To ensure this CEMP remains current and relevant to the project, it will be reviewed & updated in accordance with Conditions A31 and A32 of the **SSD-15001460 Conditions of Consent**.

Conditions A31 and A32 are shown below:

A31. Within three months of:
a) The submission of a compliance report under condition A34;
b) The submission of an incident report under condition A27;
c) The submission of an Independent Audit under condition C42 or C43;
d) The approval of any modification of the conditions of this consent; or
e) The issue of a direction of the Planning Secretary under condition A2 which requires a review,
The strategies, plans and programs required under this consent must be reviewed, and the Planning Secretary and the Certifier must be notified in writing that a review is being carried out.
A32. If necessary to either improve the environmental performance of the development, cater for a modification or comply with a direction, the strategies, plans, programs or drawings required under this consent must be revised, to the satisfaction of the Planning Secretary or Certifier (where previously approved by the Certifier). Where revisions are required, the revised document must be submitted to the Planning Secretary and / or Certifier for approval and / or information (where relevant) within six weeks of the review.
Note: This is to ensure strategies, plans and programs are updated on a regular basis and to incorporate any recommended measures to improve the environmental performance of the development.

Where a review is required, the **CEMP Review Checklist (provided overleaf)** will be used. This will determine why a review is required, who needs to be involved in the review, if revision is required as a result of the review, and what the revision is, if required.

If this CEMP is revised, it will be submitted to the Department (and/or other party as required by the conditions of consent) for assessment and approval in accordance with the requirements of the relevant conditions of consent and the review process that was documented and approved in the earlier version/s.

The revised version of the revised EMP will be provided to the Department, and accompanied by information that identifies:

- what has changed and why it has been changed
- the proposed timeframe to implement the change.

A brief summary of the changes made and the circumstance/s that triggered the review and revision will also be included in the version control information.

Complete this checklist if a review of this CEMP or its sub-plans is triggered (see section 5 for applicable triggers).

CEMP Review Checklist		
	Person Completing Checklist:	**Date:**
1	Why is a review required? *Outline what has triggered the review. Use the triggers from Condition A29 & A30 of the SSD Consent.*	
2	What sections of the CEMP and/or Sub-Plans require a review? *List all that apply.*	
3	Notify the Planning Secretary that a review is being carried out, with a description of the extent of the review. *Provide evidence of notification.*	
4	Who is required to be involved in the review? *Identify the relevant consultants, project staff and/or authorities who may need to be involved in the review.*	
5	Conduct review. Do the CEMP sections and/or Sub-Plans being reviewed still address the specific requirements of the development? **If Yes**, no revision is required. State why no revision is required and file a completed copy of this checklist for reference. No further action is required. **If no**, revision is required. Go to step 6. *Note – if a review has been triggered, the specific trigger will generally highlight what information in the CEMP or it's Sub-Plans is not adequately addressing the specific requirements of the development.*	
6	Revise CEMP and/or relevant Sub-Plans. Engage with relevant stakeholders where required. Consult with relevant parties about revision where required.	

CEMP Review Checklist		
7	Issue updated CEMP and/or Sub-Plans to the Planning Secretary (and/or other party as required by the conditions of consent) for assessment and approval (if approval is required).	
8	Provide a summary that identifies: - What has changed and why it has been changed - The proposed timeframe to implement the change	
9	Ensure revision information and the circumstances that triggered the review is included in the version control information of the revised document.	

6. APPENDICES

6.1 EMP PREPARATION CHECKLIST

Requirement	Plan Reference	Yes/No/Not Applicable
Document preparation and endorsement		
Has the EMP been prepared in consultation with all relevant stakeholders as per the requirements of the conditions of consent? (Section 4.1)	Appendix 6.2	Yes
Have the views of the relevant stakeholders been taken into consideration? Have appropriate amendments been made to the EMP and does the EMP clearly identify the location of any changes? (Section 4.1)	Throughout, Sub-Plans.	Yes
Has the EMP been internally approved by an authorised representative of the proponent or contractor? (Section 4.2)	Revision Register, Page 5	Yes
Version and content		
Does the EMP describe the proponent's Environmental Management System (EMS) (if any), and identify how the EMP relates to other documents required by the conditions of consent? (Section 3.5.1)	Section 4.1	Yes
Does the EMP include the required general content and version control information? (Section 3.1)	Pages 2-5	Yes
Does the EMP have an introduction that describes the project, scope of works, site location and any staging or timing considerations? (Section 3.2)	Section 1 & Section 2	Yes
Does the EMP reference the project description? (Section 3.3)	Section 2, Page 12	Yes
Does the EMP reference a Community and Stakeholder Engagement Plan (or similar) or include community and stakeholder engagement actions (if required)? (Section 3.4)	Section 3	Yes
Have all other relevant approvals been identified? Has appropriate information been provided regarding how each approval is relevant? (Section 4)	N/A	N/A
Has the environmental management structure and responsibilities been included? (Section 3.5.2)	Section 4	Yes
Does the EMP include processes for training of project personnel and identify how training and awareness needs will be identified? (Section 3.5.3)	Section 4.4	Yes

Does the EMP clearly identify the relevant legal and compliance requirements that relate to the EMP? (Section 3.5.3)	Section 4.3	Yes
Does the EMP include all the conditions of consent to be addressed by the EMP and identify where in the EMP each requirement has been addressed? (Section 3.5.13)	CEMP Condition Compliance Table, Pages 6-9	Yes
Have all relevant guidelines, policies and standards been identified, including details of how they are relevant? (Section 3.5)	N/A	N/A
Is the process that will be adopted to identify and analyse the environmental risks included? (Section 3.5.5)	Appendix 6.3	Yes
Have all the environmental management measures in the EIA been directly reproduced into the EMP? (Section 3.5.7)	Throughout, Sub-Plans	Yes
Have any additional environmental management measures been included in the EMP? (Section 3.5.7)	N/A	N/A

6.2 RECORD OF CONSULTATION

CEMP Consultation Requirements		
#	Condition	Location
B15	The Construction Traffic and Pedestrian Management Sub-Plan (CTPMSP) must be prepared to achieve the objective of ensuring safety and efficiency of the road network and address, but not be limited to, the following: (b) be prepared in consultation with Council and TfNSW;	A Sub-Plan specific consultation summary for Condition B15 has been prepared and provided with the Construction Traffic and Pedestrian Management Sub-Plan. See Appendix 6.8.
B16	The Construction Noise and Vibration Management Sub-Plan must address, but not be limited to, the following: (d) include strategies that have been developed with the community for managing high noise generating works; (e) describe the community consultation undertaken to develop the strategies in condition B14(d);	A CCS in accordance with Condition B9 has been prepared and provided with the Construction Noise and Vibration Management Sub-Plan. See Appendix 6.9.
B18	The Applicant must prepare a Construction Soil and Water Management Sub-Plan (CSWMSP) and the plan must address, but not be limited to the following: (a) be prepared by a suitably qualified expert, in consultation with Council;	A Sub-Plan specific consultation summary for Condition B18 has been prepared and provided with the Construction Soil and Water Management Sub-Plan. See Appendix 6.11.

6.3 PROJECT ENVIRONMENTAL RISK MATRIX/ASSESSMENT

The Project Environmental Risk Matrix/Assessment is not embedded in this document; it is provided as an attached appendix so that it can be displayed/updated/revised in isolation if required.

RICHARD CROOKES CONSTRUCTIONS

Appendix 1 Environmental Risk Matrix Construction

Project: HCoE

Developed by:

RCC Objectives and Targets / KPIs:
<3 Environmental Notices issued by EPA or Local Council annually
Action community complaints within 24 hours, no repeat complaints for same issue
Investigate non effective operational controls / environmental incidents and report

RICHARD CROOKES CONSTRUCTIONS

Environmental Aspect - also consider if any legislation applies to activity or environmental aspect. See Intranet Legal and Other Requirements Table

Activity, Product or Service Strike out non relevant items	Assessment of Significant Environmental Impact (no controls)	1 dust	2 odour	3 greenhouse	4 stormwater	5 Adjoining waterways	6 sewer	7 land	8 resources/ water	9 resources/ materials	10 resources/ energy	11 noise	12 vibration	13 community concerns	14 flora	15 fauna	16 waste / chemcials	17 landfilling	18 litter	19 traffic	20 aboriginal heritage	21 European heritage	Impact - No Controls. Refer to EMPs or Operational Controls Table Appendix 4 of PMP
Site Set Up	likelihood	l			r	r	a								u	u				u			1. photochemical smog, visual amenity
	consequence				2	2	3								1	1				2			
	risk	1			3	3	1								3	3				3			
	Signif y=yes, n=no	Y			N	N	Y								N	N				N			6. pollution of aquatic ecosystem
Demolition	likelihood																						1. photochemical smog, visual amenity; 13. stakeholder interactions; 19. community disturbance, mud tracking on public roads
	consequence																						
	risk	2			3							1	2	1			3	3	3	1		3	11. community disturbance
	Signif y=yes, n=no	Y			N							Y	Y	Y			N	N	N	Y		N	12. human discomfort, damage to buildings
Hazardous Materials Removal - Asbestos, Lead Paint, SMF	likelihood																						1. photochemical smog, visual amenity; 17. reduction in landfill space, loss of recyclables
	consequence																						
	risk	1			3									1			1	1	3			3	13. stakeholder interactions
	Signif y=yes, n=no	y			N									Y			Y	Y	N			N	16. non efficent use of materials, chemical pollution
Site Stripping & Bulk Earthworks, Transport of spoil, Importation of fill	likelihood																						1. photochemical smog, visual amenity; 11. community disturbance; 12. human discomfort, damage to buildings; 13. stakeholder interactions; 19. community disturbance, mud tracking on public roads
	consequence																						
	risk	1		3	3	3					3	1	1	1	3	3		3		2	3		
	Signif y=yes, n=no	Y		N	N	N					N	Y	Y	Y	N	N		N		Y	N		
Remediation	likelihood																						
	consequence																						
	risk	3	3	3	3	3						3	3	3			3	3		3	3	3	
	Signif y=yes, n=no	N	N	N	N	N						N	N	N			N	N		N	N	N	
Dewatering	likelihood																						4. pollution of aquatic ecosystem; 5. pollution of ecosystems
	consequence																						
	risk	3			2	2	3		3														
	Signif y=yes, n=no	N			Y	Y	N		N														
Detailed excavation / In ground Services	likelihood																						1. photochemical smog, visual amenity
	consequence																						
	risk	1			3	3						1					3	3					
	Signif y=yes, n=no	Y			N	N						Y					N	N					11. community disturbance
Foundations - piering / anchors	likelihood																						1. photochemical smog, visual amenity
	consequence																						
	risk	1			3							3	3	3									
	Signif y=yes, n=no	Y			N							N	N	N									
Foundations - piling	likelihood																						1. photochemical smog, visual amenity
	consequence																						
	risk	1			3	3						3	3	3			3	3					

RICHARD CROOKES CONSTRUCTIONS

Appendix 1 Environmental Risk Matrix Construction

Project: HCoE

RCC Objectives and Targets / KPIs:
<3 Environmental Notices issued by EPA or Local Council annually
Action community complaints within 24 hours, no repeat complaints for same issue
Investigate non effective operational controls / environmental incidents and report

RICHARD CROOKES CONSTRUCTIONS

Developed by:

Environmental Aspect - also consider if any legislation applies to activity or environmental aspect. See Intranet Legal and Other Requirements Table

Activity, Product or Service Strike out non relevant items	**Assessment of Significant Environmental Impact (no controls)**	1 dust	2 odour	3 greenhouse	4 stormwater	5 Adjoining waterways	6 sewer	7 land	8 resources/ water	9 resources/ materials	10 resources/ energy	11 noise	12 vibration	13 community concerns	14 flora	15 fauna	16 waste / chemcials	17 landfilling	18 litter	19 traffic	20 aboriginal heritage	21 European heritage	Impact - No Controls. Refer to EMPs or Operational Controls Table Appendix 4 of PMP
	Signif y=yes, n=no	Y			N	N						N	N	N			N	N					
Structure - formwork, reinforcement, concrete & curing, post tensioning	likelihood																						
	consequence																						
	risk				3	3						2	3				3			3			11. community disturbance
	Signif y=yes, n=no				N	N						Y	N				N			N			
Wet trades: Blockwork, brickwork, render, waterproof membranes	likelihood																						
	consequence																						
	risk				3					3							3					3	
	Signif y=yes, n=no				N					N							N					N	
Services - hydraulic, electrical, mechanical, incl. cable chasing, concrete coring	likelihood																						
	consequence																						
	risk	3			3							3					3		3			3	
	Signif y=yes, n=no	N			N							N					N		N			N	
Roofing	likelihood																						
	consequence																						
	risk									3		3					3		3				
	Signif y=yes, n=no									N		N					N		N				
Finishes - **Internal:** partitions, ceilings, joinery, door hanging **Wet trades:** Gyprocking, painting, tiling, floor finishes,	likelihood																						
	consequence																						
	risk									3		3	2				3		3				12. human discomfort, damage to buildings
	Signif y=yes, n=no									N		N	Y				N		N				
External works - pavements, landscaping, lighting	likelihood																						1. photochemical smog, visual amenity 11. community disturbance 12. human discomfort, damage to buildings
	consequence																						
	risk	2			3	3			3			2	2		3		3	3		3		3	
	Signif y=yes, n=no	Y			N	N			N			Y	Y		N		N	N		N		N	

6.4 ENVIRONMENTAL POLICY

The Richard Crookes Constructions Pty Ltd Environmental Policy is not embedded in this document, it is provided as an attached appendix so that it can be displayed/updated/revised in isolation if required.

ENVIRONMENTAL
POLICY

Richard Crookes Constructions Pty Limited promotes and encourages a sustainable environment throughout our business activities and sources our supplies and services in ways that prevent pollution and promote compliance with legal and other requirements.

The company implements Environmental Management System to aid us in meeting our corporate responsibilities. The System is certified by Global-Mark as meeting the requirements of AS/NZS ISO 14001:2015 Environmental Management Systems.

These form part of the company's Project Management Plans and are supported by company procedures and guidelines.

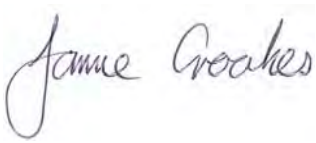
Management intends that all employees of our company, relevant subcontractors and suppliers, are made aware of their environmental responsibilities and the environmental impacts associated with their activities, products and services.

Our company objectives for continual improvement in environmental management include:

- Reducing the number of environmental notices issued on the projects by implementing a program of inductions, training and monitoring.
- Minimising the impacts to the community through the development of project specific Environmental, Traffic management plans, stakeholder consultation plans and by timely and appropriate response to complaints.
- Minimising impacts on the environment using dust, soil and water, waste and chemical management practices that are regularly inspected and maintained.
- Achieve a waste minimisation figure of 85% through monthly reporting

The Continual improvement of the project environmental management plans and progress with achieving the company's objectives will be reviewed during management meetings, project reviews and following the results of internal and external audits.

The Policy will be made available to the public and interested parties on request. This Policy will be reviewed every two years.



Jamie Crookes
Managing Director
26th February 2018

6.5 ASBESTOS MANAGEMENT PLAN

The Asbestos Management Plan is an internal RCC document used to manage asbestos if encountered on site and will also form part of the RCC PMP.

RICHARD CROOKES
CONSTRUCTIONS

HAWKESBURY CENTRE OF EXCELLENCE
[SSD-15001460]

ASBESTOS MANAGEMENT PLAN

2 February 2022

This plan has been approved for use by the following:

Approved by / Date	
	Andrew Buchanan, Project Director
Approved by / Date	
	Craig Richmond, Business Systems , Quality/Environmental Manager
Approved by / Date	
	Simon Dayball Group Safety Manager
Approved by / Date	
	Ian West, General Manager – Commercial & Risk

AUTHORITY POSITION	COMPANY NAME	NAME	NO. OF COPIES
Superintendent	Colliers Project Management	John Stalley	1 copy

REVISION REGISTER

REVISION DATE	REVISION DESCRIPTION	PREPARED BY	PMS INITIALS (ACCEPTANCE OF CHANGES)
19/11/2021	Revision 1 – MWO Submission	KT (RCC Site Engineer)	
02/02/2022	Revision 2 – For Construction	KT (RCC Site Engineer)	

CONTENTS

ACM MANAGEMENT PLAN TRAINING REGISTER

Name	Project Position	Signature	Trained By	Tool box date

1 INTRODUCTION

1.1 PURPOSE

The management of asbestos containing materials is important to ensure the Asbestos Containing Material (ACM) are not damaged nor deteriorate to such an extent that site workers, public, external contractors or visitors are unnecessarily exposed to airborne asbestos fibres.

The requirements of the contractor site induction and permit to work system will aid in the management of ACM's throughout the site. Any other unexpected finds that are or could be potentially hazardous will follow the same protocol as ACM.

Further to RCC's standards & guidelines, the NSW Department of Education commissioned an expert consultant to produce a Remediation Action Plan (RAP) specifically designed to manage the existing ACM found within the filling material on the Hawkesbury Centre of Excellence. This RAP will take precedence over any Asbestos Management Plan unless additional unidentified ACM are located within the site.

1.2 GENERAL PRINCIPLES

The RCC's principles of asbestos management have been adapted from general principles published in the Code of Practice for the Management and Control of Asbestos in Workplaces [NOHSC: 2018 (2005)]. These principles are summarised below:

- Consideration should be given to the removal of ACM during any renovations, refurbishments or maintenance work in preference to other control measures such as encapsulation, enclosure and sealing.
- The WHS Regulation requires all ACM within the construction area to be labelled. (Refer 6.3 Labelling)
- Where ACM is identified or presumed, the locations and type of ACM are to be recorded in the ACM Register located within the Asbestos management plan folder.
- A risk assessment must be performed on all identified or presumed ACM.
- Control measures must be established to prevent exposure to airborne asbestos fibres and should take into account the results of risk assessments conducted for the identified or presumed ACM.
- All workers and contractors on site etc. must be advised of the ACM Register at time of induction, and as requested, permitted access to the register for their review
- Only competent persons should undertake the identification of ACM.
- All workers and contractors on site where ACM are present or presumed to be present, and all other persons who may be exposed to ACM as a result of being on the premises, must be provided with full information on the occupational health and safety consequences of exposure to asbestos and appropriate control measures. The provision of this information should be recorded.
- Reasonable steps must be taken to identify all possible locations of ACM within the site.
- Once a risk assessment has been completed and controls established, a SWMS is to be developed and submitted to RCC'S site management team for approval

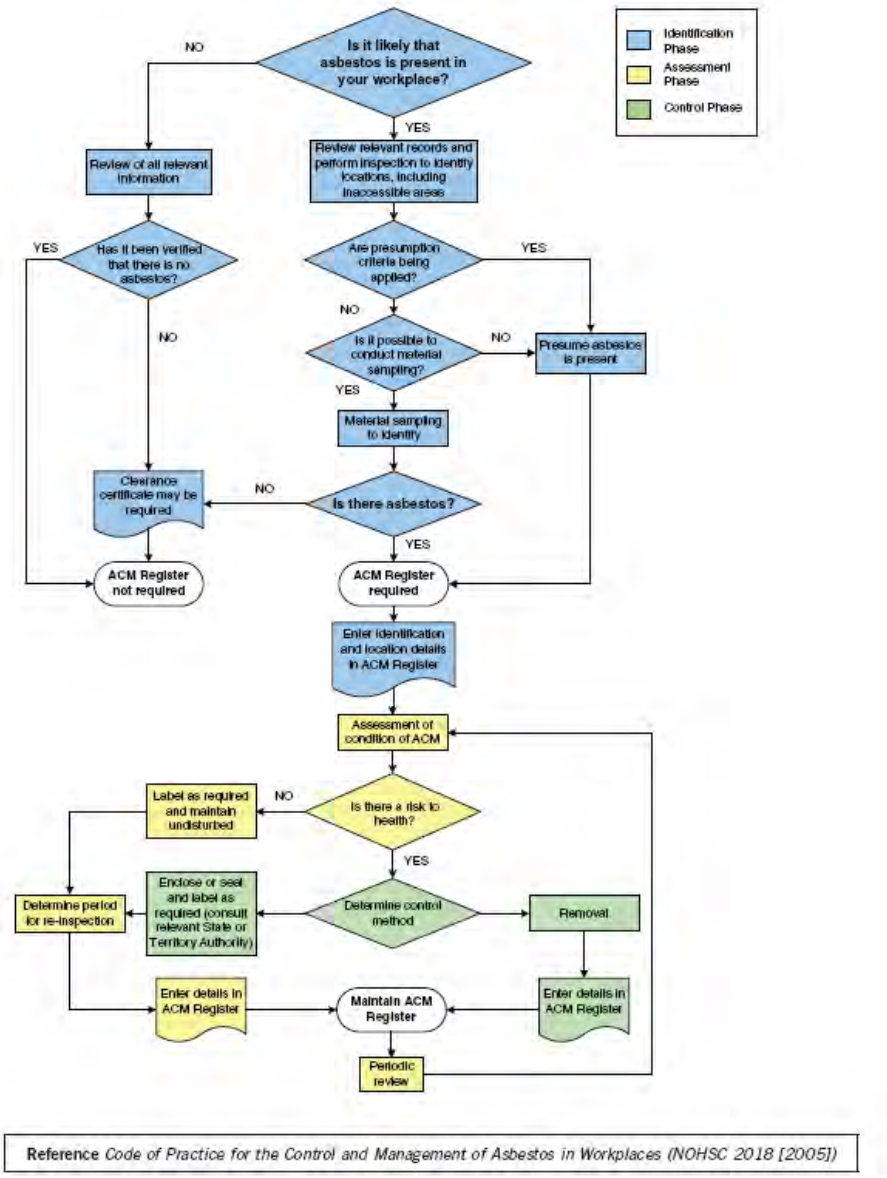


Figure 1: General principles of an asbestos management plan

Source: Code of Practice for the Management and Control of Asbestos in Workplaces [NOHSC: 2018 (2005)]

2 OBJECTIVES

- Remove all high-risk asbestos items where possible.
- Deliver effective asbestos management work programs.
- Ensure that no one is exposed to airborne asbestos fibres.
- Ensure compliance with this Asbestos Management Plan.
- Ensure the asbestos database and register is accurate.
- Comply with State and Commonwealth legislation.
- Remove asbestos containing items when and where possible

3 REGULATORY REQUIREMENTS

This asbestos management plan is consistent with removal, encapsulation, transport, and disposal or otherwise potential disturbance of asbestos containing materials. All these activities shall be performed in accordance with relevant Commonwealth and State Acts, Regulations, Codes of Practice, Advisory Standards and Industry Standards.

3.1 STATE LEGISLATIVE REQUIREMENTS – NEW SOUTH WALES/ACT/QUEENSLAND

Relevant State legislation includes:

- Work Health and Safety Act 2011
- Work Health and Safety Regulation 2017

3.2 CODE OF PRACTICE/GUIDES

Key Codes of Practice and Guidance Notes include:

- Code of Practice for the Management and Control of Asbestos in the Workplaces [NOHSC: 2018 (2005)].
- COP- How to Manage and Control Asbestos in the workplace - Oct 2018
- COP- How to safely remove asbestos - Oct 2018

3.3 RCC REQUIREMENTS

- Project Managers (PM) /Site Managers (SM) must be notified before asbestos removal work commences.
- Any new asbestos identified must be explicitly notified to the PM/SM.
- All Staff and Contractors must comply with this Plan.
- Tenants and other interested parties must be notified of the asbestos removal work in advance and asbestos awareness training shall be made available to those persons affected by the asbestos work.

4 ORGANISATIONAL RESPONSIBILITIES

Person / Party	Responsibility
Construction Manager (CM), Project Manager (PM)	▪ Ensure all staff and contractors are aware of and comply with the plan. ▪ Project management ▪ Identification and bringing to the attention of appropriate staff, any suspect material ▪ Ensure all contractors working on asbestos are aware of and meet the requirement of the plan. ▪ Notify Adjacent neighbours, property owners work type and time frame
Site Manager (SM) Health Safety and Environmental Coordinator (HSE)	▪ Obtain from Subcontractor, copy of Safework Notification (Requirement of RCC Asbestos removal permit) ▪ Ensure project personnel (including contractors) are inducted ▪ Surveying, identification and arranging for sampling of suspected asbestos containing materials by competent persons. ▪ Training and awareness RCC relevant staff ▪ Manage the asbestos works program and removal program ▪ Respond to incidents ▪ Document preparation, recording and filing ▪ Manage asbestos inspection contractor
Contractors (C) and Trades Staff (TS)	▪ Not to impact on an ACM without complying with the plan ▪ To bring to the attention of the SM/HSE any suspect material ▪ Refer to the plan for guidance to identify, manage, and remove asbestos ▪ Apply for Asbestos Permit to Work when performing asbestos removal work that requires notification. ▪ Undergo RCC Contractor Induction ▪ Develop a site specific asbestos removal control plan, SWMS and Risk Assessment prior to performing the asbestos removal work

5 CONTROL OF ASBESTOS HAZARDS

As part of the asbestos survey or subsequent resurvey, a 'Competent Person' is required to assess the risk posed by the ACM by completing a Risk Assessment; this will determine what, if any, control measures may be required. Generally, there are four control options available to select:

- Leave in-situ and manage
- Seal / encapsulate
- Enclose / isolate
- Remove

The controls are to be appropriate to the risk of the ACM in question. The following information should be used as a guideline when determining the correct control measure for management of the ACM risks.

If the ACM is friable, and there is a risk to health from exposure, it should be removed.

If the ACM is bonded and in a stable condition, encapsulation may be appropriate if the ACM is unsealed. Encapsulation is not necessarily required if the ACM is unsealed but it does provide another "barrier" to the potential release of asbestos fibre as well as prolonging the lifespan of the material by providing protection against UV and environmental elements etc.

ACM that are bonded, stable and sealed, which are unlikely to be disturbed during normal activities, can be left in-situ and managed, but need to be recorded in the ACM Register.

ACM within the works zone must be removed prior to the commencement of demolition, partial demolition, renovation or refurbishment if they are likely to be disturbed by those works. This is in accordance with the NOHSC Code of Practice for the Safe Removal of Asbestos [NOHSC: October 2018]

5.1 REMOVAL OF ACM

5.1.1 LICENSED CONTRACTORS

ACM falls into two broad categories (bonded and friable) and the category the ACM falls under will determine how the ACM is removed. If the ACM is classified as friable (e.g. sprayed limpet, pipe lagging, millboard insulation, vinyl sheet floor coverings with asbestos backing material, etc.) it is necessary to engage a contractor who holds a current AS-A class license for friable asbestos removal. The holder of an AS-A licence is also permitted to removed Bonded ACM

If the ACM is classified as bonded ACM (e.g. asbestos cement wall linings, Super Six roof sheeting, vinyl floor tiles, Zelemite electrical boards, etc.) the ACM may be removed by the contractor who holds a current AS-B licence for bonded asbestos removal. The holder of an AS-B licence is not permitted to remove friable ACM.

5.1.2 SAFEWORK – NOTIFICATION

For Bonded ACM, in quantities greater than 10m^2, requiring a licensed contractor (AS-B) to complete the removal works, a Safework (Regulator) Notification is required to be lodged by the Licensed Contractor.

The Notification is required to be lodged a minimum of seven (7) working days prior to starting the removal works. Safework (Regulator) will review the application and return the first two pages, stamped with an official Safework (Regulator) approval. No works are to proceed prior to the receipt of the Notification.

RCC will require a copy of the Safework (Regulator) stamped 'Notification' prior to issuing an RCC Asbestos removal permit.

5.1.3 SAFEWORK – PERMIT

For all Friable removal works, regardless of quantity, a suitably licensed contractor (AS-A) must apply to Safework (Regulator) for a Permit prior to removal works progressing.

The Permit application is required to be lodged a minimum of seven (7) working days prior to starting the removal works. Safework (Regulator) will review the application and return the first two pages stamped with an official Safework (Regulator) approval and, issue a separate numbered Permit. No works are to proceed prior to the receipt of the permit.

RCC will require a copy of the Safework (Regulator) 'Permit' and the application form prior to issuing an RCC Asbestos removal permit.

5.1.4 AIRBORNE FIBRE MONITORING

Airborne fibre monitoring must be conducted during and after the removal of all friable ACM by an independent competent person. For Bonded ACM, air monitoring is conducted as part of the clearance certificate (where required) or as requested by RCC, client or Hygienist. Air monitoring is conducted during the removal works to check the effectiveness of control measures implemented by the contractor (e.g. isolating the removal work area with a sealed, airtight enclosure fitted with negative air generating units, etc.).

Air monitoring is also conducted after the ACM has been completely removed and the work area has passed a satisfactory visual inspection to determine whether the area is safe to reoccupy by unprotected persons.

5.1.5 CLEARANCE CERTIFICATES

For all Friable ACM removal works or, as requested by the client or RCC for Bonded works, before an area can be re-occupied post asbestos removal, a clearance inspection must be carried out. The clearance inspection must be undertaken by an independent competent person only and a clearance certificate must be obtained from that competent person. Clearance monitoring is a mandatory requirement for all friable asbestos removal works and is recommended for bonded ACM removal works particularly when the bonded ACM is located internally or near sensitive receptors.

The complete removal of all ACM must be verified with a written clearance certificate which must include details of a satisfactory clearance inspection conducted by the independent competent person. If clearance air monitoring has been conducted, the results of the clearance monitoring must be included as part of the clearance certificate as well.

5.1.6 WASTE

All asbestos waste shall be disposed of at an approved landfill disposal site by licensed contractors, and in accordance with the requirements of The Legislation. Transport and disposal of asbestos waste shall be carried out only in a manner that will prevent the liberation of asbestos fibres into the atmosphere.

To achieve "final completion" of an asbestos removal activity, RCC require verification that the asbestos waste has been transported and disposed of in accordance with State/Territory legislative requirements. A copy of the EPA Waste Tracking document is the required documentation for disposal, and a copy of the necessary License for carrying out this removal and disposal is the required documentation for transportation.

5.2 RECORD KEEPING

RCC shall maintain detailed records of all activities relating to asbestos works which have been undertaken on site. The records kept should include:

- Copies of all asbestos survey/audit reports, including updates and amendments. (RCC ACM Registers)
- Copies of all Safework (Regulator) notifications and permits
- Risk Assessments and SWMS documents.
- RCC Asbestos removal permits
- RCC Air Monitoring and Clearance certificate records
- Records pertaining to the informing of employees/contractors about the presence of asbestos on site, and those employees have been appropriately trained in safe work procedures and practices.
- Clearance certificates indicating areas are safe to reoccupy after asbestos abatement works; and
- Airborne fibre monitoring results
- Previous versions of the asbestos register

All documentation is to be retained in the one file structure under the heading of Asbestos Management. All asbestos related records and documents are to be retained for a period of 30 years.

5.3 LABELLING

Current State and Territory legislation specify the requirements for some form of labelling in buildings. [NOHSC: 2018 (2005)] states all in-situ ACM's should be labelled where practicable. The words 'should' and 'practicable' in the Code of Practice allow some flexibility in the approach to labelling. Similar flexibility is allowed under State and Territory workplace health and safety legislation.

RCC has advised that individual labelling of ACM is to be determined by a Competent Person usually nominated by the client however may not be necessary in every instance.

All friable and high risk asbestos situations, as well as any location containing ACM's where regular maintenance or repair work is likely to be carried must be labelled.

In locations where ACM has been identified within close proximity to the work area, but not required to be removed or disturbed, should be labelled or sign posted warning of 'Asbestos containing material, do not disturb' or in wording similar.

Ref: WHS Regulation, Chapter 8, Asbestos- Clause 469

An asbestos removalist must ensure that:

a) Signs alerting persons to the presence of asbestos are placed to indicate where the asbestos removal work is being carried out, and

b) Barricades are erected to delineate the asbestos removal area.

5.4 WARNING SIGNS

All site areas which are known or suspected to contain ACM's shall have a warning sign at every main entry and around the perimeter of the isolated ACM area. An asbestos register exists for the site and a point of contact must be contacted before undertaking any works.

The warning sign must be clearly visible from all directions leading onto the area.

5.5 SAFE WORK PRACTICES

Prior to commencing any works on RCC sites, such as demolition, refurbishment, maintenance or installation of new equipment, the asbestos register must be consulted to determine if any ACM are present which may be disturbed. This ACM must be removed before commencement of the work. If unknown materials, or undocumented materials suspected of containing asbestos are encountered during building works, stop work and follow the Incident response procedures shown in figure 7.0.

If a project is likely to impinge upon ACM, the principal contractor (RCC) must assess the requirement for a licensed asbestos removalist to perform the asbestos removal work. A Safework permit / Notification may be required as part of an RCC, Asbestos Permit to work, prior to the asbestos removal work commencing.

5.5.1 MAINTENANCE PROCEDURES

Maintenance tasks that may impact on ACM are to be performed under controlled conditions to prevent the distribution of airborne asbestos fibres. [NOHSC: 2018 (2005)] has procedures for certain maintenance tasks and these must be followed. These maintenance tasks include:

- The drilling of asbestos containing materials
- Sealing, painting, coating of asbestos cement products
- Cleaning leaf litter from the gutters of asbestos cement roofs
- Replacing cabling in asbestos cement conduits or boxes
- Working on electrical mounting boards (switchboards) containing asbestos

5.5.2 TOOLS AND EQUIPMENT

Tools and equipment to be used for asbestos removal jobs are required to minimise the generation of airborne asbestos fibres. High-speed abrasive power or pneumatic tools such as angle grinders, sander, saws and high speed drills must never be used. Hand tools are preferred over power tools.

At the end of the removal work, all tools should be:

Decontaminated (i.e. fully dismantled and cleaned under controlled conditions as described in the Code, or

Disposed of in sealed containers similar to that for disposal of the ACM waste product.

Vacuum cleaners used for asbestos cleaning must comply with:

- AS 3544-1988 (Industrial Vacuum Cleaners for Particulates Hazardous to Health) and
- AS4260-1997 High Efficiency Particulate Air Filters (HEPA) - Classification, construction and performance.

5.5.3 RCC ASBESTOS REMOVAL PERMIT

An RCC Asbestos Removal Permit form must be completed for any work on ACM.

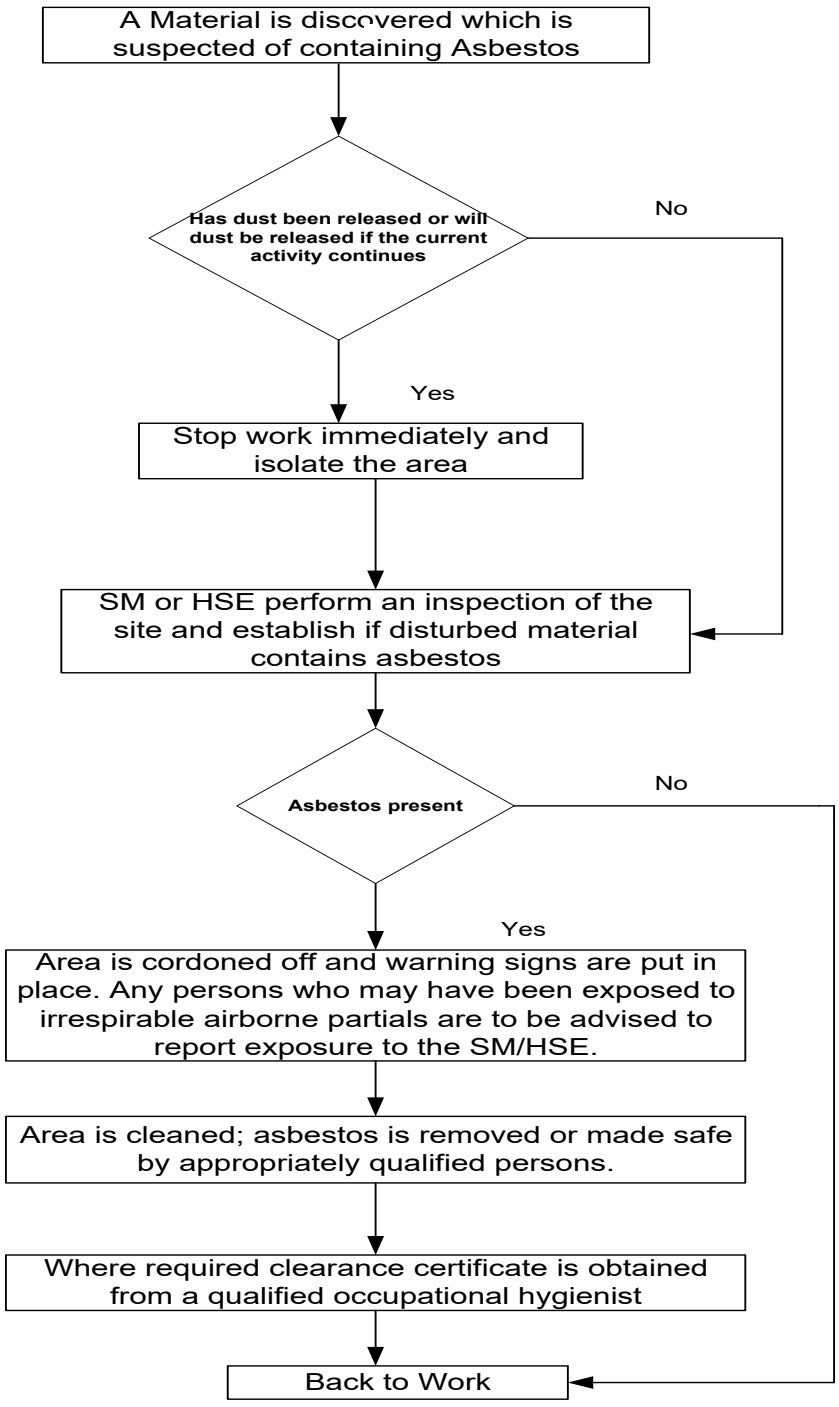
Before being issued with an Asbestos Removal Permit, individuals will be required to peruse the RCC Asbestos Management Plan and the Asbestos Register. Where practicable, contractors should be made aware of the requirements of the plan prior to tendering to ensure they allow for such requirements when quoting.

The Asbestos Removal Permit is designed to ensure appropriate work practices are employed when working with ACM. The Asbestos Removal Permit will document what ACM's are to be removed, encapsulated or otherwise protected, prior to the contracted works proceeding. The Asbestos Removal Permit will also check other requirements such as the need for barricading and airborne fibre monitoring.

The Demolisher or asbestos removal contractor will be responsible to ensure that their workers are aware of their responsibilities and abide by the requirements of the permit.

RCC's Site Manager or HSE Coordinator shall be advised immediately of any incidents of non-compliance with the RCC Asbestos Management plan or the Code.

6 INCIDENT RESPONSE FLOW CHART



7 DOCUMENTATION REQUIREMENTS

7.1 ASBESTOS CONTAINING MATERIAL (ACM) REGISTER FORM 21.1A

The RCC ACM register will be generated where no report has been received from the client or when additional ACM items have been identified but not listed in previous reports.

The RCC ACM register and the clients ACM report will be monitored and signed off where required, when ACM works are completed.

Supporting information that should be included in the register is:

- Register of ACM items
- Register of items which were samples but found to contain no asbestos
- Certificates of analysis
- Photos
- Floor plans with asbestos containing items marked up

7.2 ASBESTOS REMOVAL PERMIT FORM 21.1B

The RCC Asbestos removal permit is required to be completed prior to any ACM removal / remedial works.

The requirements for supporting documentation are listed within the permit.

7.3 ASBESTOS CONTAINING MATERIAL (ACM) AIR MONITORING & CLEARANCE CERTIFICATE RECORD FORM 21.1C (NOTE: 1 FORM PER ACTIVITY / ITEM)

Asbestos Containing Material (ACM) Air Monitoring & Clearance Certificate Record is used to collate all associated documentation involved in the identification, removal, remediation, transport and disposal of logged ACM.

8 TRAINING

8.1 ASBESTOS AWARENESS TRAINING

Asbestos awareness training provides participants with a general overview of asbestos including history and background; asbestos types and properties; common asbestos situations; health effects; risk in perspective and management of asbestos. Conducted by RCC person,or RTO . ACT region training conducted by MBA or other ATO accredited company mandatory for Act Workers.

8.2 ASBESTOS REMOVAL TRAINING

This course is typically provided by an external registered training organisation (RTO) to personnel who intend to remove bonded ACM, pre-requisite for obtaining a Safework recognised licence

APPENDIX 1 – 21.11 ASBESTOS CONTAINING MATERIAL (ACM) REGISTER

Project Name:				Report date:			
Project Number:							
Item No.	Date Entered	Entered by	Location of ACM	Sample Tested Y/N	Asbestos Bonded / Friable / NA	Description of ACM type & condition, remedial works planned (Scattered pieces, sheeting, pipe lagging etc.)	Date work completed

APPENDIX 2 – 21.11A ASBESTOS REMOVAL PERMIT

Project Name:		Company Performing Work:	
Contractors Contact:		Position:	
Location of works:			
Description of Work:			
RCC Asbestos Register – Item Identification number:			

Asbestos Type

Bonded Less than 10m² □	No License or Permit / Application required	
Bonded Greater than 10m² □ AS-B Lic. No:_____	Copy of WorkCover Stamped, Notification to be obtained from contractor prior to start.	
Friable □ AS-A Lic. No: _____	Copy of WorkCover stamped, Permit application to be obtained from contractor prior to start.	WorkCover Permit No: _____

Permit begins		Permit expires	
Date: / /	Time: am/pm	Date: / /	Time: am/pm
Date: / /	Time: am/pm	Date: / /	Time: am/pm
Date: / /	Time: am/pm	Date: / /	Time: am/pm
Date: / /	Time: am/pm	Date: / /	Time: am/pm

RCC Emergency Contact information

Name of RCC Contact:		Tel:	( )

Authorisation by company representative

The above work is authorised to proceed subject to the following action being taken prior to work starting and procedures being maintained for the duration of the work.

RCC Representative Name:	Position:	Signature:

	Yes	N/A		Yes	N/A
Work area has been inspected prior to works proceeding			Contractor has read the requirements of the RCC, ACM Management plan		
Risk Assessment completed			Disposal method established		
Will the area be occupied during the works			Air conditioning / Mechanical ventilation isolated:		
Is it necessary to vacate the building during the works			Electrical isolated (Written confirmation from Electrician required)		
SWMS reviewed by RCC			Signage / Barricades in place		
Air monitoring required			Clearance certificate required		

Weekly Review of Permit

	Week 1	Week 2	Week 3	Week 4
Signature and position of person issuing the permit:				
Signature of the person conducting the Work:				

APPENDIX 3 – 21.11B ASBESTOS CONTAINING MATERIAL (ACM) AIR MONITORING AND CLEARANCE CERTIFICATE RECORD

In all Friable removal works and in other cases where requested by RCC or the client, a clearance certificate may be required post completion of ACM removal works. Clearance certificates may require air monitoring to be conducted during the removal process. All monitoring records are to be maintained and kept for a period of 30 years post completion. Separate form required for each location.

Project Name:		Project Number :	

Clearance Certificate location / item details

RCC ACM Register No: (Refer to ACM register)	Item description, type & Location (Wall sheeting, Bonded)	Removed		Date removed
		Yes	No	

Air Monitoring Results

Monitoring Unit ID;	Sample location	Start time (24hour)	Finish time (24 Hour)	Average flow rate (mL)	Fibres / Fields	Result Fibres/mL

Completion sign off by competent person

Copy of final clearance certificate attached ☐				Copy of waste transport receipt attached ☐		
Copy of waste disposal dockets attached ☐				Copy of ACM work permit attached ☐		
Name:		Position:		Signature:	Date:	

APPENDIX 4 – 40.3 SAFE WORK METHOD STATEMENT: REMOVAL OF BONDED ASBESTOS SCATTERED AT RANDOM

[PCBU Contractor Name, contact details]		**Principal Contractor (PC) [Name, contact details]**	
Works Manager: Contact Phone:		**Date SWMS provided to PC:**	**Revision No:**
Work activity/trade:		**Project Name::**	
HIGH RISK CONSTRUCTION WORK: HRCW	Risk of a person falling more than 2 metres (*Note*: in some jurisdictions this is 3 metres)	Work on a telecommunication tower	Demolition of load-bearing structure
	Likely to involve disturbing asbestos	Temporary load-bearing support for structural alterations or	Work in or near a confined space
	Work in or near a shaft or trench deeper than 1.5 m or a tunnel	Use of explosives	Work on or near pressurised gas mains or piping
	☐ Work on or near chemical, fuel or refrigerant lines	Work on or near energised electrical installations or services	☐ Work in an area that may have a contaminated or flammable atmosphere
	☐ Tilt-up or precast concrete elements	☐ Work on, in or adjacent to a road, railway, shipping lane or other traffic corridor in use by traffic other than	☐ Work in an area with movement of powered mobile plant
	☐ Work in areas with artificial extremes of temperature	☐ Work in or near water or other liquid that involves a risk of drowning	☐ Diving work
Person responsible for ensuring compliance with		**Date SWMS received:**	
What measures are in place to ensure compliance with the SWMS?			
Person responsible for reviewing SWMS control measures:		**Date SWMS received by reviewer:**	
How will the SWMS control measures be			

Review date:		**Reviewer's signature:**	

Procedure (in steps):	Possible Hazards	Control Measures
Break the job down into steps. Each of the steps should accomplish some major tasks and be logical	Situation with potential to harm – injury, illness, damage, environmental impact Eg.loss of control of plant	What actions are necessary to eliminate or minimise the hazards – elimination, substitution, isolation, engineers solutions and lastly PPE
Isolation / protection of Asbestos containing material (ACM)	Disturbance of ACM Incorrect removal	Isolate identified material by removing workers form the area and barricading off minimum radius of 5 metres – Danger tape. Warning signage to be placed at the barrier to area warning of ACM Restrict access to one entry point ONLY Asbestos register to be updated in accordance with ACM Register. Initiate RCC ACM works permit process
Establish works area / removal area	Unauthorised entry to areas	Identify the boundary for the works area i.e the location where ACM is to be removed from and identify with danger tape and signage advising ACM removal in progress. Identify area for removal site i.e. the isolated region around the works,identify with danger tape & signage warning of restricted access ACM removal works in progress.
Protection of surrounding areas / adjoining structures	Adjoining areas contaminated by removal process	Prior to any removal: Protection in the form of 200 micron plastic to be secured to protect adjoining finishes (Floors / walls) Isolation / lock out of mechanical ventilation required prior to starting
Sealing of ACM prior to removal	Disturbance of ACM Water run off Electrical outlets i.e. switches, lights, outlets, alarms etc.	Ensure all electrical items are isolated from supply. Ensure all Any drains within the area to be protected. PPE as identified above. Low pressure coarse spray to be applied to all faces / edges. A mixture of water & PVA solution or detergent or paint can be used as a wetting agent. Ensure surface is saturated but minimise run off Ensure ACM is saturated through it's full depth prior to removal / disturbing.

		Spray all accessible voids where dust may exist
Removal process	Damage to sheets General disturbance Manual handling	Determine methodology for removal Remove any loose sections prior to removing fixed sheets. Ensure all disturbed areas remain saturated, re-apply dampening method as required. Avoid breaking sheets where possible. Should sheets continually break, reassess method of removal. Support sheets prior to removing fixings Where possible, remove nails / fixings or punch nail heads through sheeting. 2 person lifts for heavy or awkward materials. PPE as specified above.
Packaging waste	Packages become loose and tear Materials spill onto ground Manual handling	**For small pieces**, ACM to be packaged into man-handleable packages, enclosed in heavy duty 200 micron plastic. (Bag or wrap) Where possibility of tearing is identified 2 layers may be required. Bags to be labelled with appropriate warnings similar to ' Caution Asbestos' or Asbestos within, do not open bag. Where bags are used, opening to be twisted and folded over and fixed with tape or other means. **For larger sections**, skips may be used but must be in good condition. Skip is to be lined in 2 layers of 200 micron plastic. ACM must be kept wet. Once skip is full, it's contents must be sealed with the plastic sheeting.
Clean up	Adjoining areas contaminated by removal process Manual handling	Ensure all disturbed areas remain saturated, re-apply dampening method as required. Start from the top and work down cleaning ledges, sills & high flat areas that ACM can settle. Remove any loose items. Start cleaning and removing plastic from furthest workpoint from exit working towards the exit point. The use of an Asbestos vacuum is permitted for dry decontamination cleaning. All waste to be disposed of in Same way to ACM. (Lined bin, plastic bag 200 micron) All PPE to remain on till area is decontaminated.

		Scrape / clean off excess materials from boots, tools etc with damp rag, into Asbestos waste bag. All disposable PPE to be placed in Asbestos waste bag and not re-used.
Disposal of waste	Incorrect disposal of waste	Materials to be disposed of at registered waste management fascility, capable of receiving Hazardous waste. Receipts of waste disposal to be collected and recorded in Asbestos register.
Other items as identified		

Project _____ Company _____

I/We the undersigned, employees of _____, declare that I/we have attended "Work Activity Training" in the tasks to be performed on this project and have had an opportunity to participate in the development / review of the SWMS. We acknowledge that all work will be performed in the manner described within the Safe Work Method Statement.

Date	Employee Name (print)	Certificate/Licence No.:	Signature	SWMS Trainer Name

Project: (List Project Name)	**Signed by Senior Management Company Rep.**
Contractor: Richard Crookes Constructions. Lvl 3. 4 Broadcast Wav. Artarmon NSW 2064	**Signature:** (Who has reviewed the SWMS)
Description of Work: SWMS - Removal of BONDED Asbestos containing material ONLY (ACM) quantity less than 10 square metres (Non licensed - Minor works) **Revision date:**	**Title:** (Your title)
	Date: (Date reviewed prior to release)

Potential Environmental Impacts:			
Air (odour, dust, fumes)	☑	Spills to ground	☑
Noise	☐	Soil Erosion	☐
Vibration	☐	Contamination/Haz materials	☑
Spills to drains/waterways	☑	Traffic / community	☐
Flora	☐	Fauna	☐
Waste:	☑	Other:	

Safety Equipment	
Fire extinguishers	☐
Barricades	☑
Ventilation	☐
Lighting	☐
Ladders/mobile scaffold	☐
Traffic control	☐
Welding screens	☐
Dust extraction	☐
Emergency response	☐

Permits	
Hot Work	☐
Excavation	☐
Confined Space	☐
Tag out / Lock out	☐
Formwork stripping	☐
Fall Arrest Systems	☐
Scaffold	☐
Other: RCC Asbestos Permit to Work	

Personal Protective Equipment (PPE)	
Hard Hat	☑
High Vis. Clothing	☐
Steep capped boots	☑
Face Shield/Welding Shield	☐
Safety Glasses	☑
Gloves	☑
Hearing Protection	☐
Fall Protection/Harness	☐
Other Task Specific: Face mask - Type 2 Cartridge, Disposable over-alls (Non - Velcro type).	

Procedure (in steps):	Possible Hazards	Risks	Inherant Risk Score (risk with no controls)	Control Measures	Residual Risk Score (risk after controls in place)	Resp. Person
Break the job down into steps. Each of the steps should accomplish some major tasks and be logical	Situation with potential to harm – injury, illness, damage, environmental impact Eg.loss of control of plant	List Eg. Damage to plant, buildings etc,injury or death, spills	Refer to RCC Risk Assessment Calculator F 21.5 Score 1, 2, 3	What actions are necessary to eliminate or minimise the hazards – elimination, substitution, isolation, engineers solutions and lastly PPE	Refer to RCC Risk Assessment Calculator F 21.5 Score 1, 2, 3	
Isolation / protection of Asbestos	Disturbance of ACM	Dust inhalation	1	Isolate identified material by removing	3	HSE

Risk Scores: 1= Immediately Stop work until controls in place, 2 =High priority controls in place as soon as practicable, 3= Low risk, planned re assessment of risk

Procedure (in steps):	Possible Hazards	Risks	Inherant Risk Score (risk with no controls)	Control Measures	Residual Risk Score (risk after controls in place)	Resp. Person
containing material (ACM)	Incorrect removal	Long term heath effects Cross contamination Whole of site closure		workers form the area and barricading off minimum radius of 5 metres – Danger tape. Warning signage to be placed at the barrier to area warning of ACM Restrict access to one entry point ONLY Asbestos register to be updated in accordance with ACM Register. Initiate RCC ACM works permit process		SM
Establish works area / removal area	Unauthorised entry to areas	Workers exposed to ACM	2	Identify the boundary for the works area i.e the location where ACM is to be removed from and identify with danger tape and signage advising ACM removal in progress. Identify area for removal site i.e. the isolated region around the works, identify with danger tape & signage warning of restricted access ACM removal works in progress.	3	SM, HSE Competent Person
Protection of surrounding areas / adjoining structures	Adjoining areas contaminated by removal process	Workers exposed to ACM	1	Prior to any removal: Protection in the form of 200 micron plastic to be secured to protect adjoining finishes (Floors / walls) Isolation / lock out of mechanical ventilation required prior to starting	3	Competent Person
Sealing of ACM prior to removal	Disturbance of ACM	Cross contamination	2	Ensure all electrical items are isolated	3	Competent

Risk Scores: 1= Immediately Stop work until controls in place, 2 =High priority controls in place as soon as practicable, 3= Low risk, planned re assessment of risk

Procedure (in steps):	Possible Hazards	Risks	Inherant Risk Score (risk with no controls)	Control Measures	Residual Risk Score (risk after controls in place)	Resp. Person
	Water run off Electrical outlets i.e. switches, lights, outlets, alarms etc.	to other areas Electrocution Explosion Slips / falls		from supply. Ensure any drains within the area are protected. PPE as identified above. Low pressure coarse spray to be applied to all faces / edges. A mixture of water & PVA solution or detergent or paint can be used as a wetting agent. Ensure all exposed surfaces (where exposed) are saturated but minimise run off, prior to removal / disturbing. Ensure ACM is saturated (where exposed), prior to removal / disturbing. Spray all accessible voids where dust may exist		Person
Removal process	Damage to sheets General disturbance Manual handling	Workers exposed to ACM Dust generation Cross contamination to other areas Strains / cuts	1	Determine methodology for removal Remove any loose sections prior to removing fixed sheets. Ensure all disturbed areas remain saturated, re-apply dampening method as required. Avoid breaking sheets where possible. Should sheets continually break, reassess method of removal. Support sheets prior to removing fixings Where possible, remove nails / fixings or punch nail heads through sheeting. 2 person lifts for heavy or awkward	3	Competent Person

Risk Scores: 1= Immediately Stop work until controls in place, 2 =High priority controls in place as soon as practicable, 3= Low risk, planned re assessment of risk

Procedure (in steps):	Possible Hazards	Risks	Inherant Risk Score (risk with no controls)	Control Measures	Residual Risk Score (risk after controls in place)	Resp. Person
				materials. PPE as specified above.		
Packaging waste	Packages become loose and tear Materials spill onto ground Manual handling	Workers exposed to ACM Dust generation Whole of site closure Environmental damage Strains / cuts	1	**For small pieces**, ACM to be packaged into man handle-able packages, enclosed in heavy duty 200 micron plastic. All asbestos waste must be double bagged or wrapped in 2 layers of 0.2mm plastic Bags to be labelled with appropriate warnings similar to 'Caution Asbestos' or Asbestos within, do not open bag. Where bags are used, opening to be twisted and folded over and fixed with tape or other means.	3	Competent Person
Clean up	Adjoining areas contaminated by removal process Manual handling	Workers exposed to ACM Dust generation Environmental damage Strains	1	Ensure all disturbed areas remain saturated, re-apply dampening method as required. Start from the top and work down cleaning ledges, sills & high flat areas that ACM can settle. Remove any loose items. Start cleaning and removing plastic from furthest work point from exit working towards the exit point. The use of an Asbestos vacuum is permitted for dry decontamination cleaning. All waste to be disposed of in Same	3	SM HSE Competant Person

Risk Scores: 1= Immediately Stop work until controls in place, 2 =High priority controls in place as soon as practicable, 3= Low risk, planned re assessment of risk

Procedure (in steps):	Possible Hazards	Risks	Inherant Risk Score (risk with no controls)	Control Measures	Residual Risk Score (risk after controls in place)	Resp. Person
				way to ACM. (Lined bin, plastic bag 200 micron) All PPE to remain on till area is decontaminated. Scrape / clean off excess materials from boots, tools etc with damp rag, into Asbestos waste bag. All disposable PPE to be placed in Asbestos waste bag and not re-used.		
Disposal of waste	Incorrect disposal of waste	Environmental contamination Environmental fines imposed People exposed Commercial disgrace	1	Materials to be disposed of at registered waste management facility, capable of receiving Hazardous waste. Receipts of waste disposal to be collected and recorded in Asbestos register.	3	SM
Other items as identified						

Details of Site Supervisory staff		
Name:	Qualification:	Certificates of Competence / Safework Approvals required:

Training Required to Complete Work
General WHS Induction Training
Work activity training – (Asbestos awareness training)
SWMS Training
Manual Handling training
Personal protective equipment
Other: RCC Asbestos Management Plan

Plant & Equipment: (Log books to be supplied)	

Codes of Practice, Legislation, etc. applicable :
Act: Work Health & Safety Act 2011 Protection of the Environment Operations Act 1997
Regulation: Work Health & Safety Regulation 2017
Codes of Practice: COP For the safe removal of Asbestos [NOHSC:2018 (2005)] COP- How do manage and control asbestos in the workplace-Oct 2018 COP- How to safely remove asbestos- Oct 2018
Hygienists report, if submitted.

Project Company

I/We the undersigned, employees of _____, declare that I/we have attended "Work Activity Training" in the tasks to be performed on this project and have had an opportunity to participate in the development / review of the SWMS. We acknowledge that all work will be performed in the manner described within the Safe Work Method Statement.

Date	Employee Name (print)	Certificate/Licence No.:	Signature	SWMS Trainer Name

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ARTARMON NSW 2064

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BROADMEADOW NSW 2292

PO BOX 835
HAMILTON NSW 2303

PHONE: +61 2 9902 4700
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TAMWORTH

SUITE 1, 493 PEEL ST
TAMWORTH NSW 2340

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TAMWORTH NSW 2340

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ACT

UNIT 1, 155 NEWCASTLE ST
FYSHWICK ACT 2609

PO BOX 771
FYSHWICK ACT 2609

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FAX: +61 2 6280 8774

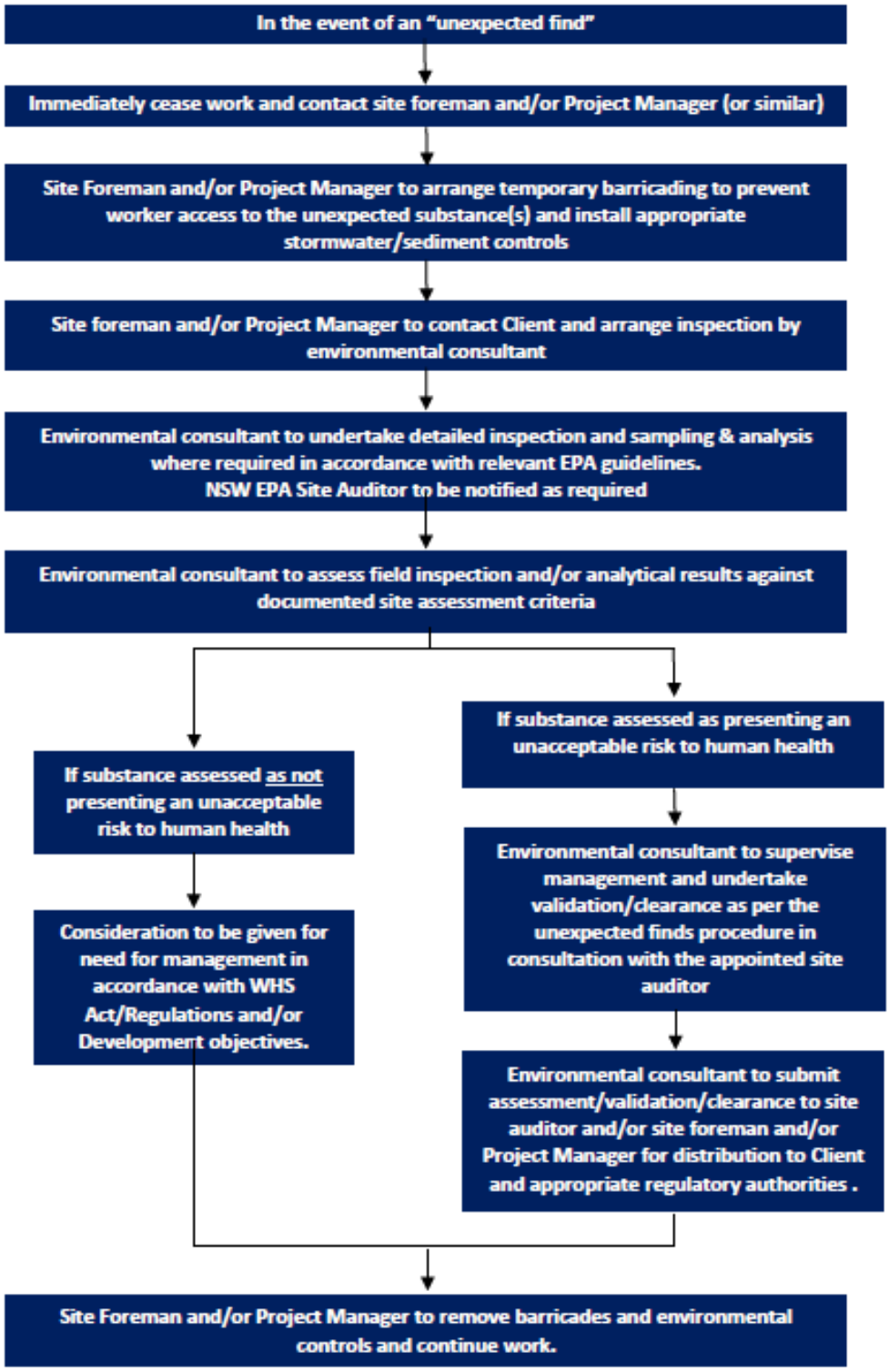
richardcrookes.com.au

Delivering Certainty

6.6 UNEXPECTED FINDS PROTOCOL (UFP) – UXO & CONTAMINATION

The objective of this protocol is to provide an appropriate UFP presenting a framework Providing the actions required to adequately protect human and environmental health should small scale unexpected finds relating to potential soil and/or groundwater contamination be identified during the proposed development works.

In the event that unexpected contamination conditions are identified, application of this UFP will include proponent engagement of an independent site auditor to review the assessment works completed and provide confirmation to the proponent that the assessment and any subsequent management and/or remediation has been completed to an appropriate standard in accordance with relevant NSW EPA Guidelines and/or NSW legislation/regulations as in force at the time of the audit. The process is outlined in the below flowchart:



All unexpected finds identified on site should be documented in an **unexpected find register** by the Principal Contractor. An example register is provided below. A copy will be made available onsite to allow initial documentation of any unexpected finds and to provide a record of successfully managed unexpected finds.

Unexpected Find ID	Contaminant Identified	Location	Characterisation Sample Lab Batch	Classification	Validation Sample Lab Batch	Validation Achieved?

The below poster will be displayed on site, to prompt the broader site to remain vigilant when it comes to unexpected finds and the UFP.

MANAGEMENT PROTOCOL IN EVENT OF DISCOVERY OF EXPLOSIVE ORDNANCE (EO), UNEXPLODED ORDNANCE (UXO) or EXPLOSIVE ORDNANCE WASTE (EOW)

Purpose

This Protocol describes the procedure to be followed in the unlikely event that Explosive Ordnance (EO), Unexploded Ordnance (UXO) or Explosive Ordnance Waste (EOW) is discovered at the site

Potential Ordnance Risk

A UXO Risk Assessment has assessed the risk of encountering an item of UXO or EO within the site is negligible and is already 'As Low As Reasonably Practicable' (ALARP).

Nonetheless, there can be no guarantee that no such items will ever be encountered. As such, it is appropriate to have an established Protocol to follow in the very unlikely event that such an item is found. This Protocol has been developed to guide the project in the unlikely event that a worker finds an item of UXO, EO or EOW.

Identification and Characteristics of Explosive Ordnance Waste (EOW)

EOW is the waste material, such as packaging, fragmentation or casings, of munitions that have been fired or used. EOW poses no threat. However, it should not be handled unless essential to do so and only then if (a) it is 100% definite that the item is EOW and (b) it is necessary to shift it.

You MUST report each find of EOW to your supervisor/site management

Identification and Characteristics of Explosive Ordnance (EO) & Unexploded Ordnance (UXO)

EO and UXO is any military munition that still contains explosive material. Basically, it looks like what you would expect a military munition to look like.

IF YOU FIND EO, UXO OR ANY SUSPICIOUS ITEM, YOU MUST TREAT IT AS A UXO.
DO NOT TOUCH IT!!
IMMEDIATELY REPORT IT TO YOUR SUPERVISOR/SITE MANAGEMENT

UXO Awareness

Remain aware of your surroundings, do not touch or go near any UXO or suspicious items and report any suspicions or concerns about UXO to your Supervisor/Site Management.

Avoid radio transmissions or use of mobile phones within a 50-metre radius of any UXO and keep vehicles with VHF/HF radios at least 150 metres away from UXO.

ACTION TO BE TAKEN IF A SUSPICIOUS ITEM IS ENCOUNTERED

1. If UXO, a munition or suspicious item is found, **STOP** all work **IMMEDIATELY** within **50 metres** of the location of the item and **NOTIFY** all other people within the immediate area.
2. **DO NOT TOUCH THE ITEM**!
3. If possible, place a recognisable marking nearby but at a safe distance from the item so it can be easily found again and take a digital photograph of the item that can be forwarded to Police if appropriate.
4. All people are to **WITHDRAW** from the immediate area (minimum of 50 metres) as soon as possible.
5. Immediately **REPORT** the item to a **SUPERVISOR/SITE MANAGEMENT** and provide the following detail:
    - The **LOCATION** of the item.
    - A **DESCRIPTION** of the shape, colour, material and approximate dimensions of the item (gathered without physically touching the item).
    - Any **MARKINGS ON THE ITEM** (again, identified without physically touching the item).
    - The location and markings placed near the item.
6. The **SUPERVISOR** is to:
    - Ensure all people are **WITHDRAWN** from the immediate area.
    - **ISOLATE** the area.
    - **PREVENT** movement into the area.
    - **NOTIFY SITE MANAGEMENT** at the work site.
7. **SITE MANAGEMENT** will notify the local Police of the find. They, in turn, will notify Defence and request that they investigate and deal with the item.
8. Work is **NOT** to **RECOMMENCE** within the immediate area of the item until it has been dealt with by Police or Defence and **SITE MANAGEMENT** has notified that it is safe to re-enter the area.

6.7 UNEXPECTED FINDS PROTOCOL – ABORIGINAL AND NON-ABORIGINAL HERITAGE

As documented within the Aboriginal Archaeological Assessment Report conducted by AMAC and SAS in June 2021, which noted the below UFP procedure

If any Aboriginal archaeological deposits and/or objects are located during the development, then the following should take place:

- All work is to cease in the immediate vicinity of the deposits and/or objects
- The area is to be demarcated
- DPIE, a qualified archaeologist and the participating RAPs are to be notified.

Should any human remains be located during the development, then the following should take place:

- All excavation in the immediate vicinity of any objects of deposits shall cease immediately;
- The NSW police and Heritage NSW Enviroline be informed as soon as possible:
- Once it has been established that the human remains are Aboriginal ancestral remains, DPIE, and the relevant Registered

6.8 CONSTRUCTION TRAFFIC AND PEDESTRIAN MANAGEMENT SUB-PLAN

The Construction Traffic & Pedestrian Management Sub-Plan has been prepared by Jim's Traffic Control for the Project.

It is not embedded in this document; it is supplied as an attached appendix so that it can be displayed/updated/revised in isolation if required.

Version 3.1
3/03/2022

Construction Traffic and Pedestrian Management Plan

Job Site Hawkesbury Centre of Excellence

RICHARD CROOKES CONSTRUCTIONS

Jim's Traffic Control

Table of Contents

About This Project

Background:

This CTPMP relates to SSD-15001460 for the development works at the Hawkesbury Centre of Excellence
Company responsible for Construction: Richard Crookes Construction®
Approved: TBC
Consent to Operate from: TBC
Consent to Lapse on: TBC

Location:

The Work Site is located at Hawkesbury Centre of Excellence

Figure 1 – Location of Work Site

Figure 2 – Location of Work Site

Purpose:

The Purpose of this report is to satisfy the TfNSW and NSW Government Department of Planning and Environment requirements and describe how Richard Crookes Construction® proposes to manage traffic and pedestrian movements safely whilst carrying out their respective activities.

Objectives:

The key objectives of this CTPMP are:

- To satisfy TfNSW and NSW Government Department of Planning and Environment conditions related to Traffic, Transport and Access.
- To ensure no one is injured on the project and there is no property damage.
- To maximize the value and outcomes of traffic monitoring activities.
- To actively monitor traffic impacts related to the construction works so that information can be applied to the planning and implementation of traffic control plans.
- To minimise delays to traffic and consider the needs of all road users.
- Ensure compliance with relevant specifications and the TfNSW's – 'Traffic Control at Work Sites' Manual Version 6.

Condition Satisfaction Table:

Condition	Section Reference
B15. The Construction Traffic and Pedestrian Management Sub-Plan (CTPMSP) must be prepared to achieve the objective of ensuring safety and efficiency of the road network and address, but not be limited to, the following: (a) be prepared by a suitably qualified and experienced person(s); (b) be prepared in consultation with Council and TfNSW; (c) detail: (i) measures to ensure road safety and network efficiency during construction in consideration of potential impacts on general traffic, cyclists and pedestrians and bus services; (ii) measures to ensure the safety of vehicles and pedestrians accessing adjoining properties where shared vehicle and pedestrian access occurs; (iii) heavy vehicle routes, access and parking arrangements; (iv) the swept path of the longest construction vehicle entering and exiting the site in association with the new work, as well as manoeuvrability through the site, in accordance with the latest version of AS 2890.2; and (v) arrangements to ensure that construction vehicles enter and leave the site in a forward direction unless in specific exceptional circumstances under the supervision of accredited traffic controller(s).	(a) P21 (b) P18 (c) (i) P5, P15, P17, P22 (ii) P15, P17, P18, P22 (iii) P6, P7, P8, P9, P10, P22, P24, P25, P26, P27, (iv) P24, P25, P26, P27, P28 (v) P23, P24, P25, P26, P27, P28
B21. A Driver Code of Conduct must be prepared and communicated by the Applicant to heavy vehicle drivers and must address the following: (a) minimise the impacts of earthworks and construction on the local and regional road network; (b) minimise conflicts with other road users; (c) minimise road traffic noise; and (d) ensure truck drivers use specified routes.	(a) P18 (b) P18 (c) P18 (d) P18

Construction

Construction Activities:

Stage 1: Site Establishment (2 weeks)
Stage 2: Substructure (3 months)
Stage 3: Structure (3 months)
Stage 4: Roofing and Façade (2 months)
Stage 5: Finishes and Services (2 months)
Stage 6: Landscaping and Completion (1 month)
Stage 7: Site Demobilisation (2 weeks)

Working Hours:

Monday – Friday: 7am – 6pm
Saturday: 8am – 1pm
No work is permitted on Sundays or Public Holidays
No Heavy Vehicle (Semi-Trailers, Low Loaders or Truck and Dog) access during school zone hours (8am – 9:30am, 2:30pm – 4pm, Monday – Friday)

Work Zones:

There will be no Work Zones in place for this project. Works will be conducted from the confines of the site during construction. Prior to the commencement of construction works, for occupation of any part of the footpath or road carrying out work, storage of building materials and the like, an application for a Road Occupancy Permit must be submitted to the relevant authority. A Road Occupancy Licence must be obtained from the relevant road authority for any works that impact on traffic flows during construction activities.

Access/Egress of Vehicles:

Vehicles will move in and out of the site in a forward direction. A speed limit of 5km/h will be maintained at all times whilst within the site area. Advanced warning and directional signage will be placed upon entry and exit of the construction site. The signage will guide drivers to the construction site.

The vehicles' movement will be carried out taking into consideration the surrounding building and roads. Mitigation measures will be put in place and a traffic control plan has been developed to ameliorate conditions.

All exiting trucks will be loaded to their prescribed weight limits. All trucks will be covered by tarpaulin or like prior to exiting the site as required. All vehicles leaving the site must be free of mud or any other debris. The Site manager is responsible for all vehicles accessing and egressing the site. At points of vehicle egress the driver will ensure vehicles give way to pedestrians and cyclists before exiting.

During times of Access and Egress, certified RMS accredited Traffic Controllers will be on site.

This CTPMP and all plans associated with it will be given to all drivers visiting the site prior to arrival.

Figure 3 – Main Access Route

Access Routes:

Access to the site will take place at one location. This will be from the Western end of Vines Drive as seen below.

Vehicles accessing the site will use State roads unless otherwise stated in this document.

1. Vehicles will approach the site using the Access routes outlined in this document.
2. Vehicles accessing the site using either the Eastern, Southern or Western Access Routes below.
3. Vehicles accessing the site will do so as shown below, moving in a forward direction.
4. Certified traffic controllers will be on site to assist with significant vehicle movements to the site.

Eastern Access:

171-163 Macquarie St
Windsor NSW 2756

- Head south-west on Macquarie St/A9 towards Brabyn St — 4.1 km
- At the roundabout, take the 2nd exit onto Blacktown Rd — 1.0 km
- Turn left onto The Driftway — 3.9 km
- Turn right onto Londonderry Rd — 1.4 km
- Turn right onto Vines Dr — 550 m

J5a
Richmond NSW 2753

Western Access:

9 Bells Line of Rd
North Richmond NSW 2754

- Head south-east on Bells Line of Rd/B59 — 950 m
- Turn right onto Old Kurrajong Rd — 240 m
- Continue onto Yarramundi Ln — 400 m
- Turn left onto Inalls Ln — 1.4 km
- Continue onto Southee Rd — 1.3 km
- Turn right onto Londonderry Rd — 35 m
- Turn left onto Vines Dr — 550 m

J5a
Richmond NSW 2753

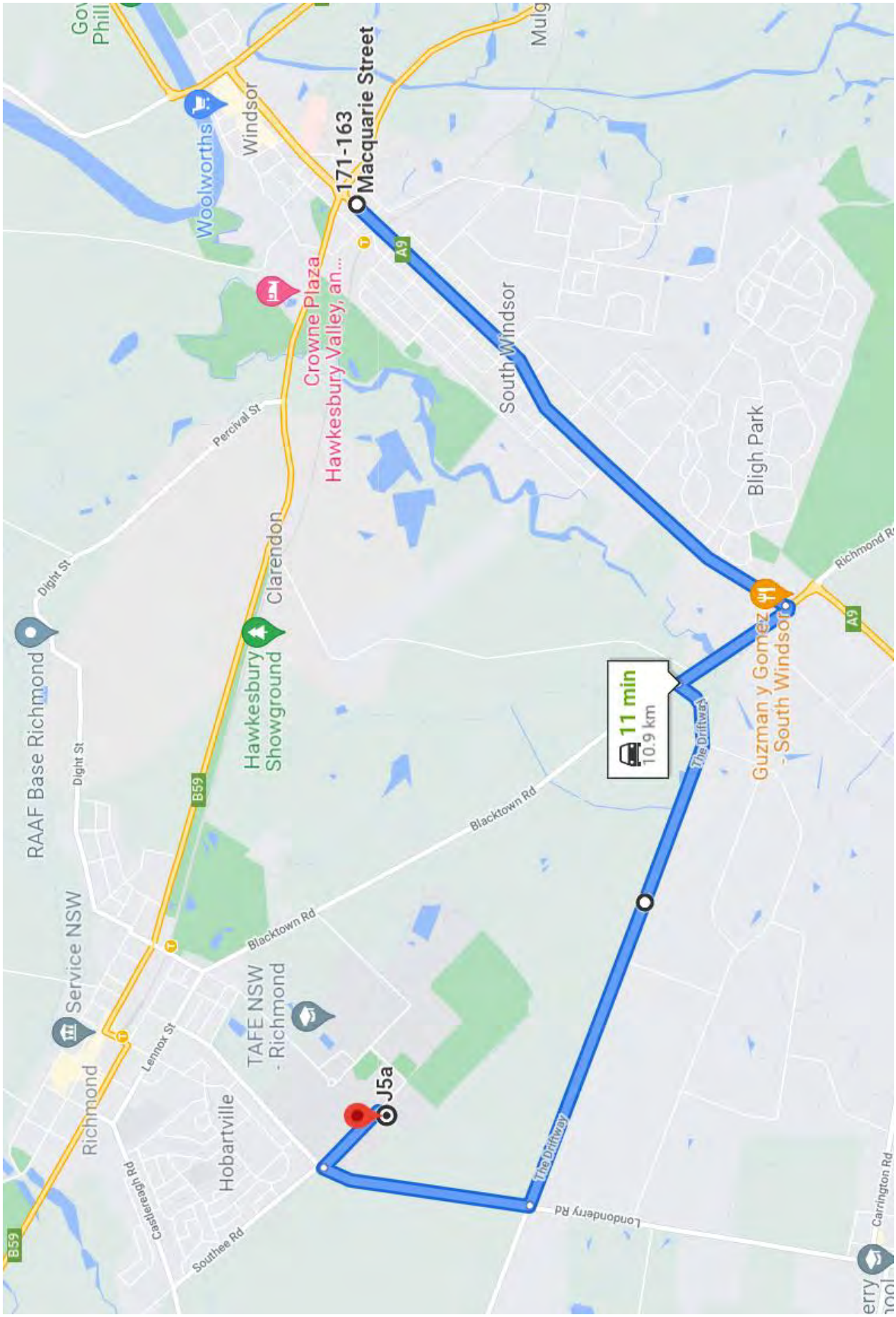
Southern Access:

794-810 The Northern Rd
Llandilo NSW 2747

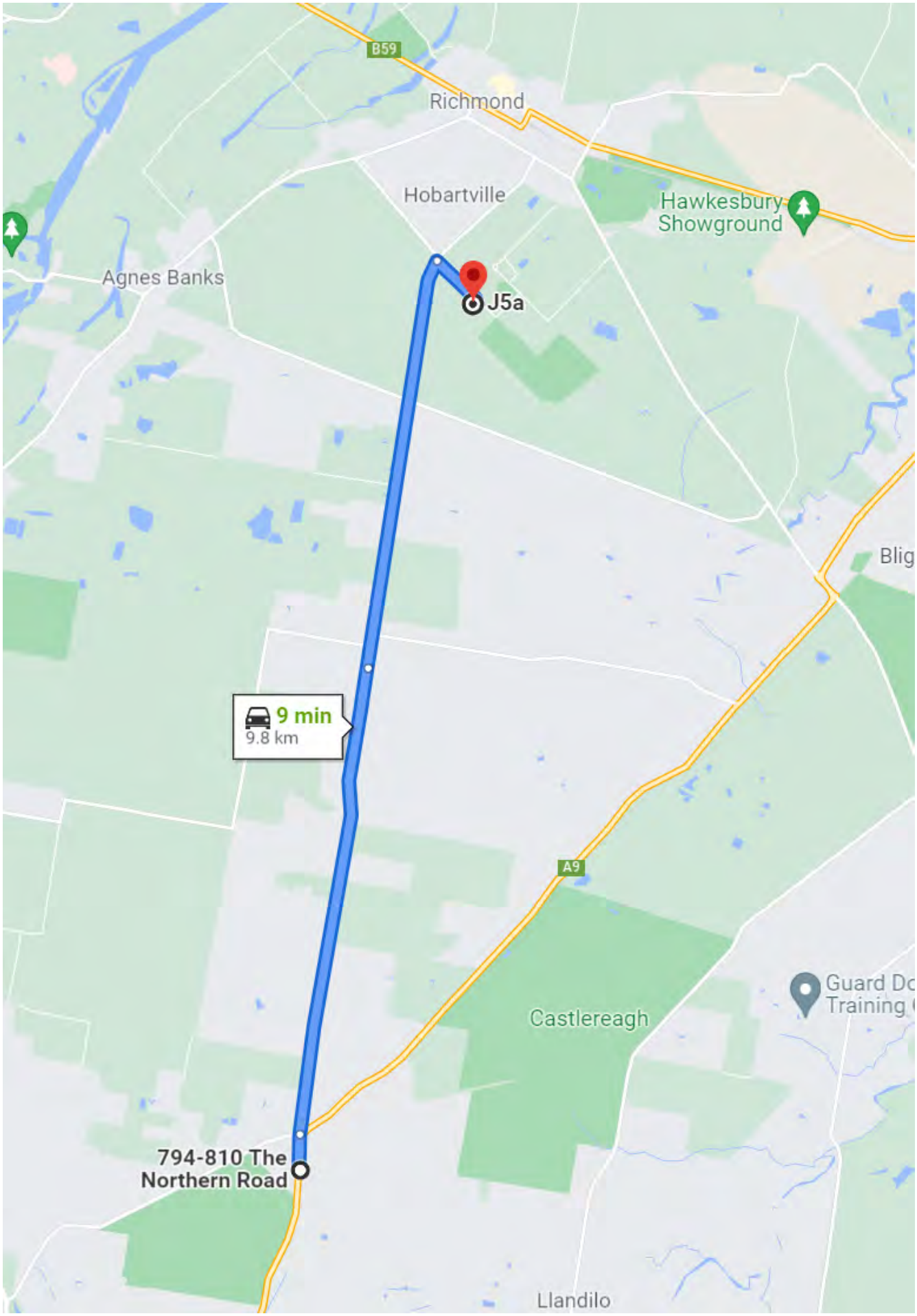
- Head north on The Northern Rd/A9 towards Fourth Ave — 350 m
- At the roundabout, take the 2nd exit onto Londonderry Rd — 4.8 km
- Continue straight to stay on Londonderry Rd — 4.2 km
- Turn right onto Vines Dr — 550 m

J5a
Richmond NSW 2753

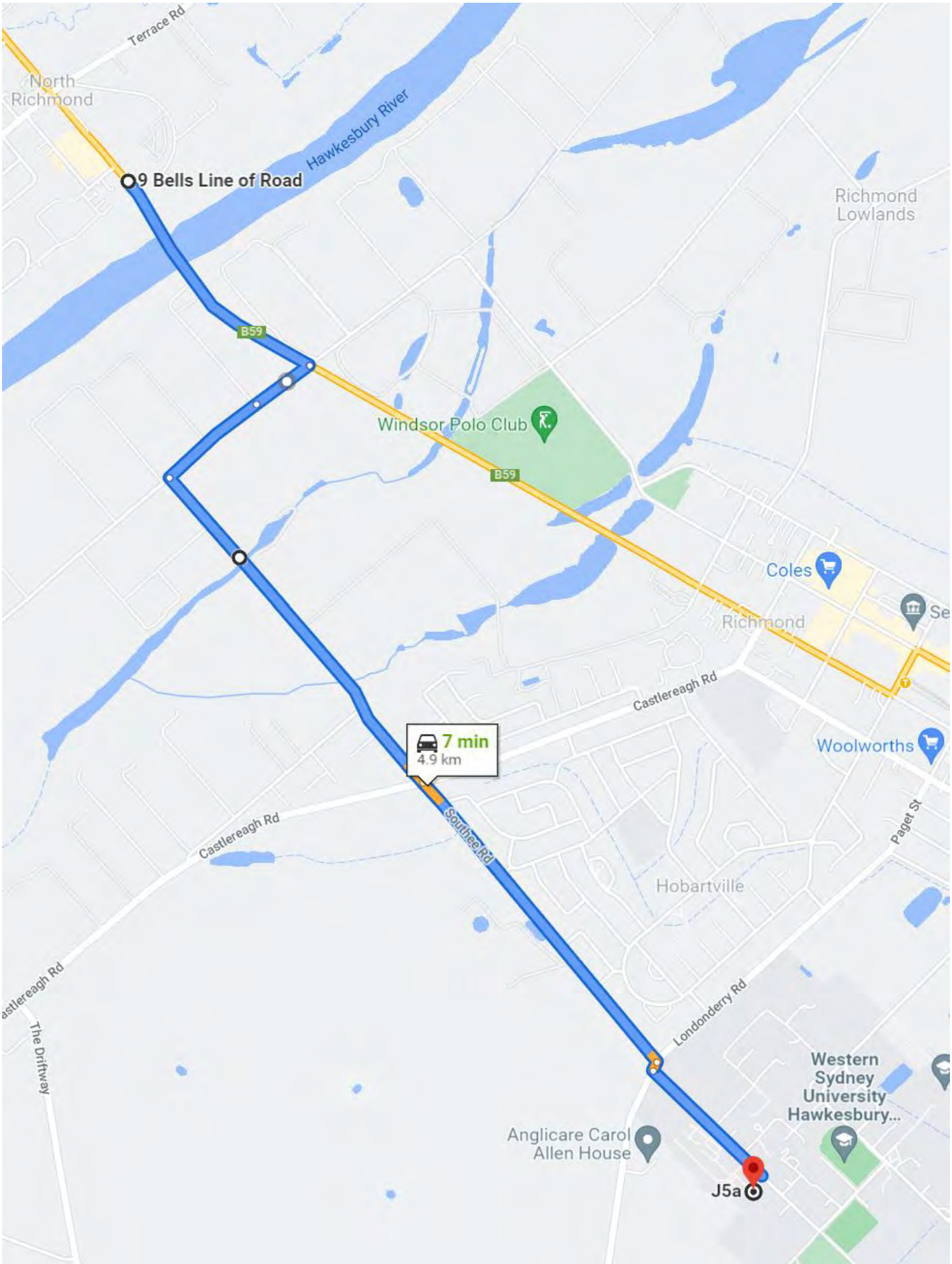
Eastern Access



Southern Access



Western Access



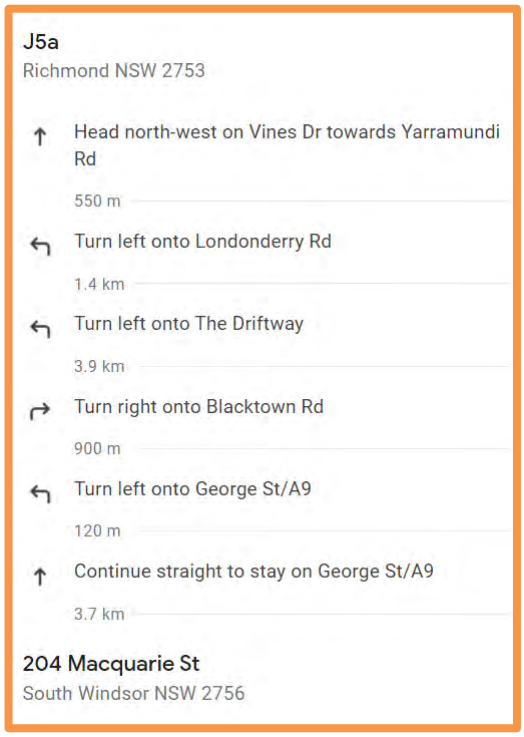
Egress Routes:

Exiting trucks will be loaded to their prescribed weight limits. All trucks will be covered by tarpaulin or like prior to exiting the site as required and will exit the site on the following basis:

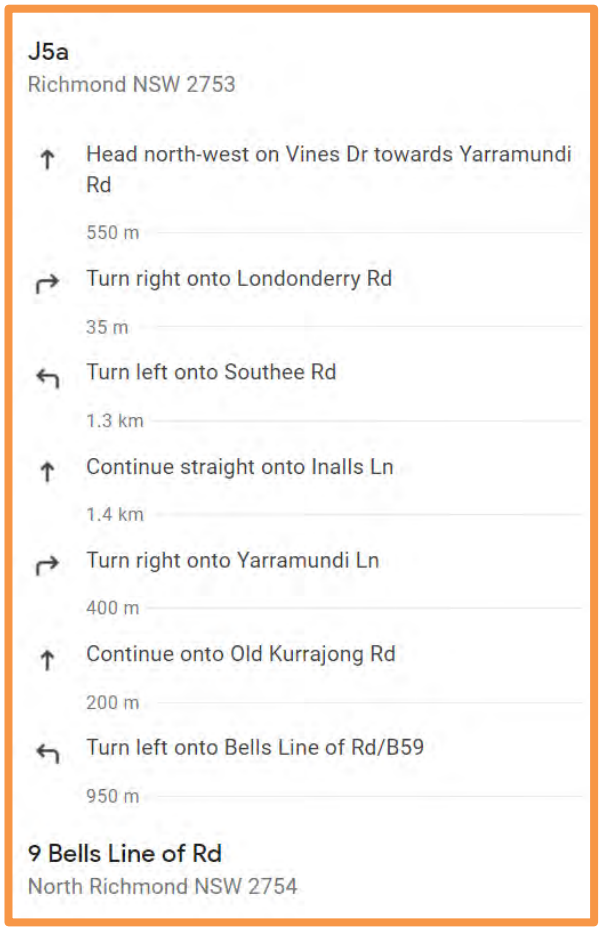
Egress from the site will be from one location as with the access point – Western end of Vines Drive as seen below.

1. Vehicles will exit the site using caution and are to give way to pedestrians, cyclists or vehicles already on the road.
2. Vehicles exiting the site will follow either the Eastern, Southern or Western egress routes below.
3. Vehicles exiting the site will do so as shown below, moving in a forward direction.

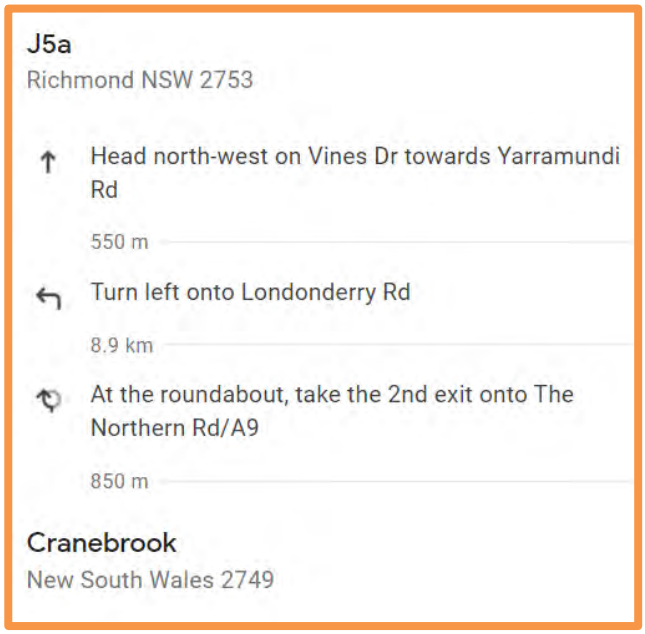
Eastern Egress:



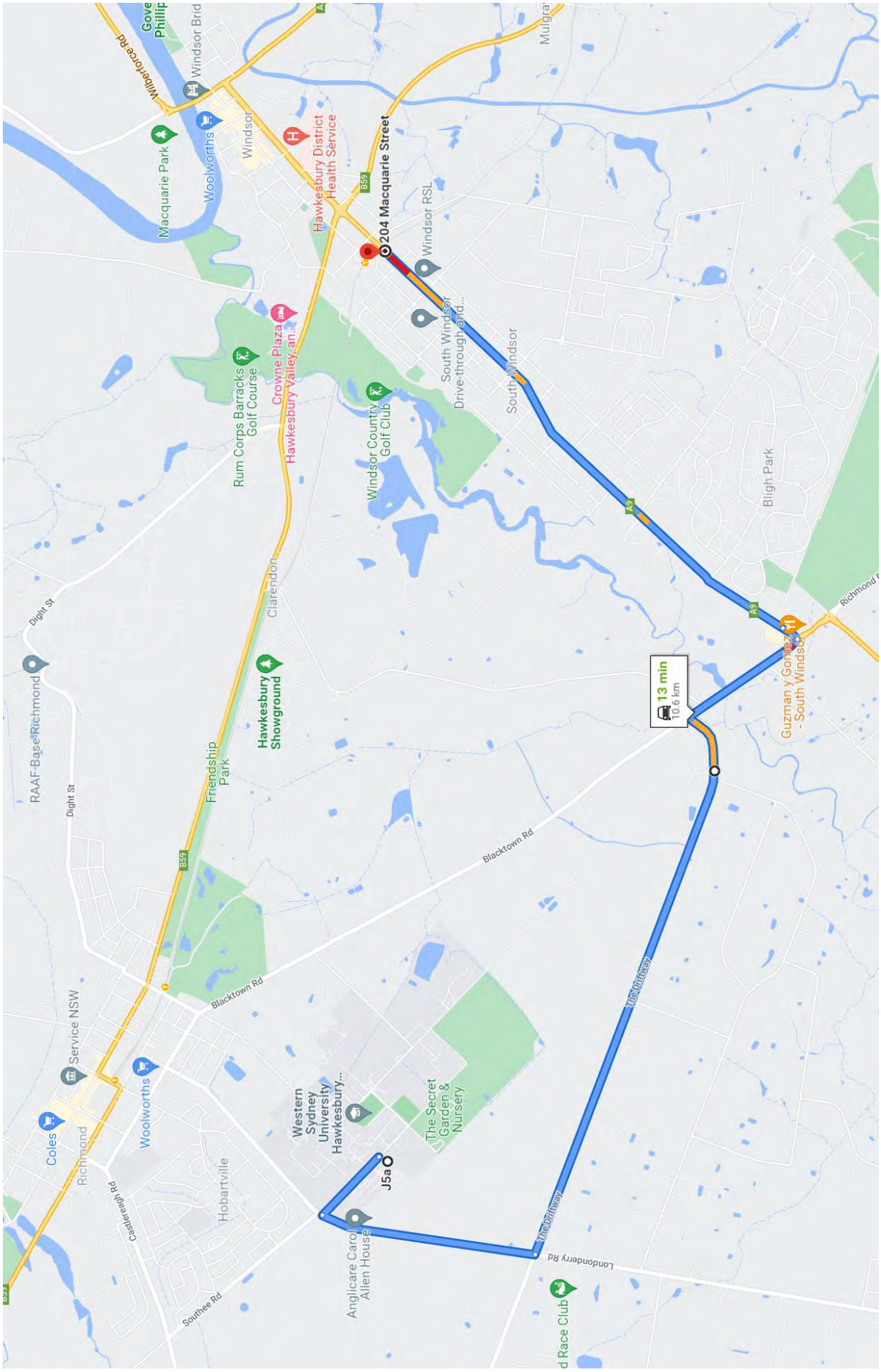
Western Egress:



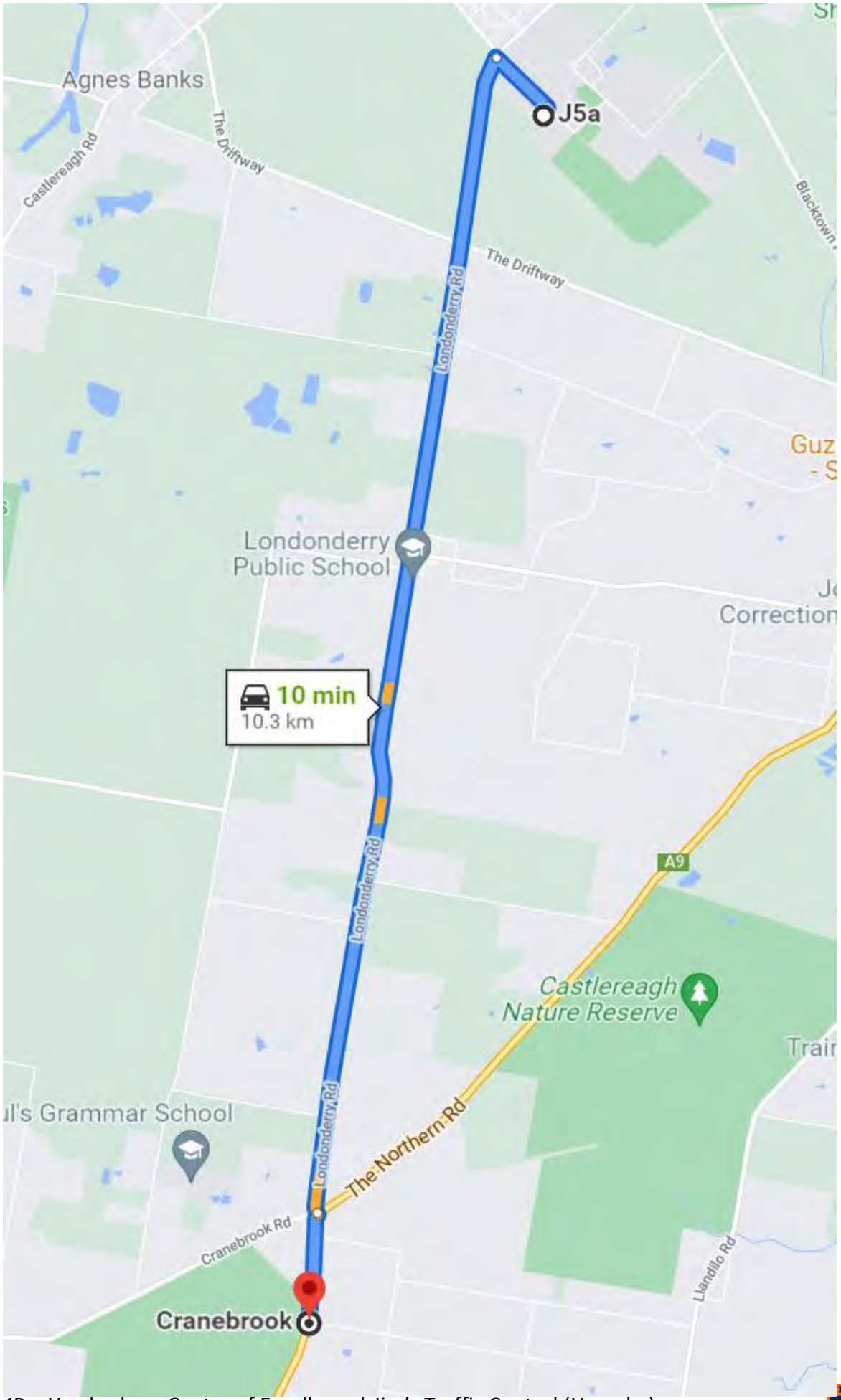
Southern Egress:



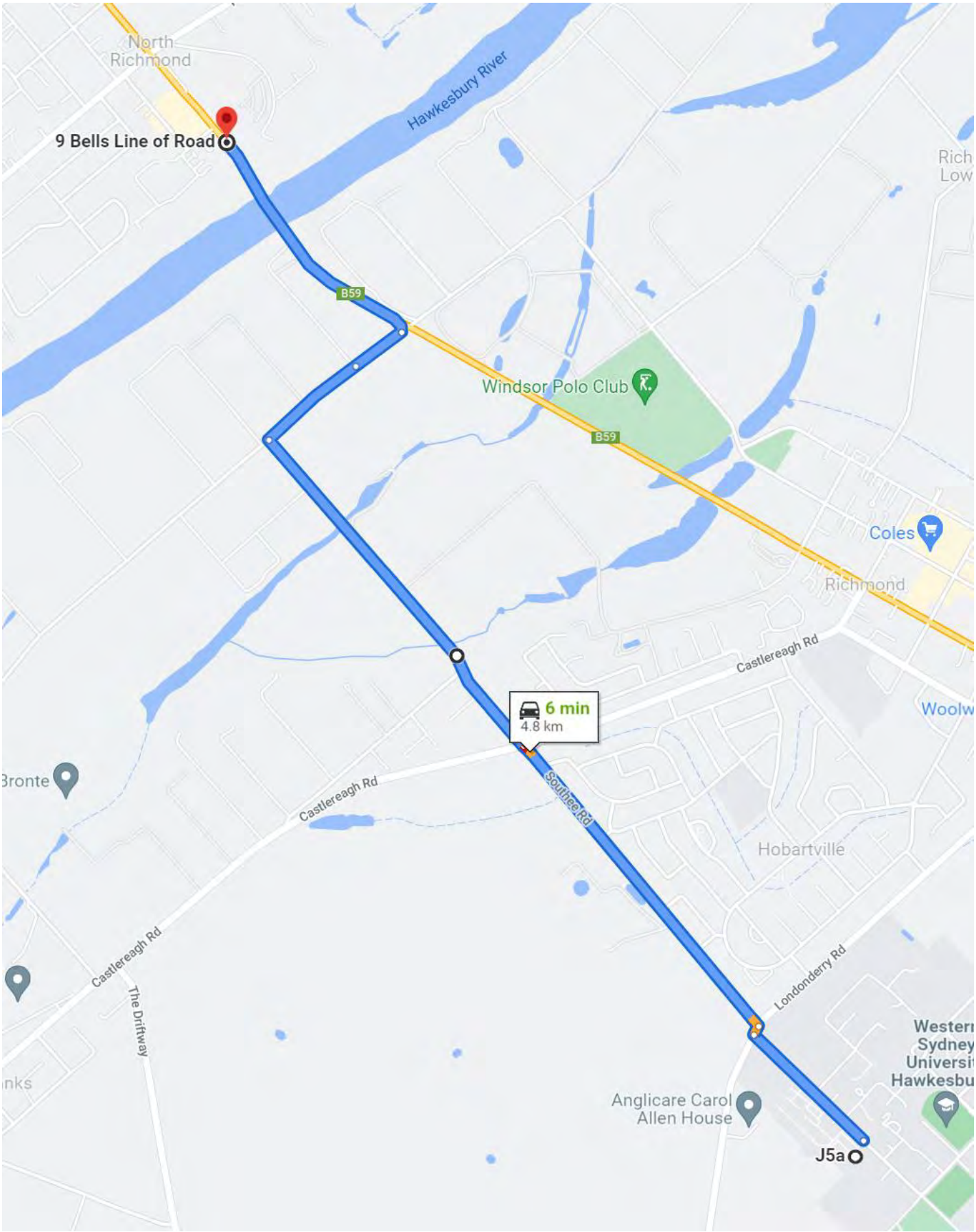
Eastern Egress



Southern Egress



Western Egress

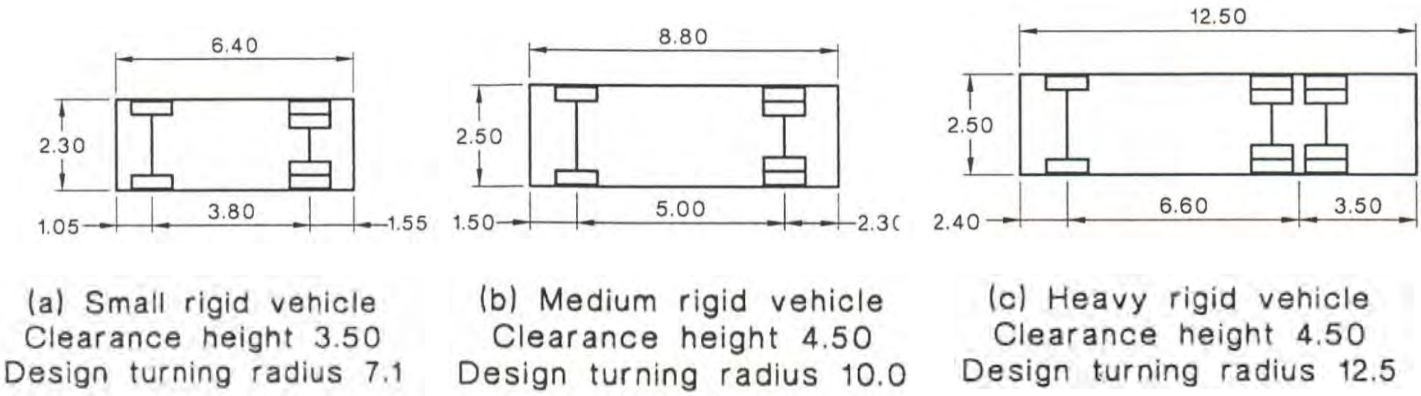


Transport Vehicles:

Richard Crookes Construction® will have an active and ongoing involvement in the management and monitoring of works during the construction phase. They will ensure, as previously mentioned, that no vehicle will make deliveries outside NSW Government Department of Planning and Environment approved DA times as well as that all delivery vehicles will arrive at pre-arranged times to the site. All vehicles approaching the work site will adhere to the road rules and observe any signage in place. At all times access to bike and footpaths will remain unobstructed and consultation with local residents will be ongoing.

Loading and unloading of vehicles will be done onsite within the property boundaries. There will be a combination of small rigid vehicles (SRV's 6.4m), medium rigid vehicles (MRV's 8.8m), Heavy Rigid Vehicles (HRV's 12.5m) and Bulk Excavation/Block Delivery vehicles (AV's 19m) accessing and egressing from the site. The largest vehicle accessing and egressing the site will be an AV.

Oversized vehicles using local roads require approval from the National Heavy Vehicle Regulator (NHVR). The Applicant must submit an application for an Oversize Vehicle Access Permit through NHVR's Portal prior to driving oversize vehicles through local roads within the Hawkesbury City local government area.



(a) Small rigid vehicle
Clearance height 3.50
Design turning radius 7.1

(b) Medium rigid vehicle
Clearance height 4.50
Design turning radius 10.0

(c) Heavy rigid vehicle
Clearance height 4.50
Design turning radius 12.5

Stage	Movements at peak	Range of vehicles during stage	Largest Vehicle
Site Establishment	2-6/day	MRV, HRV	HRV
Substructure	8-12/day	MRV, HRV	HRV
Structure	25-30/day	MRV, HRV, AV	AV
Roofing and Façade	5-10/day	MRV, HRV, AV	AV
Finishes and Services	10-15/day	MRV, HRV, AV	AV
Landscaping and Completion	8-12/day	SRV, MRV, HRV	HRV
Site Demobilisation	2-6/day	MRV, HRV	HRV

Tower Cranes and Mobile Cranes:

No tower cranes will be on site. Mobile cranes will be used onsite as required.

Site Sheds, Removal and Storage of Rubbish or Spoil:

All waste/material will be collected on site in a position for easy access for both use on site and removal by trucks. As previously described, all removal trucks will have the load covered by tarpaulin or other means to secure the load.

Impacts and Management

Road/Lane Closures:

The proposed works will not require any road or lane closures.

Pedestrians and cyclists:

All works will take into consideration pedestrians and cyclists. Advanced warning signage will be in place to warn pedestrians of the entry and exiting of vehicles to and from the site.

Only authorised personnel will be permitted within the building site unless accompanied by site management if not inducted to the site. ATF Fencing will surround the shared boundary between the site and adjoining properties. A-class hoardings will be used on the street frontages. Whilst within the confines of the building site, all personnel will attire in correct PPE to ensure that they are visible to moving traffic.

No change to the footpaths/bike paths will be made, pedestrians will follow the pathways as normal, likewise for cyclists. Certified traffic controllers will be on site during times of vehicular movements and heavy loading.

Public Transport:

The works will not impact the local public transport network.

East Richmond Station is located approx. 2.7m from the site. Bus routes 677 run along Londonderry Road approx. 550m from the site.

Parking:

Contractors will be encouraged to use public transport and carpool where possible. Facilities will be provided on site for contractors to store tools to reduce the need to bring vehicles to site each day to carry their tools. Richard Crookes Construction® will provide onsite parking for the duration of the works.

Emergency Vehicles:

Emergency services will not be affected by the proposed works. If the case, any emergency vehicle required for the site will be given priority and will enter from either end of Vines Drive or Maintenance Lane.

Access to Properties and Noise:

The works will not affect access to properties, using pre-arranged arrival times will help to control disturbance (with the required ongoing consultation with residents). Regarding noise impacts Richard Crookes Construction® will keep all noise associated with the works to a minimum. Likewise, no noise will be made outside the approved hours for the site.

Disruption to Neighbours/Residents:

During each stage of work the disruption to residents will be minimised by using the routes highlighted in this CTPMP which aims to reduce travel distance through residential areas as well as eliminate movements through shopping and significant public areas. Disruption to neighbours will be minimised by using pre-arranged arrival times for construction vehicles, ensuring no construction vehicles are illegally parked on Council/RMS roads and by conducting a letterbox drop to affected neighbours if any out of hours or disruptive works are required.

Drivers' Code of Conduct:

The below detail the site-specific code of conduct for construction vehicle drivers in addition to the general code of conduct (provisioned by the drivers PCBU) applicable to the vehicle used:

- Be inducted to the site and follow site specific requirements covered in the site induction, toolbox talks, SWMS and pre-start meetings.
- Drivers will strictly adhere to the speed limits both outside and within the site. Speed limits inside the site are generally limited to 5km/h unless otherwise specified and require a spotter in busy/high pedestrian activity areas.
- Drivers must follow their PCBU's fatigue management scheme and ensure this meets the arrival/departure times of Richard Crookes Construction® prior to arriving to site. If timings conflict, the driver must negotiate with Richard Crookes Construction® to ensure a layover area is reserved for the incoming vehicles within the site.
- Compression breaking is to be kept to a minimum whilst within residential areas to minimise the creation of excessive noise that could disturb residents/neighbours.
- Vehicle noise will be kept to a minimum by turning vehicle engines off whilst stationary. Vehicles are not to stay in idle for long periods of time.
- All trucks are to be covered by tarpaulin or like prior to exiting the site. All vehicles leaving the site are to be free of mud or any other debris. Wheel wash facilities are to be used prior to leaving the site.
- Drivers will only use the approved access/egress routes identified within this CTPMP.
- Vehicles are not to park illegally on any RMS or council roads. Whilst within the site area they will be parked wholly within the work zone or site.
- Drivers must follow the instruction of traffic controllers for access/egress movements to the site.
- Ensure vehicles are wholly contained within the work zone and vehicles come to a complete stop before exiting the vehicle or beginning and loading/unloading.
- Heavy Vehicle Access to not occur during school zone hours.
- Drivers to remain within vehicle until within the site and parked in a secure location out of internal access/egress routes.

Council/Third Party Consultation:

Richard Crookes Construction® where required as part of Condition A8 will consult with relevant parties prior to the initiation of the project and revert consultation details, outcomes of matters resolved and unresolved as well as any disagreements back to council.

Tree Protection:

There are Tree protection zones indicated on this site (Refer to Arborist report).

Environmental:

A range of measures will be in place to manage and minimise any possible impact on the environment in regards to dust control and air emissions. Such measures will include, but not limited to:

- Containment and removal of any hazardous material in accordance with EPA regulations.
- Inclusion of wash down bays or shaker rams.
- Regular cleaning of streets.
- Erosion and Sediment control to perimeter and access road.
- Wheel wash facilities for all vehicles entering and exiting the site.
- Speed limits will be reduced on site to reduces dust and exhaust emissions.
- Monitoring of air emissions throughout the construction process similarly, noise pollution will be minimised through a range of measures such as:
    - Control of noise at source where practicable (e.g. using screenings, shielding).
    - Use of noise suppression covers when plant and machinery in operation.
    - Use of electrically powered plant where possible.
    - Where possible, noisy plant equipment will be kept away from sensitive noise boundaries or alternatively within enclosures.
- Stockpiling of sand, soil and other material shall be stored clear of any drainage line or easement, tree protection zone, water bodies, footpath, kerb or road surface.

A contingency plan to manage any unpredicted impacts and their consequences, to ensure that ongoing impacts reduce to levels below relevant impact assessment criteria as quickly as possible can be referenced in the Richard Crookes Construction® CEMP.

Traffic Control Plan (TCP)

A TCP is defined in the TfNSW TCWS Manual Version 6 as a diagram showing signs and devices arranged to warn traffic and guide it around, past or, if necessary through a work site or temporary hazard. The proposed TCP is located in Appendix B.

Objectives:

The provision of a save environment for road users and works staff is a key objective of Richard Crookes Construction®. The TCP was developed with the aim to:

- Warn drivers of changes to the usual road conditions.
- Inform drivers about changed conditions.
- Guide drivers through the work site.
- Ensure the safety for workers, motorists, pedestrians and cyclists.

Context:

The TCP's prepared were based on the principles and measured outlined in this CTPMP, which details the road safety and traffic principles, strategies and measure that will be applied to enable Richard Crookes Construction® to fulfil its obligations and the requirements of relevant authorities.

The TCP's were designed to address the following issues where applicable:

- Use of traffic control devices.
- Speed limit requirements.
- Provision of pedestrian traffic and their safety.
- Provision for cyclists and their safety.
- Provision for vehicle and plant movements.
- Parking restrictions and parking facilities.
- Provision for trade vehicles and plant movements.
- Informing all site personnel of any high-risk areas.
- Providing adequate signage within the construction site for access and egress.

Traffic Controllers:

Only certified traffic controllers will undertake this activity. The placement of signs will be done so by a qualified Implement TCP Holders as per the Australian Standards 1742.

TCP Monitoring and Reporting:

Specific measures for TCP reporting will be taken. These will include, but not be limited to the following:

- The traffic control plan will be numbered, and a register maintained as a part of the CTPMP.
- All traffic control devices and traffic control arrangements will be inspected daily to ensure the adequacy of such devices and arrangements as per the TfNSW TCWS Manual Version 6.
- Traffic management records and plans will be maintained as well as record/log.
- Richard Crookes Construction® may be required to provide records in the following event instances:
    - That a breach imposed by the NSW Police Service, on a motorist who does not comply with a regulatory sign is challenged in courts or,
    - In the event of an accident is alleged to have occurred when temporary traffic control is in place.
- Ongoing and frequent onsite reviews of traffic management setups and conditions will be reviewed with Richard Crookes Construction® for the duration of the project at (but not limited to):
    - The beginning of each new phase
    - The beginning of a new major activity (e.g. concrete pours, mobile crane usage etc)

Credentials:

The TCP was prepared by Dwayne Perera, TfNSW Prepare a Work Zone Traffic Management Plan Number 0052272006.

Traffic Control Signs and Devices:

Traffic control devices are an important tool for influencing the safety of road users, in particular where temporary traffic controls are implemented at work sites. During the construction of this project Richard Crookes Construction® will assess the warrant for traffic control devices in accordance with the relevant guides/standards such as: TfNSW TCWS Manual Version 6, Australian Standard – AS1742 Manual of uniform traffic control devices, and any relevant documents listed on the 'RMS Guide to Signs and Marketing reference list' to make sure that all the traffic control devices are installed and maintained correctly.

The provision of timely, clear and consistent messages to road users is essential. Richard Crookes Construction® will ensure all signs and devices installed during the construction of this project are:

- Assessed for use in accordance with the appropriate warrants.
- Manufactured in accordance with the requirements of the Australian Standards.
- Installed in accordance with the relevant guides and standards.
- Not contradictory to existing signs or markings.
- When unwarranted, covered or removed.
- Regularly maintained and repaired/replaced when damaged.

All signposting installed throughout the project will comply with the requirements outlined in the TfNSW TCWS Manual Version 6, AUSTROADS Guide to Traffic Engineering Practice, Part 8 – Traffic Control Devices and the Relevant parts of Australian Standard 1742.

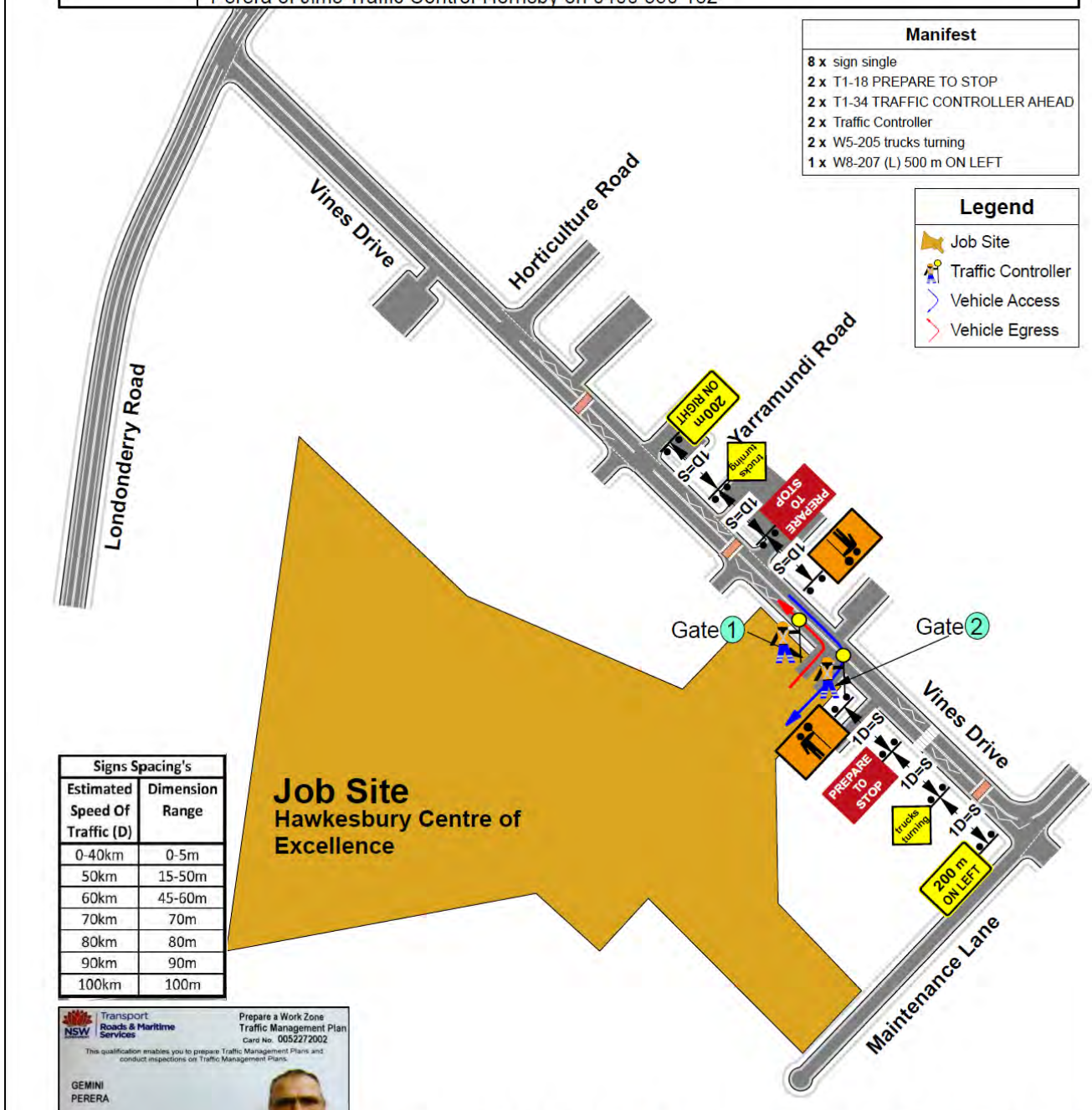
Appendix A TCP and Swept Paths:

Date: 28/01/2022 **Author:** Gemini Perera **Project:** Hawkesbury Centre of Excellence
Client: Richard Crookes Construction **Contact:** Kayan Tabbouche **Phone:** 0477 974 850

Comments:

This plan was designed by Gemini Perera of Jim's Traffic Control - Hornsby in accordance with Australian Standards and the TfNSW's Traffic Control on Worksite Manual Version 6.0. The plan is designed for the safe access and egress of construction vehicles to and from the Hawkesbury Centre of Excellence. During work traffic and pedestrians will be intermittently stopped to allow truck movements. Certified Traffic Controllers will be on site to implement and monitor this TCP. If you have any question please contact Gemini Perera of Jims Traffic Control-Hornsby on 0400 350 182

Manifest
8 x sign single
2 x T1-18 PREPARE TO STOP
2 x T1-34 TRAFFIC CONTROLLER AHEAD
2 x Traffic Controller
2 x W5-205 trucks turning
1 x W8-207 (L) 500 m ON LEFT



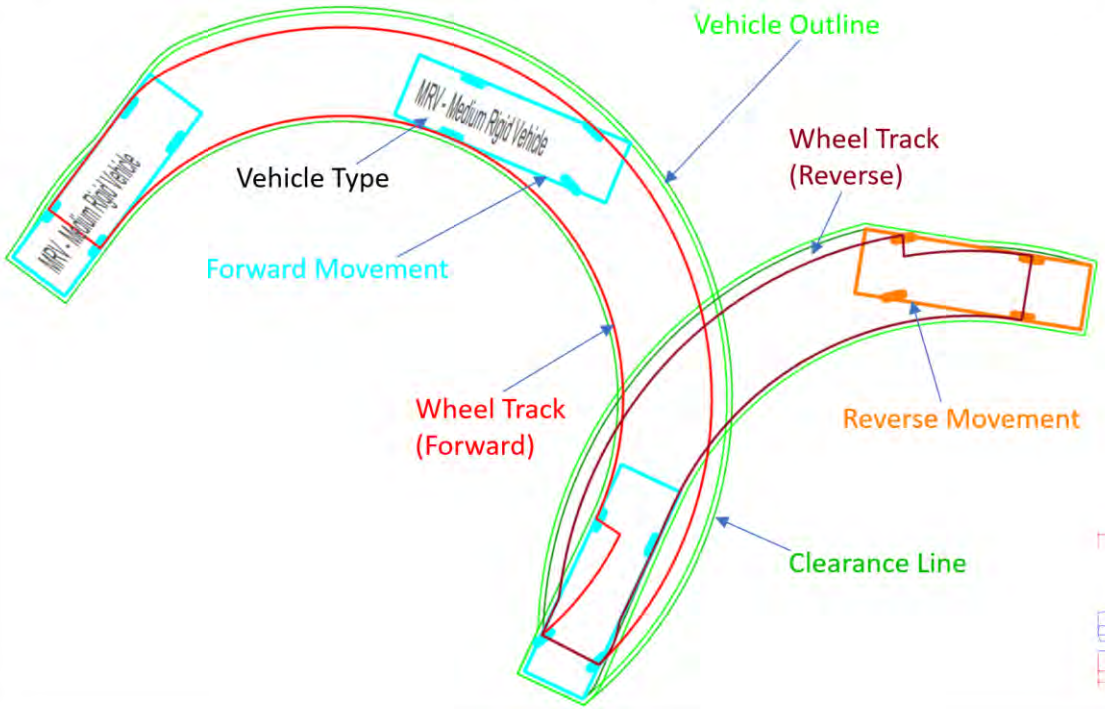
Signs Spacing's	
Estimated Speed Of Traffic (D)	Dimension Range
0-40km	0-5m
50km	15-50m
60km	45-60m
70km	70m
80km	80m
90km	90m
100km	100m

PLAN NOT TO SCALE

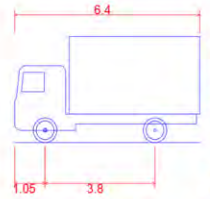
www.invarion.com

Swept Path Analysis Legend:

Road Boundary (boundary of the driveable road)	
Infrastructure Zone (exclusion zone for trees, power poles, traffic lights, barricades, fencing etc)	
Parking Zone (exclusion zone for legal street parking)	
Site Boundary	

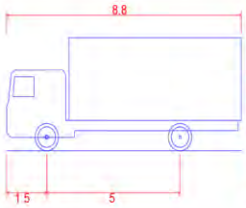


NOTE: Infrastructure and Parking Zones marked according to the significance of the vehicle path (i.e. they are marked if potentially impacted)



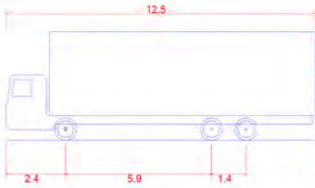
SRV - Small Rigid Vehicle

Overall Length	6.400m
Overall Width	2.330m
Overall Body Height	3.500m
Min Body Ground Clearance	0.398m
Track Width	2.330m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	7.100m



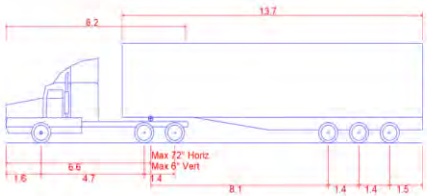
MRV - Medium Rigid Vehicle

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



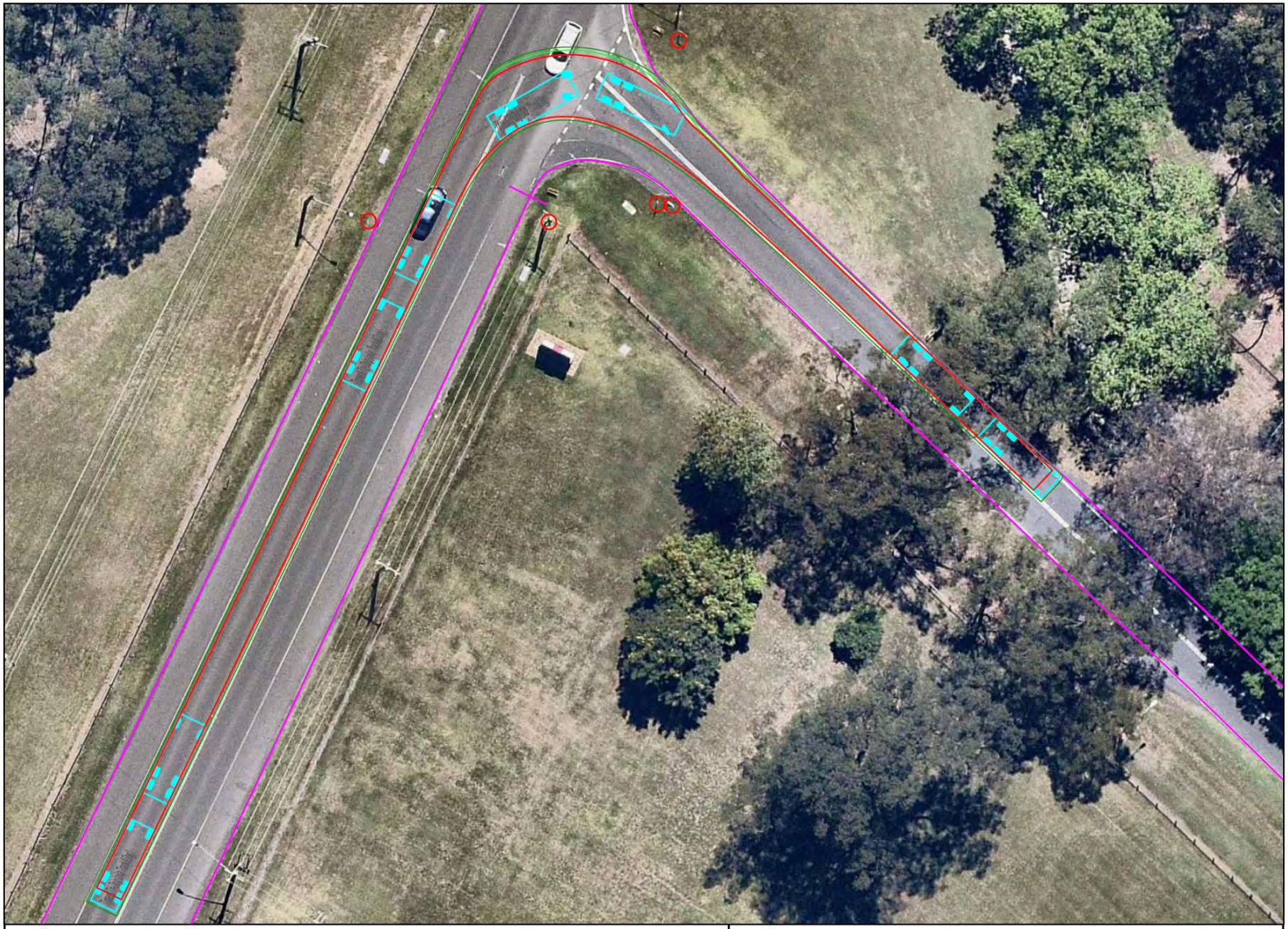
HRV - Heavy Rigid Vehicle

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



AV - Articulated Vehicle

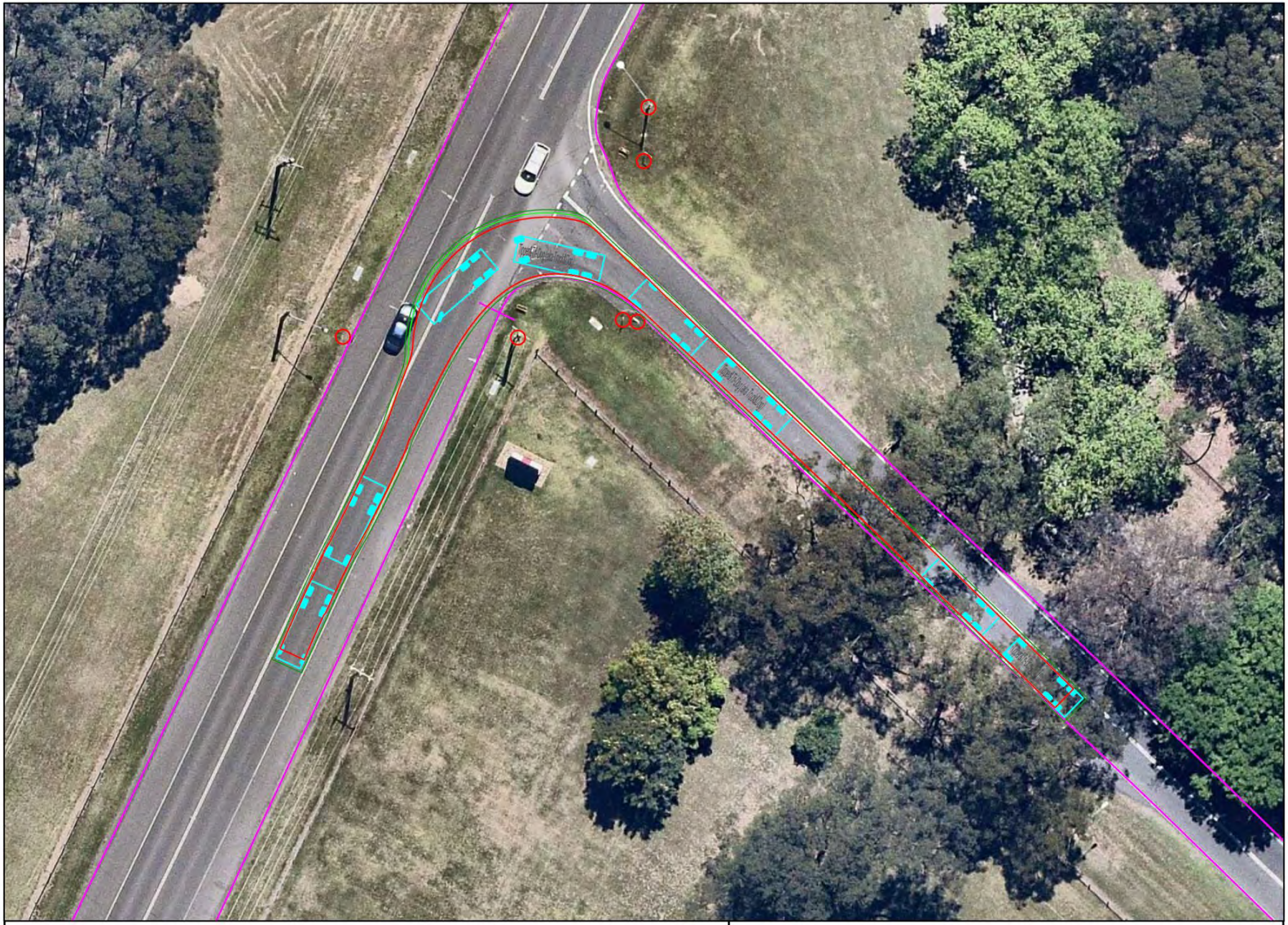
Overall Length	19.000m
Overall Width	2.500m
Overall Body Height	4.301m
Min Body Ground Clearance	0.418m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m



Hawkesbury Centre of Excellence Swept Path Diagram Londonderry Road, Turn Right onto Vines Drive 19m x 2.5m Truck and Dog (Trailer Combination) Centre Articulation (0.3m Clearance)	Scale 1:500 @ A4 Plan Prepared by Jim's Traffic Control (Hornsby) Date 02/02/2022 Sheet 01

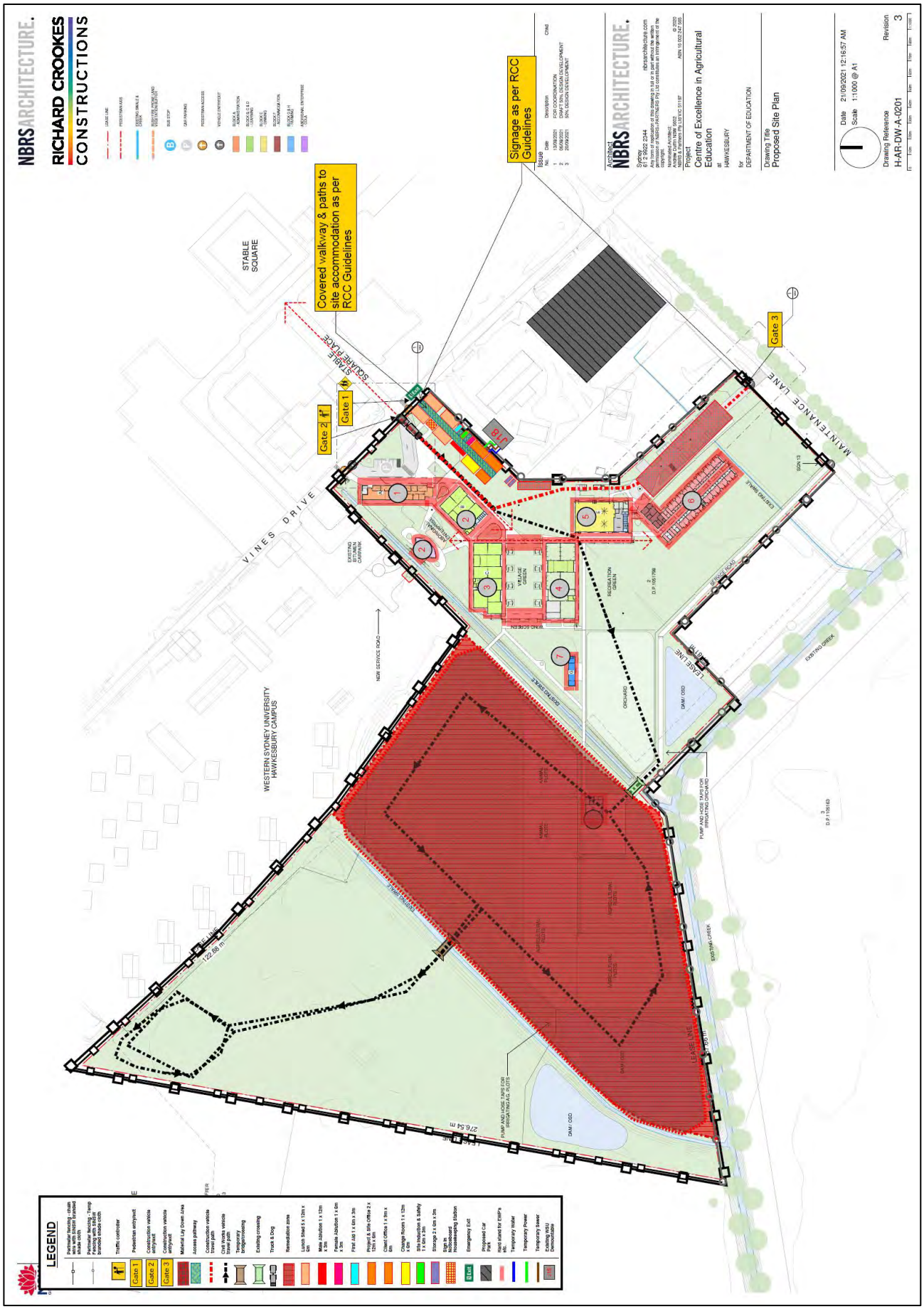
Hawkesbury Centre of Excellence Swept Path Diagram Vines Drive, Turn Right onto Hawkesbury Centre of Excellence 19m x 2.5m Truck and Dog (Trailer Combination) Centre Articulation (0.3m Clearance)	Scale 1:500 @ A4 Plan Prepared by Jim's Traffic Control (Hornsby) Date 02/02/2022 Sheet 02

Hawkesbury Centre of Excellence Swept Path Diagram Hawkesbury Centre of Excellence, Turn Left onto Vines Drive 19m x 2.5m Truck and Dog (Trailer Combination) Centre Articulation (0.3m Clearance)	Scale 1:500 @ A4 Plan Prepared by Jim's Traffic Control (Hornsby) Date 02/02/2022 Sheet 03



Hawkesbury Centre of Excellence Swept Path Diagram Vines Drive, Turn Left onto Londonderry Road 19m x 2.5m Truck and Dog (Trailer Combination) Centre Articulation (0.3m Clearance)	Scale 1:500 @ A4 Plan Prepared by Jim's Traffic Control (Hornsby) Date 02/02/2022 Sheet 04

Appendix B Site Schematics:



Appendix C RMS Road Limits and Special Signage:

5

LIGHT TRAFFIC ROADS

You must not use any road with a load limit sign if the total weight of your vehicle is the same as, or heavier than, the weight shown on the sign.

You may use a light traffic road when that road is your destination for a pick-up or delivery and there is no alternative route.

LOAD LIMIT SIGN

You must not drive past a BRIDGE LOAD LIMIT (GROSS MASS) sign or GROSS LOAD LIMIT sign if the total of the gross mass (in tonnes) of your vehicle, and any vehicle connected to it, is more than the gross mass indicated in the sign.

NO TRUCKS SIGN

Drivers of long or heavy vehicles except buses must not drive past a NO TRUCK sign unless the vehicle is equal to or less than the mass or length specified on the sign.

When the sign does not provide detailed information, no truck (ie GVM greater than 4.5 tonnes) is permitted to drive past the sign, unless the drivers' destination lies beyond the sign and it is the only route.

TRUCKS MUST ENTER SIGN

Heavy vehicle drivers must enter the area indicated by information on or with this sign.

WHERE HEAVY VEHICLES CAN STAND OR PARK

Heavy vehicles (GVM of 4.5 tonnes or more) or long vehicles (7.5 metres long or longer) must not stop on a length of road outside a built up area, except on the shoulder of the road. In a built up area they must not stop on a length of road for longer than one hour (buses excepted). For more information on where vehicles can stand or park, refer to the Road Users' Handbook.

Dwayne Perera

0400 350 182
Dwayne.perera@jimstrafficcontrol.com.au

Career Profile

Dwayne has substantial experience in traffic management design and operations, he has worked alongside members with 15yrs+ experience and has strong network of designers and auditors in his team. Dwayne has developed his reputation for working collaboratively with all parties to ensure safety is kept as a top priority whilst keeping realistic operating procedures in place.

Dwayne specialises in designing traffic management plans for complex intersection works, road widening, crane setups and large-scale construction projects.

Relevant Experiences

Covex Traffic and Management Pty Ltd

6-7 years

- Preparing Traffic Management Plans, Construction Traffic Management Plans and Traffic Control Plans for:
  - Large Commercial Development Sites
  - Small-Medium sized Residential Sites
  - Civil Roadworks
  - Community Events
  - Special Events (involving static and dynamic traffic control)
  - Crane Operations
- Liaising with Council, Police, TMC, RMS, Busses and surrounding stakeholders to organise permits for temporary works.

Sydney Traffic Control

2 years

- Preparing Traffic Management Plans, Construction Traffic Management Plans and Traffic Control Plans for:
  - Large Commercial Development Sites
  - Small-Medium sized Residential Sites
  - Civil Roadworks
- Liaising with Council, Police, TMC, Busses and surrounding stakeholders to organise permits for temporary works.

Major Projects

Road Widening and Intersection Works:

- Mamre Road, Orchard Hills
- Pittwater Road, Brookvale
- Camden Valley Way, Prestons
- Hornsby Hospital

Major Crane Operations:

- York Street, Sydney (Road Closure)
- George/Hunter/Margret Street, Sydney (Road Closure)
- Willoughby Road, Crows Nest (Road Closure)
- Macquarie Street, Liverpool (Road Closure)
- Palmer Street, Woolloomooloo (Road Closure)
- Hunter Street, Parramatta (Road Closure)
- Park Street, Sydney (Intersection Shutdown)
- Kurraba Road, Kurraba Point (Road Closure)
- Whale Beach Road, Whale Beach (Road Closure)
- Pitt Street, Sydney (Road Closure)

- Castlereagh Street, Sydney (Road Closure)

Large Construction/Related Work Sites

- Belmore Street, Burwood (B1 & B2 Buildings)
- Central Park
- Hornsby Hospital
- Brookvale Community Centre
- Arthur Phillips High School
- St Ives Primary School
- Epping Road Macquarie Park
- Elsie Street, Burwood
- Kingsway, Miranda
- Ramsay Road, Five Dock
- Devlin Street, Ryde
- Kerrs Road, Lidcombe
- Westmead Hospital
- Randwick Children's Hospital
- George Street, Sydney

Dynamic Traffic Movements:

- Campbell Parade, Bondi (Event for Street March)
- Riverview Road, Avalon Beach (Abnormal Load escort)
- Portland Street, Dover Heights (Abnormal Load escort)
- Town Hall Metro + Pitt Street Metro (Abnormal Load escort)

Qualifications

Prepare a Work Zone Traffic Management Plan (0052272006)
Implement Traffic Control Plans (0052351398)
Traffic Controller (0052227058)
Bachelor of Information Systems (Hons)

Referees

Available upon Request

Education
School Infrastructure

Consultation Record

Identified Party to Consult:	Transport for NSW
Consultation type:	Teams Meeting – Minutes for each were recorded
When is consultation required?	Pre SSDA-Submission, RtS phase
Why	Authority coordination for Transport Strategy and required road works
When was consultation held	- 16/03/2021 – Transport Working Group #1 - 13/04/2021 – Transport Working Group #2 - 27/04/2021 – Transport Working Group #3 - 17/06/2021 – Transport Working Group #4 - 24/06/2021 – Transport Working Group #5 - 08/07/2021 – TfNSW Consultation - 27/07/2021 – Transport Working Group #6 - 16/02/2022 – CPL issue Construction Traffic and Pedestrian Management Sub-Plan (CTPMSP) to WSU/TfNSW and HCC.
Identify persons and positions who were Involved	- John Broady – Service Planner - Felix Liu – Service Planner - Malgy Coman – - Shasha Kovacina - Peter Bache - Laura Van Putten -
Provide the details of the consultation	- Existing traffic and transport issues - Traffic and transport impacts in in relation to the construction and operation of CoE. - Surrounding projects and traffic requirements. -
What specific matters were discussed?	- Bride duplication project - Interface with the school and WSU - Interface with Vines Drive and Londonderry road.
What matters were resolved?	- The design that is required for construction and development of the school to begin. - Who is to build and redesign the roads.
What matters are unresolved?	- Nil
Any remaining points of disagreement?	- Nil
How will SINSW address matters not resolved?	- Nil

6.9 CONSTRUCTION NOISE & VIBRATION MANAGEMENT SUB-PLAN

The Construction Waste Management sub-Plan has been prepared by Pulse White Noise Acoustics for the Project.

It is not embedded in this document; it is supplied as an attached appendix so that it can be displayed/updated/revised in isolation if required.

Hawksbury Centre of Excellence (HCoE) – Construction Noise Vibration Management Sub-Plan (CNVMSP)

School Infrastructure NSW

Level 8, 259 George Street,
Sydney, NSW, 2000

Report number: 210390 -Hawkesbury CoE-CNVMSP-R4
Date: 25 February 2022
Version: R2 – For Construction

Project Number: 210390

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DOCUMENT CONTROL

Project Name	Hawksbury Centre of Excellence (HCoE) – Construction Noise Vibration Management Sub-Plan (CNVMSP)
Project Number	210390
Report Reference	210390 - Hawkesbury CoE - CNVMSP - R2
Client:	School Infrastructure NSW

Revision	Description	Reference	Date	Prepared	Checked	Authorised
1	R1 – For Information	210390 - Hawksbury CoE - CNVMSP - R1	4th January 2022	Matthew Furlong	Ben White	Ben White
2	R2 – For Information	210390 - Hawksbury CoE - CNVMSP - R2	12th January 2022	Matthew Furlong	Ben White	Ben White
3	R3 – For Construction	210390 -Hawkesbury CoE-CNVMSP-R3	1st February 2022	Matthew Furlong	Ben White	Ben White
4	R4 – For Construction	210390 -Hawkesbury CoE-CNVMSP-R4	25th February 2022	Matthew Furlong	Ben White	Ben White

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1 INTRODUCTION

Pulse White Noise Acoustics (PWNA) has been engaged by Schools Infrastructure NSW (SINSW) to prepare a Construction Noise and Vibration Management Sub-Plan (CNVMSP) for the construction of *Hawksbury Centre of Excellence* ("the Project") in Hawksbury NSW.

This CNVMSP has been prepared to satisfy the requirements of Conditions C13 and B16 of the Consent given in the *Notice of Determination – Approval* issued for Development Application No. SSD-15001460.

Onsite unattended noise levels have previously been determined for the project by Marshall Day Acoustics in the site's *Centre of Excellence in Agricultural Education – Noise and Vibration Assessment* submitted as part of the SSD Application reference "Rp 001 r03 20210173", dated 22nd June 2021. These levels are adopted for this assessment.

A glossary of acoustic terminology used throughout this report is included in Appendix A.

1.1 Condition Satisfaction

In addressing the requirements of Condition B16 (see table below), each item is addressed in the following section:

Table 1 Condition Satisfaction Table

CEMP Condition Satisfaction Table		
Condition	Condition Requirements	Document/Sub-Plan Reference
Condition B16	The Construction Noise and Vibration Management Sub-Plan must address, but not be limited to, the following:	-
	(a) be prepared by a suitably qualified and experienced noise expert;	Refer to Appendix D: Author Curriculum Vitae (CV) – Page 50
	(b) describe procedures for achieving the noise management levels in EPA's Interim Construction Noise Guideline (DECC, 2009);	Refer to section 3.1.1 – Page 14.
	(c) describe the measures to be implemented to manage high noise generating works such as piling, in close proximity to sensitive receivers;	Refer to section 5 – Page 29.
	(d) include strategies that have been developed with the community for managing high noise generating works;	Refer to section 5.4.5 – Page 33.
	(e) describe the community consultation undertaken to develop the strategies in condition B16(d);	
	(f) include a complaints management system that would be implemented for the duration of the construction; and	Refer to section 5.5 – Page 33.
	(g) include a program to monitor and report on the impacts and environmental performance of the development and the effectiveness of the implemented management measures in accordance with the requirements of condition B13.	Refer to section 5.2.3 & 5.3.2 – Page 33 & 32.

1.2 Environment Management Plan Checklist

As per Appendix A of the NSW Government's Environment Management Plan guideline the following preparation checklist has been populated.

Table 2 EMP Preparation Checklist

Requirement	Plan Reference	Yes/ No/ Not Applicable
Document preparation and endorsement		
Has the EMP been prepared in consultation with all relevant stakeholders as per the requirements of the conditions of consent? (Section 4.1)	Refer to section 5.4.5	Yes
Have the views of the relevant stakeholders been taken into consideration? Have appropriate amendments been made to the EMP and does the EMP clearly identify the location of any changes? (Section 4.1)	Refer to section 5.4.5	Yes
Has the EMP been internally approved by an authorised representative of the proponent or contractor? (Section 4.2)	Report issued to SINSW.	Yes
Version and Content		
Does the EMP describe the proponent's Environmental Management System (EMS) (if any), and identify how the EMP relates to other documents required by the conditions of consent? (Section 3.5.1)	-	Not Applicable
Does the EMP include the required general content and version control information? (Section 3.1)	Refer to Table 1	Yes
Does the EMP have an introduction that describes the project, scope of works, site location and any staging or timing considerations? (Section 3.2)	Refer to section 1	Yes
Does the EMP reference the project description? (Section 3.3)	Refer to section 1	Yes
Does the EMP reference a Community and Stakeholder Engagement Plan (or similar) or include community and stakeholder engagement actions (if required)? (Section 3.4)	Refer to section 5.4	Yes
Have all other relevant approvals been identified? Has appropriate information been provided regarding how each approval is relevant? (Section 4)	Refer to section 3	Yes
Has the environmental management structure and responsibilities been included? (Section 3.5.2)	-	Not Applicable
Does the EMP include processes for training of project personnel and identify how training and awareness needs will be identified? (Section 3.5.3)	-	Not Applicable
Does the EMP clearly identify the relevant legal and compliance requirements that relate to the EMP? (Section 3.5.3)	Refer to section 3	Yes
Does the EMP include all the conditions of consent to be addressed by the EMP and identify where in the EMP each requirement has been addressed? (Section 3.5.13)	Refer to section 3 and Table 1	Yes
Have all relevant guidelines, policies and standards been identified, including details of how they are relevant? (Section 3.5)	Refer to section 3	Yes
Is the process that will be adopted to identify and analyse the environmental risks included? (Section 3.5.5)	Refer to section 5	Yes
Have all the environmental management measures in the EIA been directly reproduced into the EMP? (Section 3.5.7)	Refer to section 3	Yes
Have any additional environmental management measures been included in the EMP? (Section 3.5.7)	Refer to section 5	Yes
Have environmental management measures been written in committed language? (Section 3.5.7)	-	Not Applicable

Have project environmental management measures, including hold points, been identified and included? (Section 3.5.6)	-	Not Applicable
Are relevant details of environmental monitoring that will be carried out included? (Section 3.5.8)	Refer to section 5	Yes
Have the components of any environmental monitoring programs been incorporated? (Section 3.5.8)	Refer to section 5	Yes
Are environmental inspections included? (Section 3.5.9)	Refer to section 5	Yes
Does the EMP document all relevant compliance monitoring and reporting requirements for the project? (Section 3.5.12 and 3.5.13)	Refer to section 5	Yes
Does the EMP describe the types of plans or maps (such as environmental control maps) that will be used to assist with the management of environmental matters on site? (Section 3.5.10)	-	Not Applicable
Does the EMP list environmental management documents? (Section 3.5.11)	-	Not Applicable
Is an auditing program referenced? (Section 3.5.13)	-	Not Applicable
Does the EMP include the incident notification and reporting protocols that comply with the relevant conditions of consent? (Section 3.5.15)	Refer to section 5	Yes
Does the EMP identify the project role/position that is responsible for deciding whether an occurrence is an incident? (Section 3.5.15)	Refer to section 5	Yes
Does the EMP describe a corrective and preventative action process that addresses the requirements? (Section 3.5.16)	Refer to section 5	Yes
Does the EMP include details of a review and revision process that complies with the requirements? (Section 3.6)	Refer to section 5	Yes

1.3 Development Overview

The HCoE is a new agricultural / STEM teaching facility catering for 325 students and 25 staff (including farm assistants, administration staff and teachers). The school will also comprise short-term accommodation for visiting students and professionals.

The HCoE will include the following facilities:

- Block A: One storey building on the site will accommodate the administrative activities, shared office space and staff located at the main entrance from Vines Road. Comms room and amenities are also included in this building.
- Block B: One storey building provides a central practical activities / seminar room and four general learning areas (GLAs) to be used as teaching areas. Amenities and Comms room are also attached to this building.
- Block C: One storey building offers two areas for practical activities, one seminar room, semi-commercial food tech with kitchen prep, and six GLAs. Comms room is also included in this building.
- Block D: One storey building to provide five science laboratories, one botany / zoology room, two practical spaces and one preparation & storage area. Comms room is also included in this building.
- Block E: One story building containing the dining hall and conference area, with canteen, kitchen, amenities and Comms room.
- Block F: One storey building to accommodate short term accommodation, dormitory style bedrooms with a wellbeing area extending to the northeast. The building also includes an interview room, treatment room, laundry, and Comms room
- Block G: One storey green house.
- Block H: One storey agricultural workshop.

Figure 1 Landscape Site Plan (Drawing 20417-NBRS-L-SK 002)

1.4 Site Layout

The HCoE is surrounded by the following:

Figure 2 Extract - Marshall Day Acoustics – Noise and Vibration Assessment – Section 2

2.0 SITE AND PROJECT DESCRIPTION

2.1 Site Location

The site (Part 1 Lot 2 DP 1051798) comprises a parcel of land of area 11.37 Hectares leased from Western Sydney University (WSU Hawkesbury Campus), located adjacent the south western end of the campus, separated by Vines Drive.

The WSU Campus includes a number of potential noise receptors, including student accommodation immediately adjacent the north western boundary and educational buildings to the north and east. Beyond the Western Sydney University properties are more distant residential properties comprising Anglicare Nursing Home at the far north western corner of the site (at Londonderry Road) and a residentially zoned area, the closest point of which is at the corner of Southee Road and Londonderry Road, Hobartville.

The proposed site and the intervening property to the receptor zone is essentially flat land. The nearest noise sensitive receivers surrounding the proposed site are listed in Table 1. A site plan is provided in Appendix B with aerial imagery depicting nearby receivers detailed in Appendix C. The distances shown in the table below at those between the receptor and the closest boundary of the site (or part of the site subject to development in the case of the farming area)

Table 1: Noise sensitive receivers selected for assessment

Receiver ID	Location	Receiver Type	Description
R1	North of the proposed development approximately 549 m	Residential	Single lot residential housing area to the north of the proposed development corner Southee Road and Londonderry Road. It includes two level dwellings.
R2	North West of the proposed site 118m	Residential Care	Multistorey residential care building nearby the proposed development. This residential receiver represents the closest sensitive residential type receivers located adjacent the western extremities of the subject site.
R3	North West of the proposed site 52m	Student Accommodation	Single-storey residential buildings nearby the proposed development. This group of residential receivers represents the closest sensitive residential type receivers located north west of the subject site.
E1	North of the proposed site 17m	Educational	WSU Forensic and Biology Labs (K16) to the north of the proposed development, separated by Vines Drive.
E2	East of the proposed site 21m	Educational	WSU Microbiology (J4) Labs Building with a common boundary with the proposed development. This receiver is identified as the closest educational to the subject site.

A map showing the site location as well as nearest receivers is provided in Figure 3 below. This figure also shows the location of onsite unattended measurements which were conducted as part of this assessment.

Figure 3 Site Map, Measurement Locations and Surrounding Receivers - Extract - Marshall Day Acoustics – Noise and Vibration Assessment – Appendix C

APPENDIX C AERIAL IMAGE OF SITE WITH RECEIVERS

2 EXISTING ACOUSTIC ENVIRONMENT

Figure 4 Extract - Marshall Day Acoustics – Noise and Vibration Assessment – Section 4

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4.0 BACKGROUND NOISE SURVEY

A long-term unattended survey of background noise levels was conducted at a location close to the site boundary from 3 March 2021 to 8 April 2021, using a 01dB noise logger (S/N: DUO 10419). The selected location provided a good representation of noise levels in the local environment and nearby noise sensitive receivers. Additionally, attended measurement has been carried out near the university student accommodation on 3 March 2021 using a B&K 2250 Sound Level Meter (S/N:3010249). Measurement locations are shown in Appendix C.

The measurement equipment was calibrated before and after the survey with no significant drift observed.

Average L_{A90} and L_{Aeq} noise levels measured during the long-term noise survey are shown in Table 3 and have been derived in accordance with the data exclusion rules described in the NPfI. Graphs of the measured noise levels during the measurement period are provided in at the end of this report.

Primary use of the school will be during the Daytime period (0700-1800 hrs) Additionally, the dining and multipurpose space may be used by in the evening period (1800-2200 hrs).

Table 3: Measured average background and ambient noise levels – Long-term

Period	Time of day	RBL L_{A90} dB	L_{Aeq} dB
Day	0700-1800 hrs	35	48
Evening	1800-2200 hrs	45	52
Night	2200-0700 hrs	38	47

Average L_{A90} and L_{Aeq} noise levels measured during the short-term noise survey are shown in **Table 4**.

Table 4: Measured average background and ambient noise levels – Short-term

Period	RBL L_{A90} dB	L_{Aeq} dB
1728hr-1743hr	52	54

During the attended measurement, it was noted that the ambient noise of the environment was controlled by noise from nature (insects and frogs) as well as distant traffic noise from Londonderry Road.

It is noted that the RBL during the Evening and Night periods were higher than the Day period. Examination of recorded spectra and listening to audio recordings from the noise logger revealed that seasonal insect and frog activity significantly impacted on the Evening and Night RBLs.

Extensive noise monitoring had already been carried out on site previously as part of assessment of an earlier development. Noise monitoring data was sourced from a Resonate Acoustics report HASH-00-SD-AS-RP-0001-C for a previous development proposal associated with the site. The monitoring locations for both the MDA and Resonate surveys were similar.

We note however that the Resonate Survey recorded lower RBL data during the Evening and Night-time period. Table 4 of the Resonate report is reproduced below:

Rp 001 r03 20210173 - Centre of Excellence in Agricultural Education - Noise and Vibration Assessment.docx 13

Figure 4 Extract - Marshall Day Acoustics – Noise and Vibration Assessment – Section 4 (Cont.)

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Table 4 Unattended monitoring results

Location	Rating Background Level, dB(A) L_{90}[1]			Ambient noise level, dB(A) L_{eq}		
	Day 7 am—6 pm	Evening 6 pm—10 pm	Night 10 pm—7 am	Day 7 am—6 pm	Evening 6 pm—10 pm	Night 10 pm—7 am
U1 – WSU Village	37	37	32	47	44	44

(1) The Rating Background Level is a measure of the typical minimum steady background noise level for each time of day.

As a conservative approach we have adopted the lowest RBL from both the MDA and Resonate data sets. The MDA measured Day RBL has been applied for Day and has also been applied for the Evening (in accordance with Section 2.3 of EPA NPfI, noting Resonate Evening level was higher). The Resonate measured Night RBL has been applied for for Night-time periods.

Table 5: RBL used for assessment

Period	Rating Background Level, $L_{A90,\ 15min}$ dB
Day	35
Evening	35
Night	31

3 NOISE AND VIBRATION CRITERIA

Relevant noise and vibration criteria for construction activities are detailed below.

3.1 Construction Noise Criteria

3.1.1 NSW EPA Interim Construction Noise Guideline (ICNG) – DECC 2009

Noise criteria for construction and demolition activities are discussed in the *Interim Construction Noise Guideline* (ICNG). The ICNG also recommends procedures to address potential impacts of construction noise on residences and other sensitive land uses. The main objectives of the ICNG are summarised as follows:

- Promote a clear understanding of ways to identify and minimise noise from construction works;
- Focus on applying all "feasible" and "reasonable" work practices to minimise construction noise impacts;
- Encourage construction to be undertaken only during the recommended standard hours unless approval is given for works that cannot be undertaken during these hours;
- Streamline the assessment and approval stages and reduce time spent dealing with complaints at the project implementation stage; and
- Provide flexibility in selecting site-specific feasible and reasonable work practices in order to minimise noise impacts.

The ICNG contains a quantitative assessment method which is applicable to this project. Guidance levels are given for airborne noise at residences and other sensitive land uses.

The quantitative assessment method involves predicting noise levels at sensitive receivers and comparing them with the Noise Management Levels (NMLs). The NML affectation categories for residential receivers have been reproduced from the guideline and are listed in the table below.

Table 3 NMLs for quantitative assessment at residences

Time of Day	Noise Management Level $L_{Aeq(15minute)}$[1,2]	How to Apply
Recommended standard hours: Monday to Friday 7 am to 6 pm Saturday 8 am to 1 pm No work on Sundays or public holidays	*"Noise Affected **Level**"* RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. • Where the predicted or measured $L_{Aeq(15minute)}$ 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 **Level**"* 75 dBA	The highly noise affected level represents the point above which there may be strong community reaction to noise. • Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: 1. Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences. 2. If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

Time of Day	Noise Management Level $L_{Aeq(15minute)}$[1,2]	How to Apply
Outside recommended standard hours	Noise affected RBL + 5 dB	• 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, the proponent should negotiate with the community.

Note 1 *Noise levels apply at the property boundary that is most exposed to construction noise, and at a height of 1.5 m above ground level. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence. Noise levels may be higher at upper floors of the noise affected residence.*

Note 2 *The RBL is the overall single-figure background noise level measured in each relevant assessment period (during or outside the recommended standard hours). The term RBL is described in detail in the NSW Noise Policy for Industry (EPA 2017).*

Note 3 *Requirements listed in the table above are in accordance with the Construction Hours listed in Condition C4 and C5.*

Construction noise levels at other noise receivers are outlined below:

- Construction noise levels within classrooms at schools and other educational institutions is not to exceed 45dB LAeq,15minute, when measured internally.
- Construction noise levels within places of worship is not to exceed 45dB LAeq,15minute, when measured internally.
- Construction noise levels at offices, retail outlets is not to exceed 70dB LAeq,15minute, when measured externally.

Based on the measured background noise levels summarised in section 2, and the NMLs outlined above the construction noise criteria to be used in this assessment are listed in below.

Table 4 NMLs as basis for the acoustic assessment

Receiver Types	NML, dB $L_{Aeq(15minute)}$	
	Standard Hours Monday to Friday: 7:00am to 6:00pm Saturday: 8:00am to 1:00pm	Outside Standard Hours Monday to Friday: 6:00pm to 7:00pm Saturday 1:00pm to 4:00pm
Residences along Forestwood Drive	NML: 45 + HNAL: 75	BG + 5dB$A_{Leq\ (15\text{-}minutes)}$
Classrooms at schools and other educational establishments	NML: 45 (Internal)	
	NML: 55 (External)	

3.1.2 Construction Traffic Noise Criteria

For existing residences and other sensitive land uses affected by additional traffic on existing roads, the NSW *Road Noise Policy (RNP)* states that for noise associated with increased road traffic generated by land use developments, any increase in the total traffic noise level should be limited to 2 dB during both day and night-time periods. An increase of 2 dB represents a minor impact that is considered barely perceptible to the average person.

3.2 Vibration Criteria

Effects of ground borne vibration on buildings may be segregated into the following three categories:

- Human comfort – vibration in which the occupants or users of the building are inconvenienced or possibly disturbed. Refer to further discussion in Section 3.2.1.
- Effects on building contents – where vibration can cause damage to fixtures, fittings and other non-building related objects. Refer to further discussion in Section 3.2.2.
- Effects on building structures – where vibration can compromise the integrity of the building or structure itself. Refer to further discussion in Section 3.2.2.

3.2.1 Vibration Criteria – Human Comfort

Vibration effects relating specifically to the human comfort aspects of the project are taken from the guideline titled *"Assessing Vibration – A Technical Guideline"*. (AVTG) This type of impact can be further categorised and assessed using the appropriate criterion as follows:

- Continuous vibration – from uninterrupted sources (refer to Table 5).
- Impulsive vibration – up to three instances of sudden impact e.g. dropping heavy items, per monitoring period (refer to Table 6)
- Intermittent vibration – such as from drilling, compacting or activities that would result in continuous vibration if operated continuously (refer to Table 7).

Table 5 Continuous vibration acceleration criteria (m/s^2) 1 Hz-80 Hz

Location	Assessment period	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Residences	Daytime	0.010	0.0071	0.020	0.014
	Night-time	0.007	0.005	0.014	0.010
Offices, schools, educational institutions and places of worship	Day or night-time	0.020	0.014	0.040	0.028
		0.04	0.029	0.080	0.058
Workshops	Day or night-time	0.04	0.029	0.080	0.058

Table 6 Impulsive vibration acceleration criteria (m/s^2) 1 Hz-80 Hz

Location	Assessment period	Preferred Values		Maximum Values	
		z-axis	x- and y-axis	z-axis	x- and y-axis
Residences	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	Day or night-time	0.64	0.46	1.28	0.92
Workshops	Day or night-time	0.64	0.46	1.28	0.92

Table 7 Intermittent vibration impacts criteria ($m/s^{1.75}$) 1 Hz-80 Hz

Location	Daytime		Night-time	
	Preferred Values	Maximum Values	Preferred Values	Maximum Values
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

3.2.2 Vibration Criteria – Building Contents and Structure

The vibration effects on the building itself are assessed against international standards as follows:

- For transient vibration: British Standard BS 7385: Part 2-1993 *"Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration"* (BSI 1993); and
- For continuous or repetitive vibration: German DIN 4150: Part 3 – 1999 *"Effects of Vibration on Structure"* (DIN 1999).

3.2.2.1 Standard BS 7385 Part 2 - 1993

For transient vibration, as discussed in standard BS 7385 Part 2-1993, the criteria are based on peak particle velocity (mm/s) which is to be measured at the base of the building. These are summarised in Table 8 and illustrated in Figure 5.

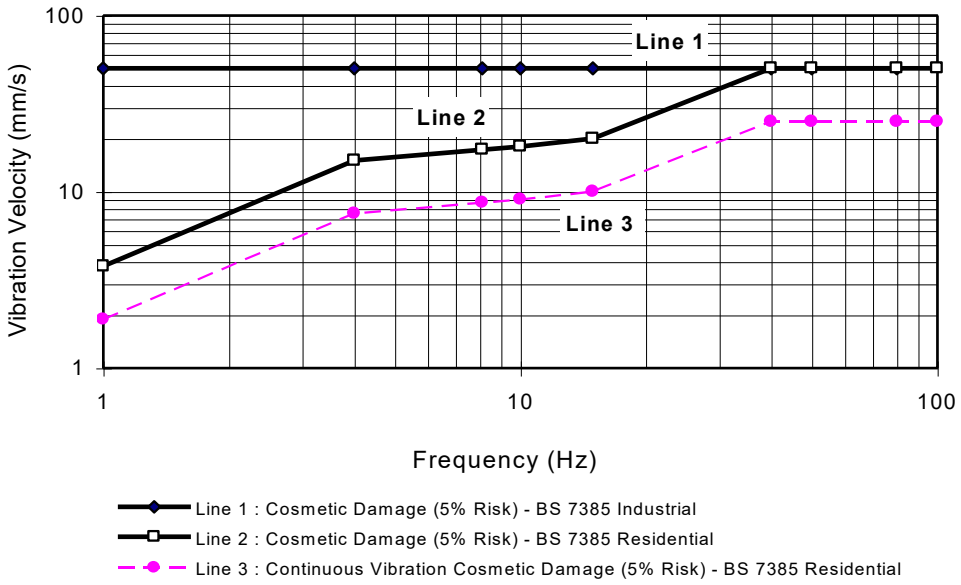
Table 8 Transient vibration criteria as per standard BS 7385 Part 2 - 1993

Line in Figure 5	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

Standard BS 7385 Part 2 – 1993 states that the values in Table 8 relate to transient vibration which does not cause resonant responses in buildings.

Where the dynamic loading caused by continuous vibration events is such as that results in dynamic magnification due to resonance (especially at the lower frequencies where lower guide values apply), then the values in Table 8 may need to be reduced by up to 50% (refer to Line 3 in Figure 5).

Figure 5 BS 7385 Part 2 – 1993, graph of transient vibration values for cosmetic damage



In the lower frequency region where strains associated with a given vibration velocity magnitude are higher, the recommended values corresponding to Line 2 are reduced. Below a frequency of 4 Hz where a high displacement is associated with the relatively low peak component particle velocity value, a maximum displacement of 0.6 mm (zero to peak) is recommended. This displacement is equivalent to a vibration velocity of 3.7 mm/s at 1 Hz.

The standard also states that minor damage is possible at vibration magnitudes which are greater than twice those given in Table 8, and major damage to a building structure may occur at values greater than four times the tabulated values.

Fatigue considerations are also addressed in the standard and it is concluded that unless calculation indicates that the magnitude and number of load reversals is significant (in respect of the fatigue life of building materials) then the values in Table 8 should not be reduced for fatigue considerations.

3.2.2.2 Standard DIN 4150 Part 3 - 1999

For continuous or repetitive vibration, standard DIN 4150 Part 3-1999 provides criteria based on values for peak particle velocity (mm/s) measured at the foundation of the building; these are summarised in Table 9. The criteria are frequency dependent and specific to particular categories of structures.

Table 9 Structural damage criteria as per standard DIN 4150 Part 3 - 1999

Type of Structure	Peak Component Particle Velocity, mm/s			
	Vibration at the foundation at a frequency of			Vibration of horizontal plane of highest floor at all frequencies
	1 Hz to 10 Hz	10 Hz to 50 Hz	50 Hz to 100 Hz[1]	
Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40
Dwellings and buildings of similar design and/or use	5	5 to 15	15 to 20	15
Structures that, because of their sensitivity to vibration, do not correspond to those listed in lines 1 and 2 and are of great intrinsic value (e.g. buildings that are under a preservation order)	3	3 to 8	8 to 10	8

Note 1: For frequencies above 100Hz, at least the values specified in this column shall be applied.

3.2.3 Sensitive Science and Medical Equipment

Some scientific equipment (e.g., electron microscopes and microelectronics manufacturing equipment) can require more stringent objectives than those applicable to human comfort.

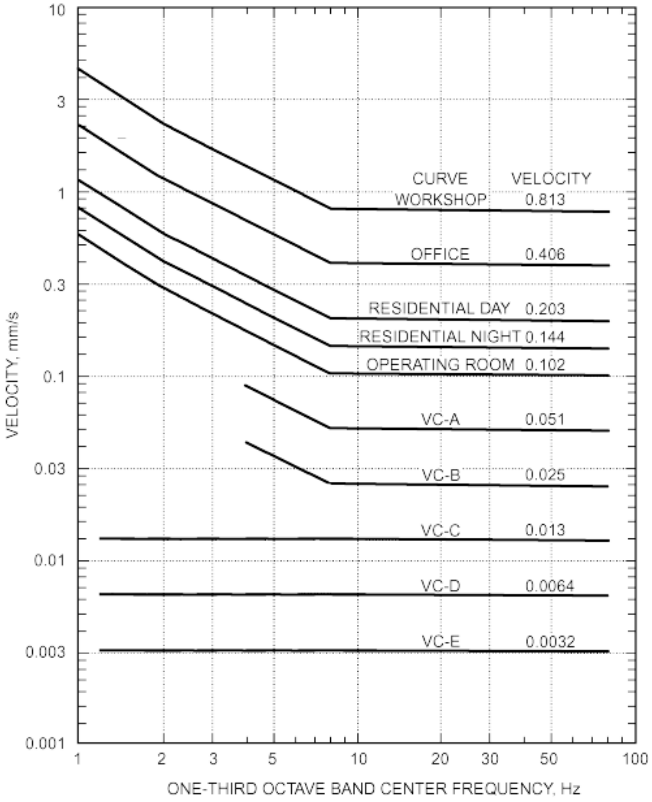
Where it has been identified that vibration sensitive scientific and/or medical instruments are likely to be in use at the nearest existing medical related buildings, objectives for the satisfactory operation of the instrument should be sourced from manufacturer's data.

Where manufacturer's data is not available, generic vibration criterion (VC) curves may be adopted as vibration goals. These generic VC curves are presented below in the table and figure below.

Table 10 Criteria for vibration sensitive equipment

Equipment	Curve
Bench microscopes up to 100× magnification; laboratory robots	0.102 mm/s
Bench microscopes up to 400× magnification; optical and other precision balances; coordinate measuring machines; metrology laboratories; optical comparators; microelectronics manufacturing equipment; proximity and projection aligners, etc.	0.051 mm/s VC-A
Microsurgery, eye surgery, neurosurgery; bench microscopes at magnification greater than 400×; optical equipment on isolation tables; microelectronic manufacturing equipment, such as inspection and lithography equipment (including steppers) to 3 mm line widths	0.025 mm/s VC-B
Electron microscopes up to 30 000× magnification; microtomes; magnetic resonance imagers; microelectronics manufacturing equipment, such as lithography and inspection equipment to 1 mm detail size	0.013 mm/s VC-C
Electron microscopes at magnification greater than 30 000×; mass spectrometers; cell implant equipment; microelectronics manufacturing equipment, such as aligners, steppers, and other critical equipment for photolithography with line widths of 1/2 µm; includes electron beam systems	0.0054 mm/s VC-D
Non-isolated laser and optical research systems; microelectronics manufacturing equipment, such as aligners, steppers, and other critical equipment for photolithography with line widths of 1/4 µm; includes electron beam systems	0.0032 mm/s VC-E

Figure 6 Criteria for vibration sensitive equipment (ASHRAE 2007, HVAC Applications, Chapter 47 ***"Sound** and Vibration **Control"***)



3.3 Ground-Borne Noise Criteria

According to the NSW EPA *Interim Construction Noise Guideline (*ICNG) 2009, the criteria for ground-borne noise at residences is defined as follows:

- Maximum internal noise levels of 40 dB LAeq(15mins) between 6:00pm and 10:00pm.

It is noted that the ground borne criteria will apply for construction works undertaken outside of standard hours. That is, work conducted during the evening period Monday to Friday between 6:00pm and 7:00pm only.

4 NOISE AND VIBRATION ASSESSMENT

4.1 Construction Noise Assessment

Sound power levels have been predicted for the construction tasks identified in the project program. The equipment anticipated for use in each task is based on previous project experience. The sound power levels for the equipment likely to be used for each of the listed tasks are provided in Table 11 below.

Table 11 Summary of predicted sound power levels (source noise levels)

Tasks	Equipment	Sound Power Levels (dBA re 1pW)	Aggregate Sound Power Level per Task (dBA re 1pW)
Site Establishment Works	Mobile crane	110	113
	Power hand tools	109	
	Semi Rigid Vehicle [1]	105	
Ground Works	Excavator	112	120
	Hydraulic Hammer	118	
	Piling Rig	110	
	Handheld jack hammer [1]	111	
	Dump truck [1]	104	
	Concrete saw [1]	114	
	Skid steer	110	
	Power hand tools	109	
Structure	Handheld jack hammer [1]	106	117
	Concrete saw [1]	114	
	Power hand tools	109	
	Welder	101	
	Concrete pump truck	110	
	Concrete agitator truck	108	
Internal Works	Power hand tools	109	109
Common and External Works	Concrete agitator truck	108	114
	Saw cutter [1]	104	
	Dump truck [1]	104	
	Concrete saw [1]	114	
	Power hand tools	109	

Note 1: An assumed time correction has been applied, this being 5 minutes of operation in any 15-minute interval.

Table 12 R1 – Summary of preliminary predicted construction noise levels – 126 Southee Road Hobartville

Phase	Activity	Aggregate Sound Power Level (dBA re 1pW)	Predicted Individual Noise Level at Receiver dBA $L_{Aeq\ 15\ minutes}$	Predicted Combined Noise Level at Receiver dBA $L_{Aeq\ 15\ minutes}$	Criteria dBA $L_{Aeq\ 15\ minutes}$	Summary of Result
Site Establishment Works	Mobile crane	113	46 to 52	50 to 56	Monday to Friday 07.00-18.00 35 + 10 = 45 Saturday 08.00-13.00 35 + 10 = 45 Highly Noise Affected Level Standard Construction Hours 75	Works indicatively predicted to have the potential to exceed the BG + 10dBA including potential exceedances above the Highly Noise Affected Level of 75dBA. Recommended that acoustic mitigation measures as outlined in section 5.
	Power hand tools		45 to 51			
	Semi Rigid Vehicle		42 to 48			
Ground Works and Demolition	Excavator	119	48 to 54	55 to 61		
	Handheld jack hammer		43 to 49			
	Dump truck		41 to 47			
	Concrete saw		51 to 57			
	Skid steer		46 to 52			
	Power hand tools		45 to 51			
Structure	Handheld jack hammer	117	43 to 49	54 to 60		
	Concrete saw		51 to 57			
	Power hand tools		45 to 51			
	Welder		37 to 43			
	Concrete pump truck		46 to 52			
	Concrete agitator truck		44 to 50			
Internal Works	Power hand tools	109	45 to 51	45 to 51		
Common and External Works	Concrete agitator truck	117	44 to 50	53 to 59		
	Saw cutter		41 to 47			
	Dump truck		41 to 47			
	Concrete saw		51 to 57			
	Power hand tools		45 to 51			

Table 13 R2 – Summary of predicted construction noise levels – Anglicare

Phase	Activity	Aggregate Sound Power Level (dBA re 1pW)	Predicted Individual Noise Level at Receiver dBA $L_{Aeq\ 15\ minutes}$	Predicted Combined Noise Level at Receiver dBA $L_{Aeq\ 15\ minutes}$	Criteria dBA $L_{Aeq\ 15\ minutes}$	Summary of Result
Site Establishment Works	Mobile crane	113	48 to 68	51 to 71	Monday to Friday 07.00-18.00 35 + 10 = 45 Saturday 08.00-13.00 35 + 10 = 45 Highly Noise Affected Level Standard Construction Hours 75	Works indicatively predicted to have the potential to exceed the BG + 10dBA including potential exceedances above the Highly Noise Affected Level of 75dBA. Recommended that acoustic mitigation measures as outlined in section 5.
	Power hand tools		47 to 67			
	Semi Rigid Vehicle		43 to 63			
Ground Works and Demolition	Excavator	119	50 to 70	56 to 76		
	Handheld jack hammer		44 to 64			
	Dump truck		42 to 62			
	Concrete saw		52 to 72			
	Skid steer		48 to 68			
	Power hand tools		47 to 67			
Structure	Handheld jack hammer	117	44 to 64	56 to 76		
	Concrete saw		52 to 72			
	Power hand tools		47 to 67			
	Welder		39 to 59			
	Concrete pump truck		48 to 68			
	Concrete agitator truck		46 to 66			
Internal Works	Power hand tools	109	47 to 67	47 to 67		
Common and External Works	Concrete agitator truck	117	46 to 66	55 to 75		
	Saw cutter		42 to 62			
	Dump truck		42 to 62			
	Concrete saw		52 to 72			
	Power hand tools		47 to 67			

Table 14 R3 - Summary of predicted construction noise levels – Student Accommodation

Phase	Activity	Aggregate Sound Power Level (dBA re 1pW)	Predicted Individual Noise Level at Receiver dBA $L_{Aeq\ 15\ minutes}$	Predicted Combined Noise Level at Receiver dBA $L_{Aeq\ 15\ minutes}$	Criteria dBA $L_{Aeq\ 15\ minutes}$	Summary of Result
Site Establishment Works	Mobile crane	113	55 to 68	58 to 71	Monday to Friday 07.00-18.00 35 + 10 = 45 Saturday 08.00-13.00 35 + 10 = 45 Highly Noise Affected Level Standard Construction Hours 75	Works indicatively predicted to have the potential to exceed the BG + 10dBA including potential exceedances above the Highly Noise Affected Level of 75dBA. Recommended that acoustic mitigation measures as outlined in section 5.
	Power hand tools		54 to 67			
	Semi Rigid Vehicle		50 to 63			
Ground Works and Demolition	Excavator	119	57 to 70	63 to 76		
	Handheld jack hammer		51 to 64			
	Dump truck		49 to 62			
	Concrete saw		59 to 72			
	Skid steer		55 to 68			
	Power hand tools		54 to 67			
Structure	Handheld jack hammer	117	51 to 64	63 to 76		
	Concrete saw		59 to 72			
	Power hand tools		54 to 67			
	Welder		46 to 59			
	Concrete pump truck		55 to 68			
	Concrete agitator truck		53 to 66			
Internal Works	Power hand tools	109	54 to 67	54 to 67		
Common and External Works	Concrete agitator truck	117	53 to 66	62 to 75		
	Saw cutter		49 to 62			
	Dump truck		49 to 62			
	Concrete saw		59 to 72			
	Power hand tools		54 to 67			

Table 15 E1 - Summary of predicted construction noise levels – Microbiology Laboratory J4

Phase	Activity	Aggregate Sound Power Level (dBA re 1pW)	Predicted Individual Noise Level at Receiver dBA $L_{Aeq\ 15\ minutes}$	Predicted Combined Noise Level at Receiver dBA $L_{Aeq\ 15\ minutes}$	Criteria dBA $L_{Aeq\ 15\ minutes}$	Summary of Result
Site Establishment Works	Mobile crane	113	36 to 50	39 to 53	All days All times Educational Establishments = 45 (Internal)	Works indicatively predicted to have the potential to exceed the noise management level when working near a receiver. Recommended that acoustic mitigation measures as outlined in section 5.
	Power hand tools		35 to 49			
	Semi Rigid Vehicle		31 to 45			
Ground Works and Demolition	Excavator	119	38 to 52	44 to 58		
	Handheld jack hammer		32 to 46			
	Dump truck		30 to 44			
	Concrete saw		40 to 54			
	Skid steer		36 to 50			
	Power hand tools		35 to 49			
Structure	Handheld jack hammer	117	32 to 46	43 to 57		
	Concrete saw		40 to 54			
	Power hand tools		35 to 49			
	Welder		27 to 41			
	Concrete pump truck		36 to 50			
	Concrete agitator truck		34 to 48			
Internal Works	Power hand tools	109	35 to 49	35 to 49		
Common and External Works	Concrete agitator truck	117	34 to 48	43 to 57		
	Saw cutter		30 to 44			
	Dump truck		30 to 44			
	Concrete saw		40 to 54			
	Power hand tools		35 to 49			

Table 16 E2 - Summary of predicted construction noise levels – Pridham Building K16

Phase	Activity	Aggregate Sound Power Level (dBA re 1pW)	Predicted Individual Noise Level at Receiver dBA $L_{Aeq\ 15\ minutes}$	Predicted Combined Noise Level at Receiver dBA $L_{Aeq\ 15\ minutes}$	Criteria dBA $L_{Aeq\ 15\ minutes}$	Summary of Result
Site Establishment Works	Mobile crane	113	33 to 44	37 to 47	All days All times Educational Establishments = 45 (Internal)	Works indicatively predicted to have the potential to exceed the noise management level when working near a receiver. Recommended that acoustic mitigation measures as outlined in section 5.
	Power hand tools		32 to 43			
	Semi Rigid Vehicle		29 to 39			
Ground Works and Demolition	Excavator	119	35 to 46	42 to 52		
	Handheld jack hammer		30 to 40			
	Dump truck		28 to 38			
	Concrete saw		38 to 48			
	Skid steer		33 to 44			
	Power hand tools		32 to 43			
Structure	Handheld jack hammer	117	30 to 40	41 to 51		
	Concrete saw		38 to 48			
	Power hand tools		32 to 43			
	Welder		24 to 35			
	Concrete pump truck		33 to 44			
	Concrete agitator truck		31 to 42			
Internal Works	Power hand tools	109	32 to 43	32 to 43		
Common and External Works	Concrete agitator truck	117	31 to 42	40 to 51		
	Saw cutter		28 to 38			
	Dump truck		28 to 38			
	Concrete saw		38 to 48			
	Power hand tools		32 to 43			

4.2 Construction Traffic Noise Assessment

It is proposed that the construction traffic would access the site via Vines Drive, Maintenance Lane and Londonderry Road.

From the criteria discussed in Section 3, it is noted that vehicle numbers on surrounding roads would need to increase by around 60% from existing traffic flows, for a 2 dB increase in road traffic noise to occur. As noted previously, a 2 dB increase in road traffic noise is not considered to be noticeable.

Based on the number of vehicles projected over each of the phases, it is concluded that noise impacts from construction traffic is unlikely to have an impact at the nearest affected properties. As a result, no further assessment is required.

4.3 Vibration Assessment

In order to maintain compliance with the human comfort vibration criteria discussed in Section 3, it is recommended that the indicative safe distances listed in Table 17 should be maintained. These indicative safe distances should be validated at the start of construction works by undertaking measurements of vibration levels generated by construction and demolition equipment to be used on site.

If applicable, the criteria for scientific or medical equipment (should any of these exist close to the site) can be more stringent than those required for human comfort. Vibration validating measurements should be conducted at each site to determine the vibration level and potential impact to this sensitive equipment.

Additionally, any vibration levels should be assessed in accordance with the criteria discussed in Section 3.

Table 17 Recommended indicative safe working distances for vibration intensive plant

Plant	Rating / Description	Safe Working Distances (m)	
		Cosmetic Damage (BS 7385: Part 2 DIN 4150: Part 3)	Human Comfort (AVTG)
Vibratory roller	< 50 kN (Typically 1 – 2 tonnes)	5	15 – 20
	< 100 kN (Typically 2 – 4 tonnes)	6	20
	< 200 kN (Typically 4 – 6 tonnes)	12	40
	< 300 kN (Typically 7 – 13 tonnes)	15	100
	> 300 kN (Typically more than 13 tonnes)	20	100
Small hydraulic hammer	300 kg, typically 5 – 12 tonnes excavator	2	7
Medium hydraulic hammer	900 kg, typically 12 – 18 tonnes excavator	7	23
Large hydraulic hammer	1600 kg, typically 18 – 34 tonnes excavator	22	73
Vibratory pile driver	Sheet piles	2 – 20	20
Jackhammer	Hand held	1	Avoid contact with structure and steel reinforcements

For vibration intensive works (such as excavation, rock break etc) in proximity of the building J4 (Microbiology Labs) or any other rooms containing sensitive equipment, attended vibration measurements may be required to ensure levels do not exceed vibration criteria. In the event of vibration impact resulting in complaints from WSU then site assessment including attended vibration measurements are to be undertaken.

5 NOISE AND VIBRATION MANAGEMENT PLAN

5.1 Acoustic Management Procedures

5.1.1 Summary of Management Procedures

Table 18 below summarises the management procedures recommended for airborne noise and vibration impacts. These procedures are also further discussed in the report. Hence, where applicable, links to further references are provided in Table 19 (next page).

Table 18 Summary of mitigation procedures

Procedure	Abbreviation	Description	Further Reference
General Management Measures	GMM	Introduce best-practice general mitigation measures in the workplace which are aimed at reducing the acoustic impact onto the nearest affected receivers.	Refer to Section 5.7 For noise impact, also refer to Section 5.2 For vibration impact, also refer to Section 5.3
Project Notification	PN	Issue project updates to stakeholders, discussing overviews of current and upcoming works. Advanced warning of potential disruptions can be included. Content and length to be determined on a project-by-project basis.	Refer to Section 5.4.4.
Verification Monitoring	V	Monitoring to comprise of attended acoustic surveys. The purpose of the monitoring is to confirm measured levels are consistent with the predictions in the acoustic assessment, and to verify that the mitigation procedures are appropriate for the affected receivers. If the measured levels are higher than those predicted, then the measures will need to be reviewed and the management plan will need to be amended.	For noise impact, refer to Section 5.2.3 For vibration impact, refer to Section 5.3.2
Complaints Management System	CMS	Implement a management system which includes procedures for receiving and addressing complaints from affected stakeholders	Refer to Section 5.4.2
Specific Notification	SN	Individual letters or phone calls to notify stakeholders that noise levels are likely to exceed noise objectives. Alternatively, contractor could visit stakeholders individually in order to brief them in regard to the noise impact and the mitigation measures that will be implemented.	Refer to Section 5.4.4.
Respite Offer	RO	Specific offer provided to stakeholders subjected to an ongoing impact.	Refer to Section 5.2.1
Alternative Construction Methodology	AC	Contractor to consider alternative construction options that achieve compliance with relevant criteria. Alternative option to be determined on a case-by-case basis. It is recommended that the selection of the alternative option should also be determined by considering the assessment of on-site measurements (refer to Verification Monitoring above).	Refer to Section 5.1 and 5.7.2

The application of these procedures is in relation to the exceedances over the relevant criteria. For airborne noise, the criteria are based on NMLs. The allocation of these procedures is discussed in Section 5.1.2

For vibration, the criteria either correspond to human comfort, building damage or scientific and medical equipment. The application of these procedures is discussed in Section 5.1.3.

5.1.2 Allocation of Noise Management Procedures

For residences, the management procedures have been allocated based on noise level exceedances at the affected properties, which occur over the designated NMLs (refer to Section 3). The allocation of these procedures is summarised in Table 19 below.

Table 19 Allocation of noise management procedures – residential receivers

Construction Hours	Exceedance over NML (dB)	Management Procedures (see Table 18)
Standard Hours	0 - 3	GMM
	4 - 10	GMM, PN, V [1], CMS, AC
	> 10	GMM, PN, V, CMS, SN, AC
	> 75	GMM, PN, V, CMS, SN, AC & RO
Outside Standard Hours	0 – 5	GMM, AC
	> 5	GMM, PN, V, CMS, SN, RO, AC

Notes

1. *Verification monitoring to be undertaken upon complaints received from affected receivers*

Please note the following regarding the allocation of these procedures:

- The exceedances have been estimated as part of the acoustic assessment, and these are summarised in Section 4.1.
- The allocation of procedures is based on the assumptions used for noise level predictions (refer to Section 4.1). Consequently, these allocations can be further refined once onsite works are undertaken and further development of the construction program.

For non-residential receivers (such as commercial), management measures are provided in Section 5.2.4.

5.1.3 Allocation of Vibration Management Procedures

Table 20 below summarises the vibration management procedures to be adopted based on exceedance scenarios (i.e., whether the exceedance occurs over human comfort criteria, building damage criteria, or criteria for scientific and medical equipment). Please note these management procedures apply for any type of affected receiver (i.e., for residences as well as non-residential receivers).

Table 20 Allocation of vibration management procedures

Construction Hours	Exceedance Scenario	Management Procedures
Standard Hours	Over human comfort criteria (refer to Section 3)	GMM, PN, V, RO
	Over building damage criteria (refer to Section 3)	GMM, V, AC
Outside Standard Hours	Over human comfort criteria (refer to Section 3)	GMM, SN, V, RO, CMS
	Over building damage criteria (refer to Section 3)	GMM, V, AC

5.2 Site Specific Noise Mitigation Measures

5.2.1 Respite Periods

Predicted noise levels outlined in Section 4.1 indicate that in some cases when works are being undertaken within proximity of receiver boundaries, exceedances above the Noise Management Levels (NMLs) may occur. In addition, in accordance with Conditions of Consent respite periods are recommended for noisy activities. As such the following respite conditions are recommended in accordance with the projects Conditions of Consent or when works extended periods of noisy works are affecting a surrounding receiver above the HNAL of 75dBA. See below.

Table 21 Recommended Respite Periods

Monday to Friday	Saturday
7:00am to 9:00am – No rock breaking, rock hammering, sheet piling, pile driving and similar activities. (Respite Period)	8:00am to 9:00am – No rock breaking, rock hammering, sheet piling, pile driving and similar activities. (Respite Period)
9:30am to 12:00pm – Works	9:00am to 12:00pm – Works
12:00pm to 2:00pm – No rock breaking, rock hammering, sheet piling, pile driving and similar activities. (Respite Period)	12:00pm to 4:00pm – No rock breaking, rock hammering, sheet piling, pile driving and similar activities. (Respite Period)
2:00pm to 5:00pm – Works	
5:00pm to 7:00pm – No rock breaking, rock hammering, sheet piling, pile driving and similar activities. (Respite Period)	

Note: Recommended respite periods for noisy works has been formulated in accordance with Condition C8 from the *Notice of Determination – Approval.*

5.2.2 General Comments

The contractor will, where reasonable and feasible, apply best practice noise mitigation measures. These measures shall include the following:

- Maximising the offset distance between plant items and nearby noise sensitive receivers including 30m in accordance with draft condition C17.
- Preventing noisy plant working simultaneously and adjacent to sensitive receivers.
- Minimising consecutive works in the same site area.
- Orienting equipment away from noise sensitive areas.
- Carrying out loading and unloading away from noise sensitive areas.

In order to minimise noise impacts during the works, the contractor will take all reasonable and feasible measures to mitigate noise effects.

The contractor will also take reasonable steps to control noise from all plant and equipment. Examples of appropriate noise control include efficient silencers and low noise mufflers.

The contractor should apply all feasible and reasonable work practices to meet the NMLs and inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels, duration of noise generating construction works, and the contact details for the proposal.

5.2.3 Noise Monitoring

Attended noise monitoring is recommended to be undertaken at the start of each major milestone of the project. It is proposed that these milestones are at the commencement of the excavation and structural works only.

These works should be undertaken by a qualified acoustical consultant directly engaged by the contractor.

The statistical parameters to be measured should include the following noise descriptors: LA90, LA10, and LAeq. All noise measurements should be conducted over consecutive 15-minute periods.

This monitoring should also be complemented by undertaking attended noise measurements in order to:

- Differentiate between construction noise sources and other extraneous noise events (such as road traffic and aircraft noise)
- Note and identify any excessive noise emitting machinery or operation.

In addition to the above detailed measurements, should any ongoing complaints be received which have not been determined previously, it should be confirmed by conducting additional attended noise measurements.

The survey methodology and any equipment should comply with the requirements discussed in Standard AS 1055.1-1997.

5.2.4 Noise Mitigation Measures for Non-Residential Receivers

Where exceedances have been identified in Section 4, the following mitigation measures are recommended:

- Undertake general mitigation measures as discussed in Section 5.7
- Issue project updates to tenants in affected premises. The updates can include overview of current and upcoming works, as well as advanced warning of potential disruptions.
- Signage to be posted in order to provide stakeholders information regarding project details, emergency contacts and enquiry contact information.

5.2.5 Alternate Equipment or Process

Exceedance of the site's NMLs should result in an investigation as to whether alternate equipment could be used, or a difference process could be undertaken.

In some cases, the investigation may conclude that the use of other equipment is not possible, however, a different process could be undertaken.

5.2.6 Acoustic Enclosures/Screening

Typically, on a construction site there are three different types of plant that will be used: mobile plant (i.e., excavators, skid steers, etc.), semi mobile plant (i.e., hand tools generally) or static plant (i.e., diesel generators).

For plant items which are static it is recommended that, in the event exceedances are being measured due to operation of the plant item, an acoustic enclosure/screen is constructed to reduce impacts. These systems can be constructed from Fibre Cement (FC) sheeting or, if airflow is required, acoustic attenuators or louvres.

For semi mobile plant, relocation of plant should be investigated to either be operated in an enclosed space or at locations away from a receiver.

With mobile plant it is generally not possible to treat these sources. However, investigations into the machine itself may result in a reduction of noise (i.e., mufflers/attenuators etc).

5.2.7 Site Cranes (Permanent)

The use of permanent fixed cranes are not required to be used as part of the proposed construction of the project.

5.3 Vibration Mitigation Measures

5.3.1 General Comments

As part of the CNVMSP, the following vibration mitigation measures should be implemented:

- Any vibration generating plant and equipment is to be in areas within the site in order to lower the vibration impacts.
- Investigate the feasibility of rescheduling the hours of operation of major vibration generating plant and equipment.
- Use lower vibration generating items of construction plant and equipment; that is, smaller capacity plant, where feasible
- Minimise conducting vibration generating works consecutively in the same area (if applicable).
- Schedule a minimum respite period of at least 30 minutes before activities commence which are to be undertaken for a continuous 4-hour period.
- Use only dampened rock breakers and/or "city" rock breakers to minimise the impacts associated with rock breaking works.

5.3.2 Vibration Monitoring

Based on the proximity of the surrounding receivers to the works magnitudes of vibration resulting from construction activities required to be undertaken on the site are not expected to approach structural damage vibration limits detailed in Section 4.2 of this report, therefore permanent continuous vibration monitoring is not recommended.

Similar to the measurement procedure outlined in the noise monitoring section, attended vibration monitoring is to be undertaken at the following periods:

- Commencement of any high vibration generating activities including hydraulic hammering, rock breaking or vibration rolling on the site works within the safe working distances outlined above.
- Receiver location in the event complaints resulting from construction activities resulting from the perception of vibration are experienced by the occupants of buildings within the vicinity of the site.
- For vibration intensive works (such as excavation, rock break etc) in proximity of the building J4 (Microbiology Labs) or any other rooms containing sensitive equipment, attended vibration measurements may be required to ensure levels do not exceed vibration criteria. To be negotiated with the WSU.

5.4 SINSW Complaints management process as outlined in the Community Communication Strategy (CCS)

5.4.1 Enquiries and complaints management

SINSW manages enquiries (called interactions in our CRM, Darzin), and complaints in a timely and responsive manner.

Prior to project delivery, a complaint could be related to lack of community consultation, design of the project, lack of project progress, etc.

As per our planning approval conditions, a complaints register is updated monthly and is publicly available on the project's website page on the SINSW website. The complaints register will record the number of complaints received, the nature of the complaints and how the complaint was resolved.

5.4.2 Complaints management process

If SINSW receives a complaint about the project during construction, it must be logged in our CRM system, actively managed, closed out and resolved by SINSW within 24-48 hours of receipt by the SINSW Community Engagement Manager, as outlined in Table 6 below. If this is not possible, the complaint must be escalated internally as required and resolved within 7 business days.

Complaints received via the following channels will be directed to the SINSW Community Engagement Manager for resolution:

- Phone: 1300 482 651 (24 hour toll free number)
- Email: schoolinfrastructure@det.nsw.edu.au
- Postal address: GPO Box 33, Sydney, NSW 2001
- Face to face
- School executive
- Project team

If the complainant is not satisfied with the SINSW response, and they approach SINSW for rectification, the process will involve a secondary review of their complaint as per the outlined process.

Complaints will be escalated when:

- An activity generates three complaints within a 24-hour period (separate complainants).
- Any construction site receives three different complaints within a 24-hour period.
- A single complainant reports three or more complaints within a three day period.
- A complainant threatens to escalate their issue to the media or government representative.
- The complaint was avoidable.
- The complaint relates to a compliance matter.

Complaints will be first escalated to the Senior Manager, Community and Engagement or Director of Communications for SINSW as the designated complaints handling management representatives for our projects. Further escalation will be made to the Executive Director, Office of the Chief Executive to mediate if required.

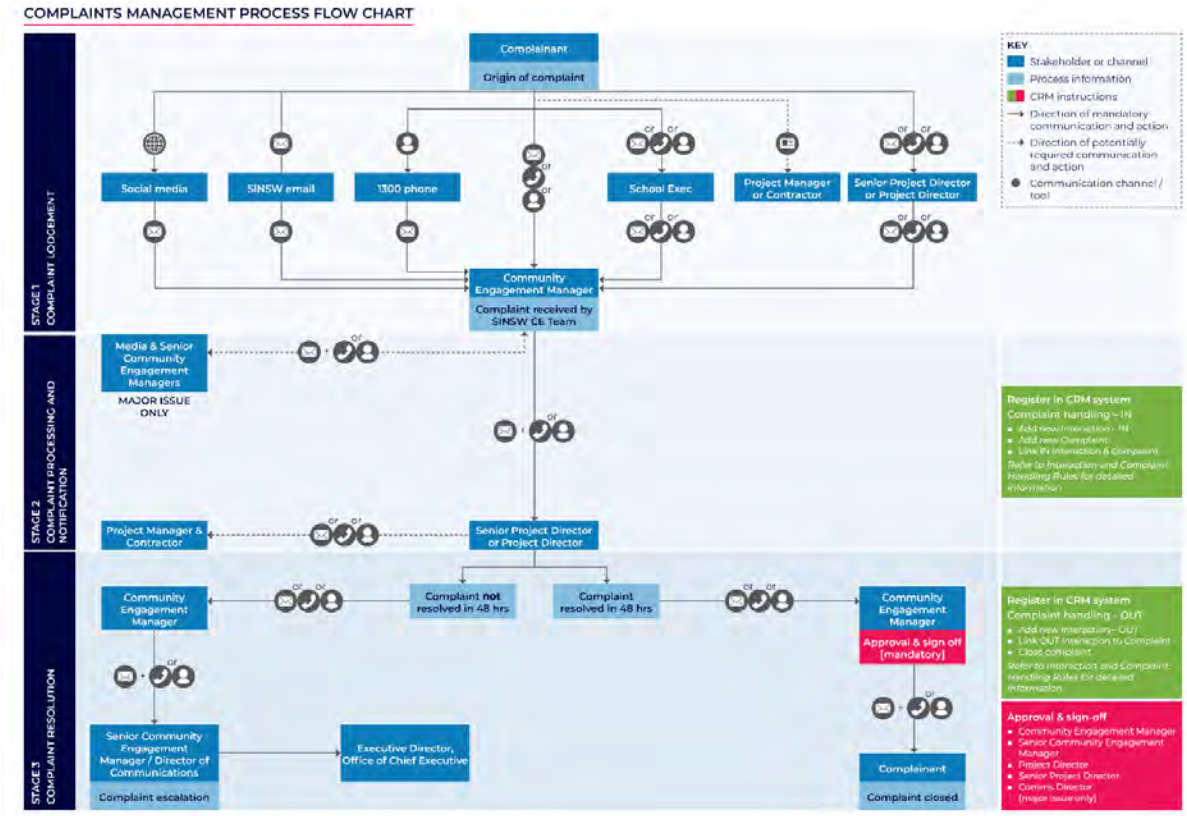
If a complaint still cannot be resolved by SINSW to the satisfaction of the complainant, we will advise them to contact the NSW Ombudsman - https://www.ombo.nsw.gov.au/complaints.

The below table summarises timeframes for responding to enquiries and complaints, through each correspondence method. Responses should be undertaken in accordance with the Community Consultation Strategy which may have difference response timeframes and should be followed:

Table 22 Recommended Response to Complaints

Complaint	Acknowledgement times	Response time
Phone call during business hours	At time of call – and agree with caller estimated timeframe for resolution.	Complaint to be closed out within 48 hours. If not possible, continue contact, escalate as required and resolve within 7 business days.
Phone call after hours*	Within two (2) hours of receiving message upon returning to office.	Following acknowledgement, complaint to be closed out within 48 hours. If not possible, continue contact, escalate as required and resolve within 7 business days.
Email during business hours	At time of email (automatic response)	Complaint to be closed out within 48 hours. If not possible, continue contact, escalate internally as required and resolve within 7 business days.
Email outside of business hours	At time of email (automatic response)	Complaint to be closed out within 48 hours (once return to business hours). If not possible, continue contact, escalate internally as required and resolve within 7 business days.
Letter	NA	Complaint to be closed out within 48 hours following receipt. If phone or email contact details are not provided a written response to be sent within 48 hours following receipt. If not possible, continue contact, escalate internally as required and resolve within 7 business days.
Interaction/ Enquiry		
Phone call during business hours	At time of call – and agree with caller estimated timeframe for response.	Interaction to be logged and closed out within 7 business days.
Phone call after hours	Within two (2) hours of receiving message upon returning to office.	Interaction to be logged and closed out within 7 business days.
Email during business hours	At time of email (automatic response)	Interaction to be logged and closed out within 7 business days.
Email outside of business hours	At time of email (automatic response)	Interaction to be logged and closed out within 7 business days.
Letter	N/A	Interaction to be logged and closed out within 10 business days following receipt.

The below diagram outlines our internal process for managing complaints.



5.4.3 Complaints in common community languages

Complaints can be made in common community languages using the Translating and Interpreting Service (TIS), managed by the Department of Home Affairs. Community members can be connected to an interpreter by calling TIS on 131 450. TIS contact details are included on all project communications. Once TIS has the interpreter on the line, the interpreter and community member are connected to School Infrastructure and phone interpretation can begin. School Infrastructure NSW receives the complaint via the translator and begins the complaints management process as outlined above.

5.4.4 Community Notifications

Prior to the works onsite being undertaken, it is recommended that community consultation with the neighbouring affected parties be undertaken. These include:

Table 23 Receiver Locations

Receiver Type	Location
Residential	Southee Road Residences
Residential	Anglicare
Education	Western Sydney University

The communication, however, should not be limited to the beginning of the onsite works but throughout, providing the community with constant updates on the progress and upcoming works. In our experience these could include:

- Project website.
- Email notifications; and
- Letterbox drops.

5.4.5 Community Engagement

In addressing the requirement for the community consultation when formulating onsite noise and vibration mitigation measures, we note the following.

Condition B16, item "e" from the consent, states:

(e) *describe the community consultation undertaken to develop the strategies in condition B16(d)*

Note: Condition B16(d) relates to the formulation of noise and vibration management strategies to manage high nose works.

In addressing the requirement of Condition B16(e), School Infrastructure NSW have requested feedback from the community in regard to the proposed noise and vibration mitigation measures as outlined in the January 2022 Project Update. Refer to Appendix E for Schools Infrastructure Project Notification.

At the closure of the consultation period, no input was provided by the community in relation to the Construction Noise Vibration Management Sub-Plan.

5.5 Complaints Management System

Should complaints arise they must be dealt with in a responsible and uniform manner, therefore, a management system to deal with complaints is detailed above through SINSW.

5.6 Contingency Plans

Contingency plans are required to address noise or vibration problems if excessive levels are measured at surrounding sensitive receivers and/or if justified complaints occur. Such plans include:

- Stop the onsite works.
- Identify the source of the main equipment within specific areas of the site which is producing the most construction noise and vibration at the sensitive receivers; and
- Review the identified equipment and determine if an alternate piece of equipment can be used or the process can be altered.
- In the event an alternate piece of equipment or process can be used, works can re-commence.
- In the event an alternate piece of equipment or process cannot be determined implement a construction assessment to be performed by a suitably qualified acoustic consultant.

The Superintendent shall have access to view the Contractor's noise measurement records on request. The Superintendent may undertake noise monitoring if and when required.

5.7 General Mitigation Measures (Australia Standard 2436-2010)

As well as the above project specific noise mitigation controls, AS 2436-2010 "*Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites*" sets out numerous practical recommendations to assist in mitigating construction noise emissions. Examples of strategies that could be implemented on the subject project are listed below, including the typical noise reduction achieved, where applicable.

5.7.1 Adoption of Universal Work Practices

- Regular reinforcement (such as at toolbox talks) of the need to minimise noise and vibration.
- Regular identification of noisy activities and adoption of improvement techniques.
- Avoiding the use of portable radios, public address systems or other methods of site communication that may unnecessarily impact upon nearby sensitive receivers.
- Where possible, avoiding the use of equipment that generates impulsive noise.
- Minimising the need for vehicle reversing for example (particularly at night), by arranging for one-way site traffic routes.
- Use of broadband audible alarms on vehicles and elevating work platforms used on site.
- Minimising the movement of materials and plant and unnecessary metal-on-metal contact.
- Minimising truck movements.

5.7.2 Plant and Equipment

- Choosing quieter plant and equipment based on the optimal power and size to most efficiently perform the required tasks.
- Selecting plant and equipment with low vibration generation characteristics, where feasible.
- Operating plant and equipment in the quietest and most efficient manner.

5.7.3 On Site Noise Mitigation

- Maximising the distance between noise activities and noise sensitive land uses.
- Installing purpose-built noise barriers, acoustic sheds and enclosures around static plant.

5.7.4 Work Scheduling

- Providing respite periods which could include restricting very noisy activities to time periods that least affect the nearby noise sensitive locations, restricting the number of nights that after-hours work is conducted near residences or by determining any specific requirements.
- Scheduling work to coincide with non-sensitive periods where possible.
- Planning deliveries and access to the site to occur quietly and efficiently and organising parking only within designated areas located away from the sensitive receivers.
- Optimising the number of deliveries to the site by amalgamating loads where possible and scheduling arrivals within designated hours.
- Including contract conditions that include penalties for non-compliance with reasonable instructions by the principal to minimise noise or arrange suitable scheduling.

5.7.5 Source Noise Control Strategies

Some ways of controlling noise at the source are:

- Where reasonably practical, noisy plant or processes should be replaced by less noisy alternatives.
- Modify existing equipment: Engines and exhausts are typically the dominant noise sources on mobile plant such as cranes, graders, excavators, trucks, etc. In order to minimise noise emissions, residential grade mufflers should be fitted on all mobile plant utilised on site.
- Siting of equipment: locating noisy equipment behind structures that act as barriers, or at the greatest distance from the noise-sensitive area; or orienting the equipment so that noise emissions are directed away from any sensitive areas, to achieve the maximum attenuation of noise.
- Regular and effective maintenance.

5.7.6 Miscellaneous Comments

Deliveries should be undertaken, where possible, during standard construction hours.

Maximise hammer penetration (and reduce blows) by using sharp hammer tips. Keep stocks of sharp profiles at site and monitor the profiles in use.

"As per Consent Condition C15, where practicable, the use of "quackers" will be used to ensure noise impacts on surrounding noise sensitive receivers are minimised. This will not be implemented where it is deemed the use of quackers (as opposed to standard vehicle notification devices) would compromise the safety of construction staff or members of the public.

No public address system should be used on site.

6 CONCLUSION

Pulse White Noise Acoustics (PWNA) has been engaged by Schools Infrastructure NSW (SINSW) to prepare a Construction Noise and Vibration Management Sub-Plan (CNVMSP) for the construction of *Hawkesbury Centre of Excellence* ("the Project") in Hawkesbury.

This CNVMSP has been prepared to satisfy the requirements of Conditions B13 and B16 of the Consent given in the Notice of Determination – Approval issued for Development Application No. SSD-15001460.

An assessment of potential noise and vibration impacts from the required processes to be undertaken during the construction period of the project (including excavation/ground works and construction) has been undertaken and suitable mitigation methods and community engagement has been detailed in this report.

Providing the recommendations in this report are included in the construction of the site, compliance with the relevant EPA's Interim Construction Noise Guideline Objectives of the propjets *Conditions of Consent* can be achieved.

For any additional information please do not hesitate to contact the person below.

Regards

Matthew Furlong
Senior Acoustic Engineer
Pulse White Noise Acoustics

APPENDIX A: ACOUSTIC GLOSSARY

The following is a brief description of the acoustic terminology used in this report:

Ambient Sound	The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.
Audible Range	The limits of frequency which are audible or heard as sound. The normal ear in young adults detects sound having frequencies in the region 20 Hz to 20 kHz, although it is possible for some people to detect frequencies outside these limits.
Character, acoustic	The total of the qualities making up the individuality of the noise. The pitch or shape of a sound's frequency content (spectrum) dictate a sound's character.
Decibel [dB]	The level of noise is measured objectively using a Sound Level Meter. The following are examples of the decibel readings of every day sounds; 0dB the faintest sound we can hear 30dB a quiet library or in a quiet location in the country 45dB typical office space. Ambience in the city at night 60dB Martin Place at lunch time 70dB the sound of a car passing on the street 80dB loud music played at home 90dB the sound of a truck passing on the street 100dB the sound of a rock band 115dB limit of sound permitted in industry 120dB deafening
dB(A)	*A-weighted decibels* The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.
Frequency	Frequency is synonymous to *pitch*. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Loudness	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on
LMax	The maximum sound pressure level measured over a given period.
LMin	The minimum sound pressure level measured over a given period.
L1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L10	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L90	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L_{90} noise level expressed in units of dB(A).
Leq	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
dB (A)	'A' Weighted overall sound pressure level

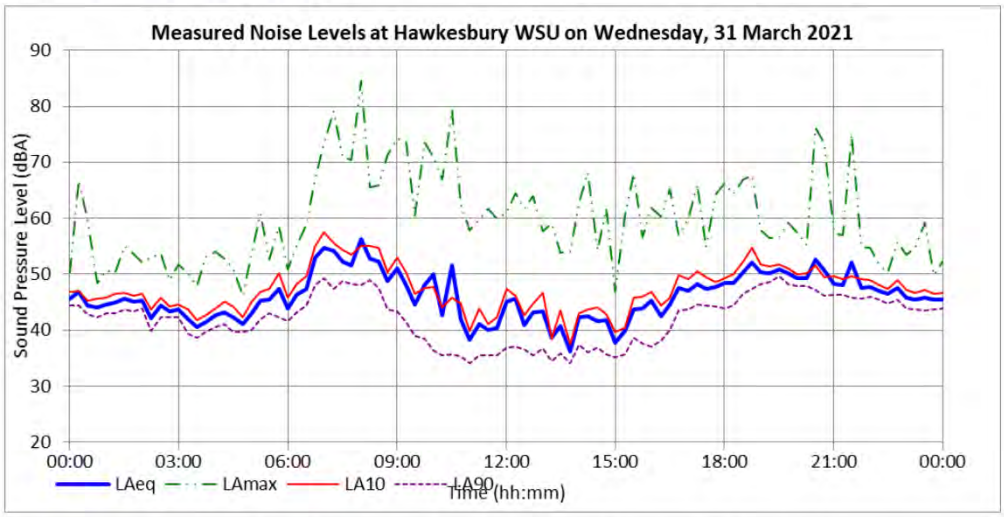
Sound Pressure Level, LP dB	A measurement obtained directly using a microphone and sound level meter. Sound pressure level varies with distance from a source and with changes to the measuring environment. Sound pressure level equals 20 times the logarithm to the base 10 of the ratio of the rms sound pressure to the reference sound pressure of 20 micro Pascals.
Sound Power Level, Lw dB	Sound power level is a measure of the sound energy emitted by a source, does not change with distance, and cannot be directly measured. Sound power level of a machine may vary depending on the actual operating load and is calculated from sound pressure level measurements with appropriate corrections for distance and/or environmental conditions. Sound power levels is equal to 10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 picoWatt

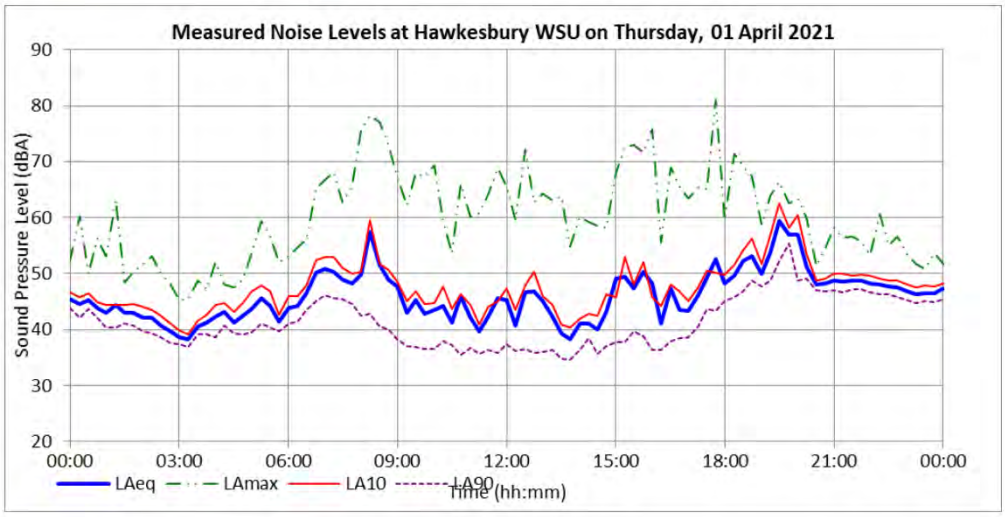
APPENDIX B: UNATTENDED NOISE MEASUREMENTS

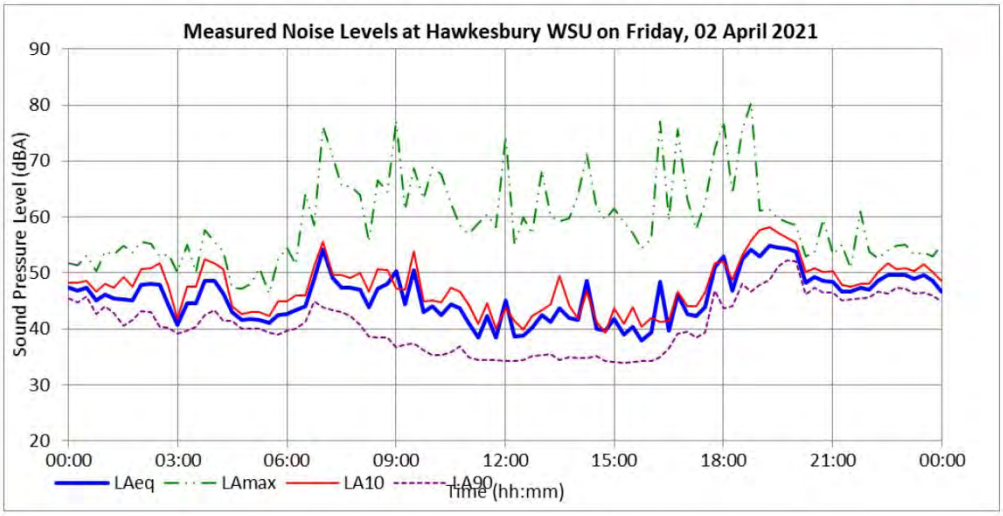
Note: Extract - Marshall Day Acoustics – Noise and Vibration Assessment – Appendix I

MARSHALL DAY Acoustics

APPENDIX I MONITORING RESULTS



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Sound Pressure Level (dBA)
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80
70
60
50
40
30
20
00:00
03:00
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LAeq
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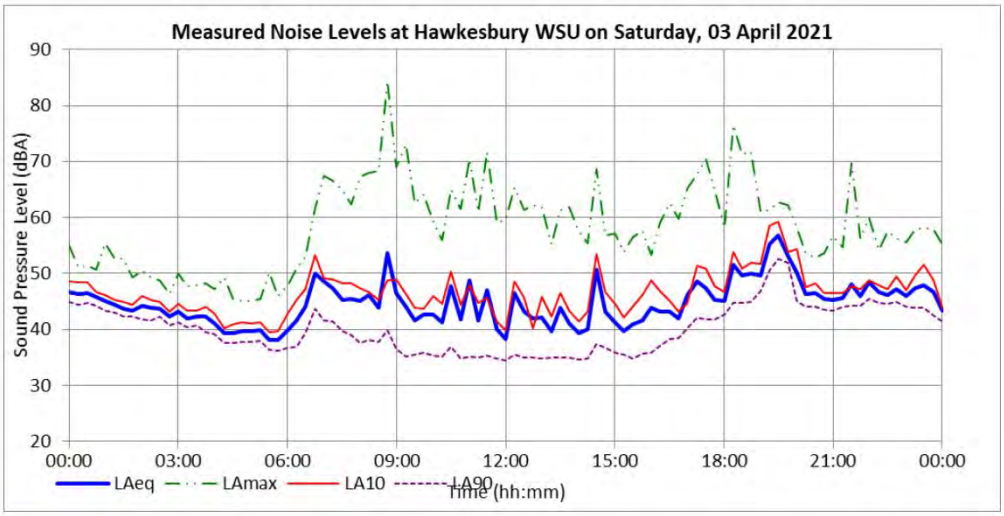
LA10
LA90
Time (hh:mm)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40
30
20
00:00
03:00
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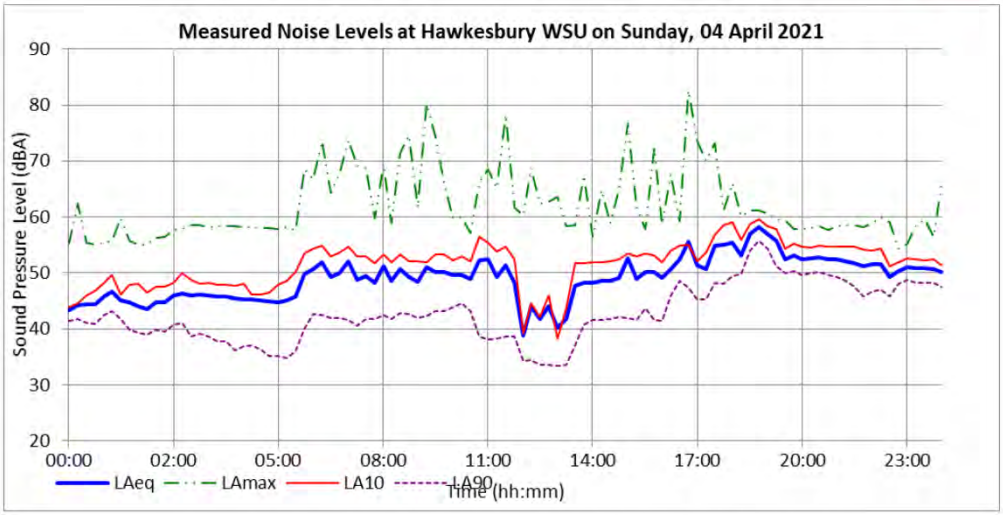
18:00
21:00
00:00
LAeq
LAmax
LA10
LA90
Time (hh:mm)


Measured Noise Levels at Hawkesbury WSU on Sunday, 04 April 2021
Sound Pressure Level (dBA)
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80
70
60
50
40
30
20
00:00
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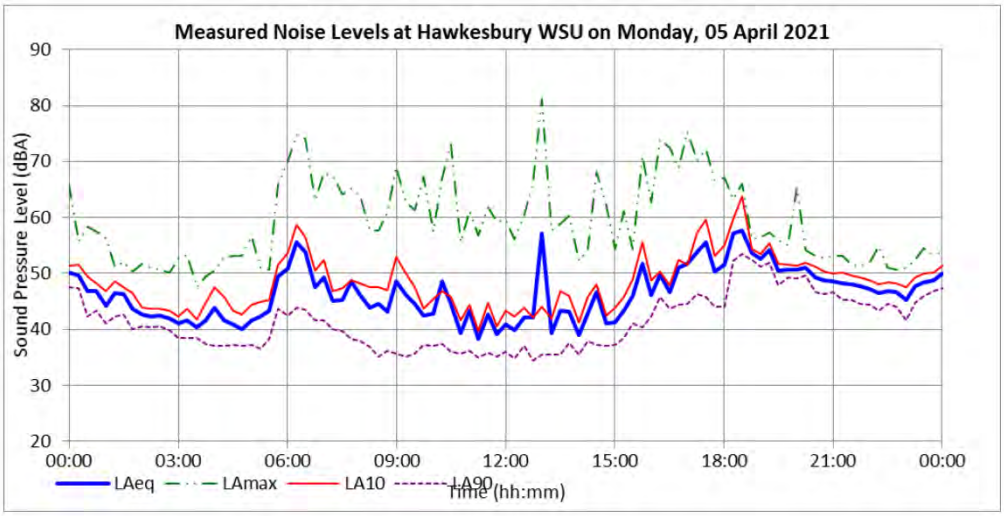
LA10
LA90
Time (hh:mm)


Measured Noise Levels at Hawkesbury WSU on Monday, 05 April 2021
Sound Pressure Level (dBA)
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70
60
50
40
30
20
00:00
03:00
06:00
09:00
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LAeq
LAmax
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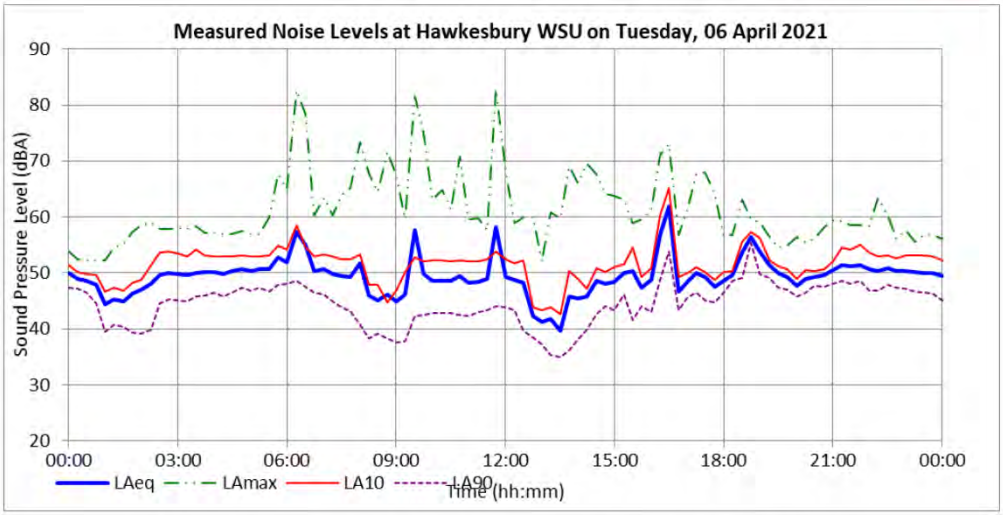
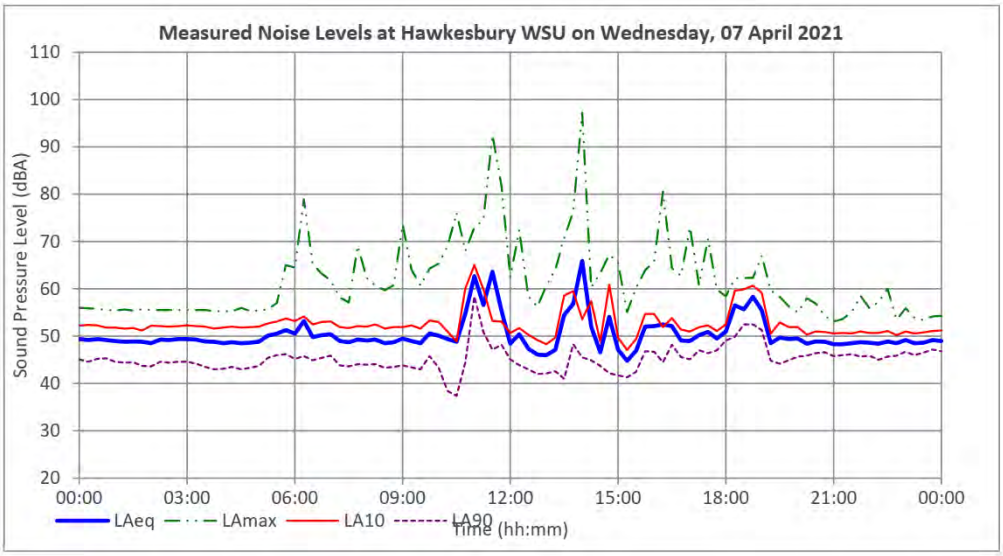
LA90
Time (hh:mm)

MARSHALL DAY Acoustics





APPENDIX C: NOISE & VIBRATION INVESIGATION CHECKLIST

Hawkesbury Centre of Excellence (HCoE) – Noise & Vibration Investigation Checklist

Pulse White Noise Acoustics (PWNA) and Schools Infrastructure NSW (SINSW) have prepared the following noise and vibration investigation checklist to assist the onsite construction team in investigation any received noise and vibration complaint or identifying an exceedance over the management levels. This checklist should be completed in conjunction with *Hawkesbury Centre of Excellence, Hawksbury – Construction Noise Vibration Management Sub-Plan (CNVMSP)* prepared by PWNA.

Should any noise and vibration complaint be received, SINSW must complete the following steps:

Exceedance/Complaint Information

Complaint reference number:.....

Date Received: .....

Location of Complaint: .....

Complainant Contact Details:.....

Step	Task	Completed Response
1	Pause onsite works	
2	Identify the main source(s) construction noise and/or vibration within specific areas of the site which is impacting the most at the sensitive receiver.	
3	Review the identified equipment and determine if an alternate piece of equipment can be used or the process can be altered. ***(If no, skip to step 5)***	
4	In the event an alternate piece of equipment or process can be used, works can re-commence incorporating possible and practical mitigation measures.	
5	In the event an alternate piece of equipment or process cannot be determined implement a construction assessment to be performed by a suitably qualified acoustic consultant. This may include additional respite periods.	

PULSE WHITE NOISE ACOUSTICS Level 5, 73 Walker Street, North Sydney NSW 2060
P 1800 4 PULSE (1800 478 573) E info@pwna.com.au pwna.com.au ABN 95 642 886 306

APPENDIX D: AUTHOR CURRICULUM VITAE (CV)

MATTHEW FURLONG
SENIOR ACOUSTIC CONSULTANT

QUALIFICATIONS

Bachelor of Creative Technology (Audio Engineering and Sound Production)

Matthew Furlong has 8 years' experience in delivering acoustic design on architectural, environmental and infrastructure projects, including conceptual, detailed design, construction and post-construction stages.

He has consulted for mixed use of commercial and residential developments, developing in-principle recommendations for the client and managing contractor providing detailed design advice as well as full construction services.

In addition to the above, Matthew has being part of many consulting teams in many education, health, fitouts and Land and Environmental Court (LEC) proceedings across the state.

SELECTED PROJECT EXPERIENCE

Residential Developments

- Acoustic Design for Crown Casino Sydney
- Acoustic Design and Construction Services 130 Elizabeth Street, Sydney (One30Hyde)
- Acoustic Design and Construction Services Trinity Terraces Rosebery
- Construction Services 1a Coulson Street, Erskinville
- Construction Services for the Erko Apartments Erskinville
- Construction Services for the Eve Apartments Erskinville
- Acoustic Design 54-56 Riley Street and 1 Crown Lane, Darlinghurst
- Development Application, Acoustic Design and Construction Services New Life Darling Harbour, 495 Harris Street, Ultimo
- Development Application, Acoustic Design and Construction Services Meriton Developments (Mascot, Rosebery, Epping, Parramatta, Pagewood, Bondi, Dee Why, Zetland, Waterloo, North Sydney, Sydney, Macquarie Park)
- Development Application, Acoustic Design and Construction Services Summer Hill Flourmill Stages 1, 2, 3 and 4.
- Acoustic Design and Construction Services Macquarie Park Village
- Acoustic Design and Construction Services Ryde Gardens
- Acoustic Design and Construction Services Tempo Apartments Victoria Road Drummoyne
- Development Application, Acoustic Design and Construction Services Winston Hills Mall Residential
- Construction Services Presbyterian Aged Care Paddington
- Acoustic Design and Construction Services Wahroonga Nursing Home
- Acoustic Design and Construction Anglicare Castle Hill (ARV)
- Acoustic Design and Construction Cardinal Freeman Village, Ashfield

MATTHEW FURLONG
SENIOR ACOUSTIC CONSULTANT

Commercial / Educational / Health Facilities

- Formulation of the new Victorian Health Engineering Guidelines (Acoustics)
- Development Application and Acoustic Design 210-220 George Street Sydney
- Acoustic Design and Construction Services 151 Clarence Street, Sydney
- Development Application for 390-396 Pitt Street, Haymarket
- Acoustic Design and Construction Services Chifley Plaza Internal Works
- Development Application 371-375 Pitt Street, Sydney
- Construction Services Fitout of the Department of Premier and Cabinet
- Noise Investigations for Transport NSW (Chatswood and Burwood)
- SSDA and Acoustic Design Meadowbank Education Precinct
- CNVMP and Construction Services Anzac Park Public School
- CNVMP and Construction Services Alexandria Park Public School
- Construction Services for Wagga Wagga Base Hospital Stage 2
- Construction Services for North Shore Public Hospital
- SSDA and Acoustic Design for Concord Repatriation General Hospital
- SSDA and Acoustic Design Nepean Public Hospital
- Construction Services for South East Regional Hospital (Bega)
- Acoustic Design for North Shore Health Hub
- Acoustic Design Sydney Children's Hospital Stage 1 & Children's Comprehensive Cancer Centre (SCH1/CCCC), Randwick

Licensed Premises

- Development Application for The Cauliflower Hotel, Waterloo
- Development Application for Christopher Hanna Salon and Bar, 13-15a Bridge Street, Sydney

Industrial Developments

- Acoustic Design Erskine Park Industrial Area
- Acoustic Design and Construction Services Snackbrands Orchard Hills

APPENDIX E – SCHOOL INFRASTRUCTURE (SI) *HAWKESBURY CENTRE OF EXCELLENCE – PROJECT UPDATE JANUARY 2022*

NSW Department of Education – School Infrastructure

Artist impression of the Centre of Excellence in Agricultural Education

Centre of Excellence in Agricultural Education

Notification | January 2022

Project overview

Design is underway for Centre of Excellence in Agricultural Education co-located at the Western Sydney University Hawkesbury campus. The Centre of Excellence – Richmond Agricultural College will be used as a state-wide resource delivering world class agricultural and science, technology, engineering and mathematics (STEM) education.

Construction Noise and Vibration Management Sub-Plan

As part of the works being completed at the Centre of Excellence in Agricultural Education under State Significant Development (SSD) Approval 15001460, Schools Infrastructure New South Wales (SINSW) are preparing a Construction Noise & Vibration Management Sub-Plan (CNVMSP). The CNVMSP needs to include strategies that have been developed with the community for the delivery of the project.

There are strategies that are already planned as part of the construction works, such as;

- Attended noise monitoring, to ensure compliance with the noise & vibration management criteria outlined in the SSDA approval.
- Compliance with the 'Construction Hours' conditions in the EPA's Interim Construction Noise Guideline to minimise noise and vibration impacts of the development.
- Design considerations to minimise the extent of any rock breaking and excavation in rock.
- Task specific acoustic shielding where practical, to minimise noise leaving site.

If you would like to contribute any recommendations or feedback that you feel would be beneficial and feasible for the project to implement, please contact SINSW on the below contact information by 28 January 2022.

For more information contact:

School Infrastructure NSW
Email: schoolinfrastructure@det.nsw.edu.au
Phone: 1300 482 651
www.schoolinfrastructure.nsw.gov.au

NSW GOVERNMENT

NSW GOVERNMENT Education School Infrastructure

Post Approval Consultation Record

Identified Party to Consult:	Western Sydney University (WSU)
Consultation type:	Teams Meetings Emails & Phone calls ad hoc
When is consultation required?	Prior to construction and operation
Why	Condition A8
When was consultation held	- 2/2/22 Letterbox drop issued requesting public contribution to C18, Vibration Management Plan. - 16/02/2022 – CPL issue construction soil and management plan to WSU. - 16/02/2022 – CPL issue Construction Traffic and Pedestrian Management Sub-Plan (CTPMSP) to WSU/TfNSW and HCC.
Identify persons and positions who were Involved	- Aswant Prasad Associate Director, Campus and Maintenance Delivery - Natalie Harris Senior Manager – Infrastructure Delivery - Joe Lantz Director, Campus and Maintenance Delivery - Andrew Hawke-Landscape Manager -Campus Maintenance
Provide the details of the consultation	- Vibration Management Plan has been prepared and issued for comment
What specific matters were discussed?	- B31 – Road Upgrade & Intersection Works - C18 – Vibration Criteria
What matters were resolved?	- All of the above.
What matters are unresolved?	- Final Design sign off for the proposed road works
Any remaining points of disagreement?	- Nil
How will SINSW address matters not resolved?	- Progress design and submit for WSU approval.

6.10 CONSTRUCTION WASTE MANAGEMENT PLAN

The Construction Waste Management is not embedded in this document; it is supplied as an attached appendix so that it can be displayed/updated/revised in isolation if required.

RICHARD CROOKES
CONSTRUCTIONS

HAWKESBURY CENTRE OF EXCELLENCE
1233

CONSTRUCTION WASTE MANAGEMENT PLAN

25 February 2022

CONTENTS

1 INTRODUCTION

This Construction Waste Management Sub-Plan (CWMSP) forms part of the Construction Environmental Management Plan for the Hawkesbury Centre of Excellence.

1.1 PURPOSE OF THE PLAN

Richard Crookes Constructions (RCC) recognises the importance of promoting building design and construction techniques which minimise waste and provides an efficient recycle procedure for all waste material.

The purpose of this plan is to outline processes for:

- Objectives and Targets;
- Operational Controls;
- Recording, Monitoring Corrective Action; and,
- Reporting

1.2 CONDITION SATISFACTION TABLE

This CWMSP satisfies SSDA condition B17 as outlined in the below table:

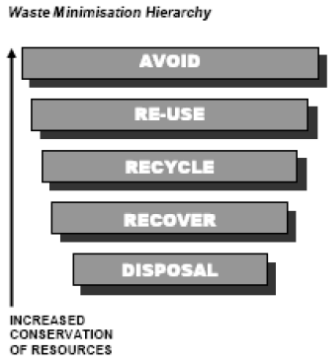
B17. The Construction Waste Management Sub-Plan (CWMSP) must address, but not be limited to, the procedures for the management of waste including the following:

Condition	Status	Section
(a) the recording of quantities, classification (for materials to be removed) and validation (for materials to remain) of each type of waste generated during construction and proposed use;	Satisfied	Section 2: Objectives and Targets (Pages 4-5) Section 5: Estimated Quantities (Page 9)
(b) information regarding the recycling and disposal locations; and	Satisfied	Section 2.2: Waste Management (Page 6)
(c) confirmation of the contamination status of the development areas of the site based on the validation results.	Satisfied	Section 3: Contamination Status (Page 7)

2 OBJECTIVES AND TARGETS

RCC's overall objective is to achieve a minimum of (90%) for recycled waste (by weight) generated by the Project.

The Operational Controls implemented to achieve this are as per the appended Bingo Waste Management & Recycling Plan (NSW), as well as the below:

Operational Controls		Method of Recording
General	Identify any hazardous and toxic materials (e.g. asbestos) and comply with WorkCover requirements. Try not to over-order on materials (initial waste avoidance). Communicate housekeeping & litter reduction rules with subcontractors during contract letting and site inductions.	Hazardous substance survey Waste Records Inductions
Implement the waste hierarchy – avoid, reuse, recycle and lastly disposal to landfill.		
		
Consider recycling reprocessing	Where practicable: Timber for reuse or mulching Aluminium wall frames – reprocess Plasterboard – recycled or use as soil improvers Steel – reprocess Toughened Glass – reprocess Carpet & underlay – reprocess & mulch mats	Monthly Waste Report
Product Stewardship	Investigate returning waste to the supplier? (e.g. plasterboard, packaging)	Contract/ Supply agreem'ts
Putrescibles Waste	Putrescible waste is to be contained in bins and collected by licenced contractor for disposal	Invoices
Contaminated Soils	Contaminated soils will be excavated and classified in accordance with EPA guidelines "Environmental Guidelines: Assessment, Classification & Management of Liquid & Non-Liquid Wastes" (June 2004) – www.environment.nsw.gov.au/waste/envguidlns/index.htm.	RAP Reports Test Reports Waste Records Disposal Dockets

Operational Controls		Method of Recording
Virgin Excavated Natural Materials (VEMN)	VENM excavated from site with suitable compaction qualities will be beneficially re-used on other construction sites whenever possible. Disposal to landfill will be the last option. No fill will be received on site that does not comply with EPA guidelines i.e. Contamination limits appropriate to the development.	Test Reports Waste Records Disposal Dockets
Acid Sulphate Soils (ASS)	Potential for acid sulphate soils ASS 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 suspected, consultant to prepare Acid Sulphate Soil Management Plan (ASSMP). Excavation and neutralisation to be supervised by consultants as per ASSMP.	ASSMP Test Reports Product delivery (lime) dockets Site Plans
Monitoring	Bin(s) with heavy lids shall be provided for putrescibles waste Daily inspections shall be carried out to ensure the worksite is litter free.	Env. Inspection Checklist
Reporting	Waste reports/management plans indicate estimated waste min (80%) of accumulated totals for the project.	Monthly Reports
Non-Compliance	Generation of water pollution and/or air pollution from onsite waste storage Inappropriate/illegal off-site disposal of waste materials Asbestos & CCA treated timber contamination of recoverable waste stream thereby requiring landfill disposal.	Env. Inspection Checklist Incident Report, NCRS
Emergency Response	No specific requirements associated with waste management Scenarios such as spill, fires, explosions covered by the project emergency response plans.	Incident Report

2.1 ESTIMATED WASTE QUANTITIES

Source Blacktown Council Waste Not Development Control Plan (internet, http://www.blacktown.nsw.gov.au/planning-anddevelopment/waste-not-overview/waste-not-overview_home.cfm, 2007).

Block of Flats (per 1000 m2)			
Waste Type	**Conversion Factor**	**Demolition (t)**	**Construction (t)**
Excavated Material	1.8 t/m3	na	na
Concrete (incl. Blocks)	2.4 t/m3	813	813
Bricks	1.0 t/m3	655	655
Timber Gyprock	Timber 0.5 t/m3[3] Gyprock: 0.75 t/m3	22	22
Steel	2 -4 t/m3	9	9
Roof Tiles	0.75 t/m3	33	33
Other – vegetation, cardboard, plastic	0.05 t/m3	26	26

Factory (per 1000 m2)			
Waste Type	**Conversion (t to m3)**	**Demolition (t)**	**Construction (t)**
Excavated Material	1.8 t/m3	na	na
Concrete	2.4 t/m3	448	0.25
Bricks	1.0 t/m3	205	2.10
Timber Gyprock	Timber 0.5 t/m33 Gyprock: 0.75 t/m3	4	1.65
Steel	2 -4 t/m3	23	0.45
Roof Tiles	0.75 t/m3	na	4.80
Other	0.05 t/m3	?	0.60

Office Block (per 1000 m2)			
Waste Type	**Conversion (t to m3)**	**Demolition (t)**	**Construction (t)**
Excavated Material	1.8 t/m3	7,410	5.10
Concrete	2.4 t/m3	1,485	18.80
Bricks	1.0 t/m3	124	8.50
Timber Gyprock	Timber 0.5 t/m33 Gyprock: 0.75 t/m3	29	8.60

2.2 WASTE MANAGEMENT

Bingo Industries will be the dedicated waste management contractor for the Hawkesbury Centre of Excellence. Their recycling centre's combine bin storage, waste collection, waste recycling and waste transfer to service the needs of the building & construction industry in NSW.

Waste collected by Bingo Industries are taken directly to one of their facilities where approximately 90% of wastes are converted to recovered resources.

Bingo's Waste Management Plan (Appendix A) outlines the procedures used to classify each type of waste and includes information regarding the recycling and disposal locations.

3 CONTAMINATION STATUS

As per the remediation action plan prepared by Douglas Partners for the Hawkesbury Centre of Excellence; all known contamination on site will be remediated through the containment cell methodology which will negate the need to export any contamination as waste. (Section 8. Remediation Methodology in Appendix B Remediation Action Plan).

Any additional contamination found on site will be managed utilising the unexpected finds protocol (Construction Environmental Management Plan: Appendix 6.6).

4 REPORTING

Greenstar:

The Project Green Star Administrator will be responsible for collecting monthly waste reports or utilising the waste subcontractor reporting format and issuing them to the Project Manager and Client Representative.

These reports will measure the weight of waste generated of material by classification, total weight of waste, percentage by weight recycled and percentage by weight to landfill.

General waste reporting:

Nominated member of the project team will be responsible for collecting monthly waste reports and issuing them to the Project Manager and Client Representative.

These reports will measure the weight of waste generated of material by classification, total weight of waste, percentage by weight recycled and percentage by weight to landfill estimated quantities.

5 ESTIMATED QUANTITIES

The below extract from EcCell's Construction Waste Management Plan (Appendix C) is an estimate of the core waste streams that will be removed from the Hawkesbury Centre of Excellence. Project waste to be removed will be assessed for the Reuse & recycling content and the Disposal to landfill.

PROJECT PHASE

EXCAVATION

Material Type on Site	Estimated Volume (m^3) or Weight (t) (Most Favourable → Least)			ON-SITE TREATMENT	OFF-SITE TREATMENT	
	Reuse	Recycling	Disposal	Proposed reuse and/or recycling collection methods	Disposal / Transport Contractor	Waste Depot, Recycling Outlet or Landfill site
Excavated Natural Material (ENM) Greenfield site		Reused Volume $50m^3$	Nil	Used for site levelling / cut & fill of the site.	N/A	N/A
Sub Total		**$50m^3$**		$50m^3$		
TOTAL		**$50m^3$**				
Narrative: There is minimal excavation of ENM, which will be used back on the site for landscaping. This material will be covered to reduce soil displacement and prevent air pollution. **There may be potential contaminated soils, refer to any contamination reports prior to excavation and re-use of materials on site**						

CONSTRUCTION

Material Type on Site	Estimated Volume (m^3) or Weight (t) (Most Favourable → Least)			ON-SITE TREATMENT	OFF-SITE TREATMENT	
	Reuse	Recycling	Disposal	Proposed reuse and/or recycling collection methods	Disposal / Transport Contractor	Waste Depot, Recycling Outlet or Landfill site
Concrete Brick Block-work & Tile		$168m^3$		Co-mingled Bins	TBA	Crushed for road base
Metals		$88m^3$		Co-mingled Bins	TBA	Scrap Metal Dealer for smelting
Timber off-cuts		$180m^3$		Co-mingled Bins	TBA	Recycled for chips and mulch
Cardboard		$145m^3$		Co-mingled Bins	TBA	Recycled into cardboard
Plasterboard		$170m^3$		Co-mingled Bins	TBA	Recycled as soil conditioner
Plastics, plastic packaging, paint drums*, containers		$65m^3$	$35m^3$	Co-mingled Bins	TBA	- Styrene and plastic to landfill * Paint drums nested and recycled
Pallets and Reels	70 units			Separated onsite	TBA	Returned to the supplier
Liquid Waste			$22m^3$	Separated onsite	TBA	Transferred to licenced landfill
General Waste			$160m^3$	Co-mingled Bins	TBA	Transferred to licenced landfill
Sub Total	**NB:70 units**	**$816m^3$**	**$217m^3$**			
TOTAL	**$1033m^3$**			**NB: Plus, an additional 70 pallets (single units returned to suppliers for reuse)**		
Narrative: As the contracts for all contractors have not been let there are still those including the waste contractor to be advised (TBA). All waste will be co-mingled and taken for off-site separation and reuse or recycling except pallets and reels.						

6 APPENDIX A: BINGO WASTE MANAGEMENT PLAN

CONFIDENTIAL

Waste Management & Recycling Plan (NSW)

Client: **Richard Crookes Constructions**
Project: **Vines Dr, Richmond**
(Hawkesbury Centre of Excellence in Agricultural Education)

BINGO Industries offers a complete, comprehensive solution to the management and recycling of wastes to assure compliance with clients' waste management policy.

BINGO Recycling Centre's combine bin storage, waste collection, waste recycling and waste transfer to service the building and construction industry and domestic waste management needs in New South Wales. Wastes collected by BINGO Industries are taken directly to one of these facilities where approximately 90% of wastes are converted to recovered resources.

BINGO Recycling Centre Alexandria EPL No. 4679
BINGO Recycling Centre Artarmon EPL No. 20763
BINGO Recycling Centre Auburn EPL No. 10935
BINGO Recycling Ecology Park Eastern Creek EPL No. 20121
BINGO Recycling Centre Greenacre EPL No. 20847
BINGO Recycling Centre Kembla Grange EPL No. 20601
BINGO Recycling Centre Mortdale EPL No. 20622
BINGO Recycling Centre Patons Lane EPL No. 21259
BINGO Recycling Centre Revesby EPL No. 20607
BINGO Recycling Centre Tomago EPL No. 20585

As can be expected waste materials inwards vary considerably and are delivered to the Recycling Centres in tipping and non-tipping vehicles or in skip bins. Of the wastes inwards approximately 90% is recovered and recycled as materials outwards and the balance 10% to

landfill. Waste materials inwards are processed to achieve the maximum recovery of resources and the minimum of un-recoverable material for disposal.

Typical Composition of BINGO's Wastes Inwards

Wastes Inwards	Percentage (approx.)
Heavy Recyclable Materials	45%
Light Recyclable Materials	35%
Metals	10%
Non-Recyclable Materials	10%
Total	100%

Heavy Recyclable Materials:

- Soil
- Dirt
- Sand
- Rubble
- Brick
- Concrete
- Tiles
- Stone
- Asphalt

Light Recyclable Materials:

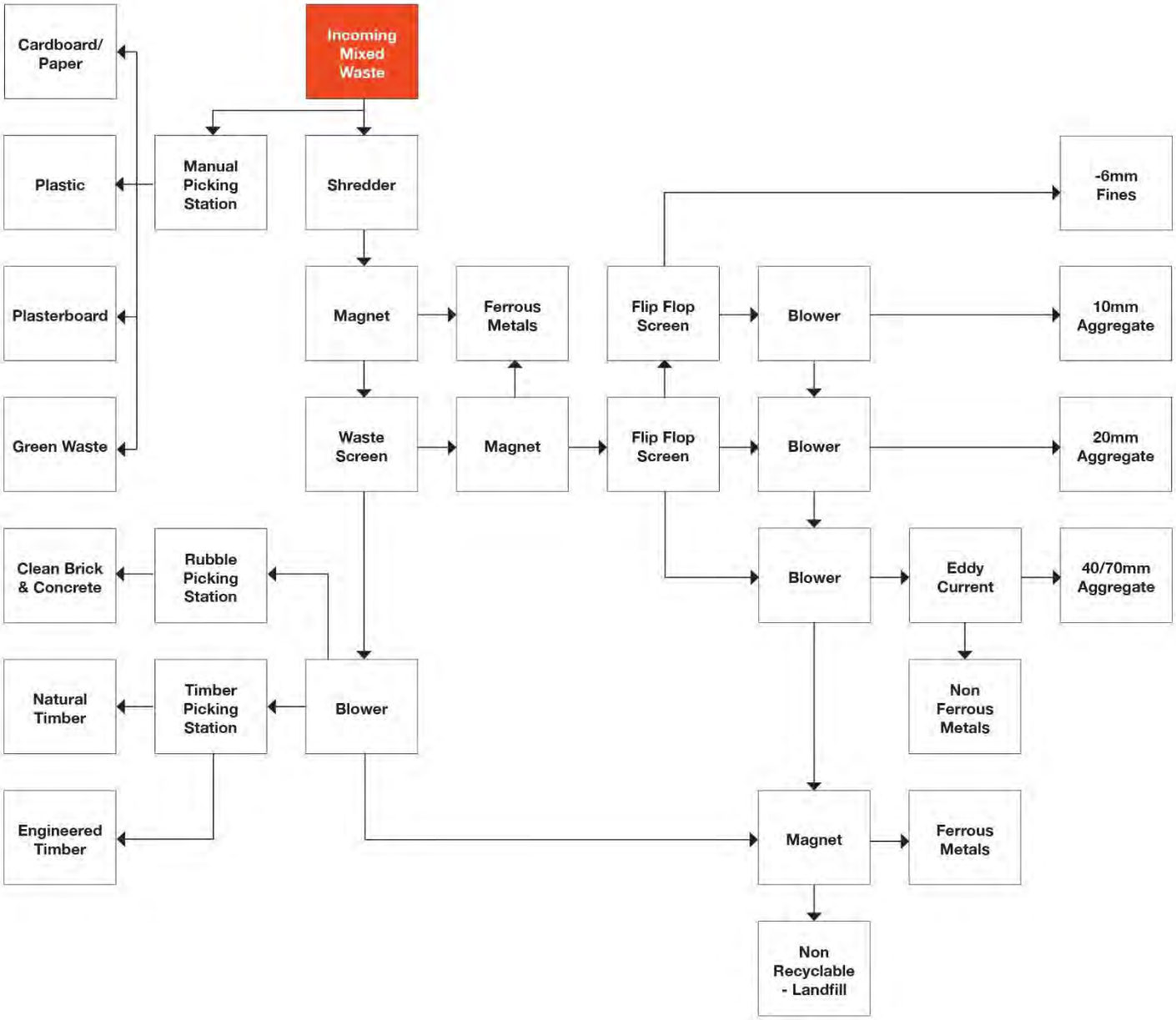
- Timber
- Green Waste
- Cardboard/ Paper
- Plastic
- Plasterboard

Metals:

- Ferrous (steel, black iron)
- Non-Ferrous (copper, wire, aluminium, stainless)

At the Resource Recovery Facility an effective waste processing procedure is applied. See Materials Flow Diagram (below). Wastes inwards unloaded onto the sorting area where the waste is raked with a hydraulic excavator to expose the contents and where recyclable materials are hand and machine sorted.

BINGO Recycling Centre
Materials Flow Diagram



In summary, BINGO Industries take all their mixed waste skip bins directly to EPA Licensed Recycling Centres. From there the waste is sorted and separated into the following material classes for processing and recycling.

Type of Material	Where Processed/ Recycled	How Processed/ Recycled
Heavy Recyclable Materials (soil, dirt, sand, rubble, concrete, brick, tiles, asphalt, stone)	• BINGO Recycling Centres	Re-processed into recycled products (such as aggregates and roadbase) by crushing and screening.
Timber / Green Waste	• Clean & Green Organics • BINGO Recycling Ecology Park	Re-processed into woodchip and mulch by shredding.
Metal / Steel	• Sell & Parker • CMI • SIMS • Sydney Copper Scraps	Re-processed into new metal and steel products by shearing, baling and re-smeltering.
Brick / Concrete	• BINGO Recycling Ecology Park	Re-processed into recycled products (such as aggregates and roadbase) by crushing and screening.
Cardboard / Paper / Plastic	• Polytrade Recycling • J.J. Richards • Orora	Re-processed into new cardboard, paper and plastic products by breaking down the material into a form for re-use.
Plasterboard	• ReGyp	Re-processed into gypsum products by shredding and screening.
General Waste	• Eastern Creek Landfill	n/a

- **BINGO Recycling Centres**
  76-82 Burrows Road, Alexandria NSW 2015
  10 Mclachlan Ave, Artarmon NSW 2064
  3-5 Duck Street, Auburn NSW 2144
  Honeycomb Drive, Eastern Creek NSW 2766
  35 Wentworth St, Greenacre NSW 2190
  50 Wyllie Road, Kembla Grange NSW 2526
  20 Hearne Street, Mortdale NSW 2223
  Patons Lane, Orchard Hills NSW 2748
  37-51 Violet Street, Revesby NSW 2212
  29 Laverick Avenue, Tomago NSW 2322

- **Clean & Green Organics**
  769 The Northern Rd, Bringelly NSW 2566

- **Sell & Parker**
  45 Tattersall Road, Blacktown NSW 2148

- **CMI**
  38 York Road, Ingleburn NSW 2565

- **SIMS**
  43 Ashford Ave, Milperra NSW 2214
  76 Christie St, St Marys NSW 2760

- **Sydney Copper Scraps**
  130 Adderley St, Auburn NSW 2760

- **Polytrade Recycling**
  32 South St, Rydalmere NSW 2116
  40 Madeline St, South Strathfield NSW 2136

- **J.J. Richards**
  12 Heald Rd, Ingleburn NSW 1890
  8 Kommer Pl, St Marys NSW 2760

- **Orora**
  1891 Botany Rd, Matraville NSW 2036

- **ReGyp**
  330 Captain Cook Drive, Kurnell NSW 2231

- **Eastern Creek Landfill**
  Honeycomb Drive, Eastern Creek NSW 2766

7 APPENDIX B: REMEDIATION ACTION PLAN

Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Remediation Action Plan

Centre of Excellence in Agricultural Education (CoE)
Londonderry Road, Richmond, NSW

Prepared for
NSW Department of Education

Project 85644.05
October 2021

Douglas Partners
Geotechnics / Environment / Groundwater

Document History

Document details

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Rev 1	Emily Eden (previously known as Emily McGinty)	Glyn Eade	25 March 2021
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Rev 4	1	0	Woolacotts Consulting Engineers Pty Ltd
Rev 5	1	0	Richard Crookes Constructions Pty Ltd

The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature	Date
Author		13 October 2021
Reviewer	p.p.	13 October 2021

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Report on Remediation Action Plan
Centre of Excellence in Agricultural Education (CoE)
Londonderry Road, Richmond

1. Introduction

Douglas Partners Pty Ltd (DP) was commissioned by the NSW Department of Education to prepare a Remediation Action Plan (RAP – this report) for identified contamination at a proposed school development located on Londonderry Road, Richmond, NSW ('the site'). The site locality is presented on Drawing 1, Appendix A.

The RAP has been prepared with reference to NSW Environment Protection Authority (EPA) guidelines under the Contaminated Land Management (CLM) Act 1997, and the findings of DP report titled *Report on Detailed Site Investigation (Contamination), Centre of Excellence in Agricultural Education (CoE), Londonderry Road, Richmond, Project 85644.04, Rev 0 dated March 2018* (DP, 2018a – 'the DSI').

Filling containing anthropogenic material including bonded asbestos containing materials (ACM) has been identified in the central-southern portion of the site; isolated metals (lead and zinc) and benzo(a)pyrene exceedances above human health and ecological criteria have also been identified in the filling material. The DSI recommended remediation of identified metals, benzo(a)pyrene and ACM exceedances be carried out to render the site suitable for the proposed development, from a contamination perspective. This RAP documents the remediation and validation procedures required to resolve the identified remediation works.

This RAP will inform a Remediation Specification which will be prepared to document the remediation process with reference to the construction design, including construction details for containment cell(s) should that option be chosen) and how excavated soils will be managed with reference to this RAP.

The Rev 5 version of this report has been prepared to resolve comments made by the NSW EPA accredited[1] auditor Rebeka Hall of Zoic (now Geosyntec) as documented in their Interim Audit letter report reference 21047 IA1 dated 6 May 2021 ('the IA1').

1.1 Purpose

The purpose of this RAP is three-fold:

- Summarise the site background, proposed development, ground conditions and the findings of previous contamination investigations undertaken at the site;
- Document the necessary remediation and validation procedures to resolve contamination identified at the site; and
- Provide an unexpected finds protocol (UFP) to be adopted should further possible contamination be encountered during site earthworks.

[1] Under the Contaminated Land Management Act 1997.

1.2 Regulatory Compliance

The following regulatory compliance requirements, licences and approvals apply to the site and the remediation works and have been considered in the preparation of this RAP:

- State Environmental Planning Policy No. 55 – *Remediation of Land* (SEPP 55 – 1998) and *Managing Land Contamination: Planning Guidelines*, SEPP 55 (1998);
- SafeWork NSW Code of Practice, *How to Safely Remove Asbestos* (SafeWork NSW, 2019);
- NSW Work Health and Safety Regulation 2017 (NSW WHS 2017);
- Protection of the Environment Operations Act 1997 (POEO Act) for the transportation, treatment and disposal of wastes;
- Hawkesbury Development Control Plan 2002 (DCP); and
- Development consent conditions (consent determination anticipated late 2021).

The remediation works required for the site are Category 2 under SEPP 55, ie. remediation can be carried out without consent. Development consent conditions are to be reviewed by the Proponent when available and depending on the conditions provided it may be necessary to update this RAP.

Although the above documents and regulations have been consulted in preparing this RAP, this does not absolve the parties defined in this RAP (see Section 11.1) of their responsibilities in the execution of this RAP.

2. Site Background

2.1 Site Identification

The redevelopment site is located to the south west of the main Western Sydney University buildings on part of Lot 2 DP 1051798 and covers an area of approximately 11.4 ha. The site is bounded by Western Sydney University halls of residence and an aged-care facility to the north, land used largely for agricultural purposes to the east and south, and Londonderry Road to the west. The current proposed development is bounded by Vines drive to the north east, playing fields to the south and south west and University departments to the south east. The ground surface on the site slopes very gently downwards to south east; surface levels vary between about RL 23.5 m and RL 22.5 m relative to Australian Height Datum (AHD).

At the time of the RAP, the site comprised paddocks with very few improvements and drainage swales are located across the wider investigation area and within the current proposed development. The location of the site is shown on Drawing 1 in Appendix A.

2.2 Local Climate and Topography

The climate associated with Richmond is generally warm and temperate. Mean rainfall levels based on data collected by the Bureau of Meteorology (BOM) between 1881 and 2021 from a BOM monitoring site located at the adjacent UWS campus indicate that rainfall levels range from 42 mm in August to 96 m in January.

The site is located on the floodplain of the Hawkesbury River, which is located approximately 4 km north west of the site. The surrounding topography is generally flat with an approximate elevation of 23 to 24 m relative to Australian Height Datum (AHD) and a gentle slope towards the Hawkesbury River and minor unnamed tributaries located approximately 600 m east which flow into Eastern Creek (located approximately 2.5 km east), also a tributary of the Hawkesbury River.

The site topography is also generally flat and the elevation of the ground surface is approximately 23 to 24 m AHD.

2.3 Proposed Development

The proposed development is shown in the survey plan provided in Appendix B and outlined below:

- In the north eastern part of the site various buildings are proposed to be constructed including administration, leaning, dining, accommodation, farming and aboriginal enterprise departments and facilities. Car parking facilities will be constructed in the south eastern portion;
- In the southern and south western portion of the site, open-air agricultural plots and dams are to be constructed. Part of the farming department will also be constructed next to the agricultural plots in the south western portion of the site;
- Existing swales (described in Section 2.4 below) will be retained as part of the development; and
- The remainder of the site will comprise pastoral and / or open fields.

2.4 Regional Soils, Geology, Hydrology and Hydrogeology

Reference to soil landscape mapping for the site available on the NSW Government eSPADE map[2] indicates that the soil landscape beneath the site comprises Berkshire Park Alluvial deposits which are associated with dissected, gently undulating low rises on the Tertiary terraces of the Hawkesbury and Nepean River. The soils are generally characterised as weakly pedal orange heavy clays and clayey sands, often mottled, with common ironstone nodules. Large silcrete boulders do occur in a sandy / clay matrix.

DP had previously undertaken a geotechnical investigation (reference 85644.00.R.002.Rev0, issued November 2016) which included soil testing to inform salinity as well as geotechnical advice. Of relevance to the current investigation, the data observed the following soil conditions at the site:

- Soil conditions generally comprised silty sand topsoil to depths of between 0.1 and 0.9 m underlain by sands to depths of between 3.9 and 4.8 m and clays at depth; and
- Soil pH from four samples analysed at depths of between 0.5 and 2.95 m bgl ranged from 5.6 to 6.9 and was therefore slightly acidic to near-neutral.

Reference to the *Penrith 1:100 000 Geological Series Sheet 9030* (Edition 1, 1991) indicates that the site is underlain by the Tertiary-aged Londonderry Clay (code 'Tl') which comprises clay with patches of cemented, consolidated sand. The area to the north (but outside of the site extent) is shown as being underlain by the Quaternary-aged Clarendon Formation (code 'Qpd') which comprises clay, clayey sand and silt. An extract from the geological map is shown in Figure 1 with the blue pin showing the site location.

Three drainage swales are present on the site. As previously mentioned, the site is located on the floodplain of the Hawkesbury River which is located approximately 4 km north west of the site. The alignment of the Hawkesbury River flows northwards to the west of the site and then eastwards approximately 5 km north of the site. Approximately 600 m to the east of the site are minor unnamed tributaries and farm dams (on the wider Western Sydney University site) which flow into Eastern Creek approximately 2.5 km east which joins the Hawkesbury River via other creeks approximately 6.3 km north east of the site.

Limited groundwater data was made available from the groundwater bore search undertaken as part of the DSI (DP, 2021a; referenced in Section 2.5) however, the search results do indicate that groundwater is present at generally shallow depths (< 10 m or so). Groundwater was observed during a geotechnical investigation undertaken by DP (discussed in the DSI – see Section 2.5 for reference) to be at depths of between 0.3 and 2.5 m in nine of 11 bores drilled; two bores were dry at the completion of drilling. Given the inconsistent groundwater elevation and occurrence observed it was considered likely that the groundwater encountered were representative of perched water bodies rather than a continuous groundwater body below the site.

Given the site is in a floodplain, the presence of surface water bodies both on and near the site and observations made in a previous geotechnical investigation of the site, there is a reasonable likelihood that groundwater is present in shallow depths below the site, likely as perched water. From a review of

[2] Department of Planning, Industry and Environment, 2020, Soil Landscapes of Central and Eastern NSW - v2.1, NSW Office of Environment and Heritage, Sydney. Accessed at: https://www.environment.nsw.gov.au/eSpade2WebApp. Last accessed 10 September 2021.

the location of surface water bodies in the region it is anticipated that groundwater is most likely to flow towards the east / north east, however given the relatively flat topography of the site, the direction of groundwater flow may vary to some degree.

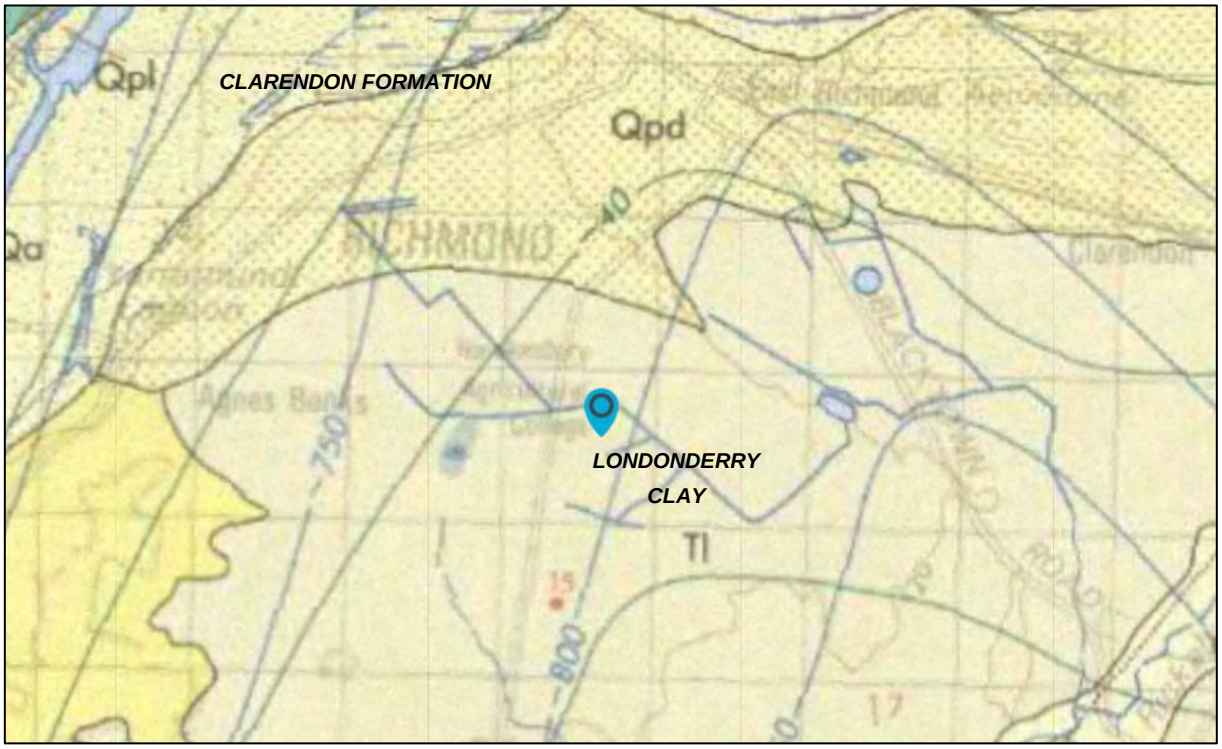


Figure 1: Extract from geological map (blue pin is site location)

The topography of the site suggests that groundwater may be shallow and possibly a beneficial resource in sandy zones of the aquifer.

The field work undertaken for the DSI confirmed the mapping.

2.5 Previous Investigations

The following contamination investigations have been undertaken at the site:

- DP, *Report on Preliminary Site Investigation (Contamination), Hurlstone Agricultural High School (Hawkesbury), Londonderry Road, Richmond,* reference 85644.00, dated November 2016 (DP, 2016 – 'the PSI');
- DP, *Report on Detailed Site Investigation (Contamination), Proposed Centre of Excellence, Vines Drive, Richmond, NSW,* reference 85644.04/85644.08, dated September 2021 (DP, 2021a); and
- DP, *Report on Detailed Asbestos Delineation Investigation, Proposed Centre of Excellence, Vines Drive, Richmond, NSW,* reference 85644.06, dated September 2021 (DP, 2021b).

The PSI established that the main contamination risks are associated with possible filling and the use of the site for agricultural purposes. Limited testing from boreholes undertaken at the site observed PAH impact in filling.

The DSI established that parts of the site (in the south western area) has been backfilled with demolition waste at some stage. It is noted that the DSI was updated in 2021 (as documented in DP, 2021b) to incorporate agricultural guidelines and soil data from both the PSI and the DSI were screened as part of the DSI. The analytical results from the PSI and DSI established exceedances in several locations in the south western portion of the site, and two locations in the north eastern portion of the site (C115 and C122). The recommendations made in the DSI for each exceedance is presented in Table 1 below.

Table 1: Conclusions and Recommendations for Soil Exceedances (from the DSI)

Location	Exceedances	Recommendations
BH6 (fill) *	PAHs exceed adopted agricultural criterion. Benzo(a)pyrene TEQ exceeds HIL.	The placement of fill in BH6 at depth (either in a containment cell or at depth) will resolve the risks to human health (through direct contact, inhalation and ingestion) and to agricultural receptors (grazing animals).
C26 (fill) *	Lead exceeds adopted agricultural criterion. Zinc exceeds adopted EIL and agricultural criteria.	The placement of fill at C26 at depth (either in a containment cell or at depth) will potentially resolve the risks to the environment and agricultural receptors (grazing animals), however leachate testing is required to establish whether zinc in soils here are potentially mobile. If zinc is potentially mobile, this would limit the extent to which fill from this location can be retained on site.
C27 (fill) *	Copper, nickel and zinc exceeds adopted EIL and agricultural criteria. Lead exceeds adopted HIL and agricultural criteria. Select PAHs exceed adopted agricultural criteria.	The placement of fill at C26 at depth either in a containment cell or at depth) will potentially resolve the risks to human health, the environment and agricultural receptors (grazing animals), however leachate testing is required to establish whether zinc in soils here are potentially mobile. If metals are potentially mobile, this would limit the extent to which fill from this location can be retained on site. The placement of fill at depth will also resolve the PAH risk to agricultural receptors.
C35 (fill) *	Lead exceeds adopted HIL and agricultural criteria.	The placement of fill from C35 at depth either in a containment cell or at depth) will adequately resolve the risks to agricultural receptors.
C41 (fill) *	Lead exceeds adopted HIL and agricultural criteria. Zinc exceeds adopted EIL and agricultural criteria. Select PAHs exceed adopted agricultural criteria.	The placement of fill at C41 at depth (either in a containment cell or at depth) will potentially resolve the risks to human health, the environment and agricultural receptors (grazing animals), however leachate testing is required to establish whether zinc in soils here are potentially mobile. If metals are potentially mobile, this would limit the extent to which fill from this location can be retained on site. The placement of fill at depth will also resolve the PAH risk to agricultural receptors.
C47 (fill) *	Lead exceeds adopted HIL and agricultural criteria. Zinc exceeds adopted EIL and agricultural criteria. Select PAHs exceed adopted agricultural criteria.	The placement of fill at C47 at depth (either in a containment cell or at depth) will potentially resolve the risks to human health, the environment and agricultural receptors (grazing animals), however leachate testing is required to establish whether zinc in soils here are potentially mobile. If metals are potentially mobile, this would limit the extent to which fill from this location can be retained on site. The placement of fill at depth will also resolve the PAH risk to agricultural receptors.
C55*	Select PAHs exceed adopted agricultural criteria.	The placement of fill from C55 at depth will resolve PAH risk to agricultural receptors.

Location	Exceedances	Recommendations
C60*	Lead exceeds adopted agricultural criterion. Zinc exceeds adopted EIL and agricultural criteria. Pyrene exceeds adopted agricultural criterion.	The placement of fill at C60 at depth (either in a containment cell or at depth) will potentially resolve the risks to human health, the environment and agricultural receptors (grazing animals), however leachate testing is required to establish whether zinc in soils here are potentially mobile. If metals are potentially mobile, this would limit the extent to which fill from this location can be retained on site. The placement of fill at depth will also resolve the PAH risk to agricultural receptors.
C115	Select PAHs adopted exceed agricultural criteria.	The placement of fill from C115 at depth at the site (either in a containment cell or at depth) will potentially resolve the risks to agricultural receptors (grazing animals).
C122	Lead exceeds adopted agricultural criterion. Pyrene exceeds agricultural criteria.	The placement of fill from C122 at depth at the site (either in a containment cell or at depth) will potentially resolve the risks to agricultural receptors (grazing animals). The placement of fill at depth will also resolve the PAH risk to agricultural receptors.
BH5* (below fill)	Lead exceeds the adopted agricultural criterion in natural soils.	Additional assessment of lead in shallow natural soils at BH5 would be of benefit to better understand if the lead is present as a natural metal in strata or if contamination has potentially been introduced to natural strata here (e.g. leaching from overlying soils).

*: Located in south western portion of the site where demolition fill had historically been placed.

Asbestos was also observed in five locations in fill in the same area of the site during the DSI (C27, C34, C41, C47 and C80). DP subsequently undertook an asbestos delineation assessment which established that fill impacted with asbestos across the south western portion of the site will either require remediation or placement at depth. The delineation assessment is further discussed below. The preferred remediation strategy for asbestos in fill is understood by DP to be via the construction of an on-site containment cell. This has been considered in the above recommendations (Table 1).

Soil analytical results for the remainder of the site (i.e. excluding the fill area in the south western portion of the site) were consistently below the adopted criteria.

The scope of the detailed asbestos delineation report included the excavation of 50 test pits across an estimated area of 1.5 ha of fill in the south western part of the site (as informed by the findings of the DSI). At each test pit, 10 L bulk samples were subject to field screening (WA DoH (2009) field gravimetry) and laboratory analysis with reference to NEPC (2013) and DoH (2009) guidelines. The results of the assessment suggested that the presence of asbestos in the fill may be quite widespread and essentially confirms the need for remediation. The results were used to establish areas where fill requires placement into a containment cell or is suitable for retention at the site at depth in accordance with this RAP.

Drawing 1 and Drawing 2 in Appendix A show the location of all test locations undertaken at the site to date. The summary tables provided in Appendix C show all analytical results, from the PSI, the DSI and the detailed asbestos delineation assessment.

2.6 Site Specific Soil Conditions

The previous investigations undertaken at the site and discussed in Section 2.4 encountered the following conditions:

- Topsoil (typically silty sand with rootlets, gravel) to depths of between 0.01 m and 0.9 m; or

- Fill in the south western portion of the site (silty sand to depths of up to 2.5 m) with anthropogenic inclusions (asbestos containing materials (ACM) plastic bags, rags, plastic bottles, porcelain, brick, glass, terracotta, metal, concrete and plastic in places); underlain by
- Sands (medium dense to very dense silty sand, clayey sand, clayey silty sand) to depths of up to 4.8 m; underlain by
- Clays (stiff to very stiff silty clay, sandy silty clay, sandy silt) to the base of the deeper bores at 7.5 m depth.

The observed site conditions were generally consistent with conditions indicated by regional mapping.

No free groundwater was observed during drilling of groundwater wells installed as part of the DSI, or in any of the test pits during the short time they were open during the investigation. Free groundwater was recorded in GW2 (2.5 m bgl) at the time of sampling, which was undertaken approximately two months following well installation.

2.7 Site History Summary

The site history information indicates that the site has been used for agricultural teaching purposes since the late 19th Century. Activities of a rural nature have therefore been undertaken on the site for at least the last 120 years.

3. Data Gaps

The following data gaps are required to be assessed separate to this RAP to establish whether or not remediation is required, and to inform remediation options available:

- Targeted leachate sampling and analysis of fill at C26 (zinc), C27 (copper, nickel, zinc, lead), C41 (zinc), C47 (zinc) and C60 (zinc);
- Additional assessment of lead impact at depth in BH5; and
- Additional assessment of lead and PAH exceedances in C115 and C122.

Depending on the findings of the above, it may be beneficial to undertake an environmental risk assessment to establish whether elevated PAHs pose an actual risk to receptors. However, this may not be necessary if the fill is either disposed of (because of the amount of leachable metals present), placed into the containment cell (asbestos impact) or is able to be placed at a suitable depth at the site to prevent exposure to grazing animals and birds or below buildings / hard standing.

It may be necessary to either update this RAP or provide a RAP Addendum once the above data gaps have been investigated.

4. Conceptual Site Model

The DSI established the following potentially contaminating activities at the site:

- The placement of filling on the site (including the identified stockpiles that are located outside the current proposed development area);
- Contaminants associated with farming/grazing (eg: pesticides); and
- The placement of waste and/or incinerator ash which was prevalent in rural areas throughout the 20th Century.

Shallow perched water bodies are likely present below the site. Significant excavation is not proposed and the use of groundwater within the development will only be undertaken (if at all) following approvals for groundwater extraction. The quality of the groundwater from a land-use perspective would therefore only be of significance if elevated concentrations of volatile contaminants had been reported.

No exceedances of volatile/ contaminants were observed during the DSI, therefore soil vapour intrusion and/or ground gas exposure pathways are not considered to be present at the site.

The human receptors to soil contamination are likely to be the teachers, students, support staff and visitors to the redeveloped site and potentially the consumption of grown produce on the site. Give the site is primarily an educational facility, consumption of produce is not considered likely to be at a large (ie. commercial) scale. Given the type of education facility proposed (agricultural high school), exposure scenarios including direct contact with soil and accidental ingestion/inhalation of dust including fibres apply. Construction personnel, nearby workers/students/residents and the general public require consideration during the construction phase of the redevelopment project.

The ecological receptors are likely to include flora and fauna that grow/live on the site, and on adjacent sites as well as farmed (grazing) animals. The area is not known to be ecologically significant. Any contamination present in the upper 2 m of the soil profile (root zone) is potentially in contact with fauna at the site.

The findings of the DSI (DP, 2021a) and the delineation investigation (DP, 2021b) established that elevated concentrations of asbestos, PAHs, metals (lead, zinc, copper and nickel) were recorded in several locations in fill across the south western portion of the site. Of the exceedances observed, the identified contamination risks are as follows:

- Asbestos:
  - Filling within the yellow shaded areas (see Drawings 2 and 3, Appendix A) excluding fill in the vicinity of BH6 is generally suitable for reuse at the site from a contamination perspective.
  - Filling within the purple areas contain asbestos above guideline values including ACM and/or FA and AF and can either be placed in the containment cell or suitably disposed of.
- Carcinogenic PAHs (reported as B(a)P.TEQ) in BH6 (0.5 m and 1 m depth) presenting a possible risk to human health but is relatively immobile and suitable for placement in the containment cell;
- Lead in fill in the south western portion of the site (locations C26, C27, C35, C41, C47 and C60), the majority of which exceed the agricultural criteria protective of soil and food ingestion, however also exceed the adopted HIL criteria in some instances (fill in C26, C27, C35, C41 and C47), and the EIL in one instance (C27);

- Zinc in fill in the south western portion of the site (locations C17, C26, C27, C41, C47 and C60) which exceeded both ecological and agricultural (environmental) criteria, the latter protective of grazing mammals and birds;
- Copper in fill in the south western portion of the site (locations C26, C27, C41 and C47) which exceed the ecological criteria and (in the case of C27 and C47) the agricultural criterion;
- Nickel in fill in the south western portion of the site (location C27 only); and
- Several PAHs in fill in the south western portion of the site (locations C26, C27, C41, C43, C47, C55 and C60) which pose a possible environmental risk to environmental receptors in an agricultural setting, namely grazing mammals and birds.

The following additional information is required to inform the RAP:

- Additional assessment of some metals (zinc, copper and nickel) and PAHs to ascertain whether the metals are mobile and potentially a risk to groundwater receptors. This will inform the remediation options available (eg. placement in a containment cell or off-site disposal); and
- An environmental risk assessment may better establish whether elevated PAHs pose an actual risk to receptors, however, any assessment should only be undertaken once leachate analysis and the detailed asbestos assessment has been undertaken. The findings of the leachate analysis and the detailed asbestos assessment will likely play a key role in decisions made on remediation options to manage asbestos accordingly. For example, both asbestos impacted fill and metal and PAH impacted fill that is not posing a risk to groundwater receptors (hence the leachate testing) could be placed in a containment cell on site.

5. Summary of Remediation Required

Based on the findings of the investigations to date, and investigations of data gaps yet to be undertaken (and which must be undertaken before remediation commences), remediation is required to resolve asbestos exceedances in fill in the south western portion of the site as follows (refer to Drawings 2 and 3, Appendix A):

- Fill at location BH6 should be placed in an on-site containment cell in accordance with Section 8.3 of this RAP. The dimensions of fill to be removed is 5 m x 5 m to base of filling;
- Fill within yellow shaded areas excluding fill in the vicinity of BH6 is generally suitable for reuse at the site and should be managed in accordance with Section 8.4 of this RAP. Depending on the findings of the additional investigation works (data gaps) it may be necessary to manage fill in C26 separately; and
- Fill within the purple areas exceed adopted criteria including bonded and friable asbestos. As such, fill in the purple areas will require remediation (i.e. placed in an on-site containment cell) in accordance with Section 8.5 of this RAP. Depending on the findings of the additional investigation works (data gaps) it may be necessary to manage fill in C27, C34, C41, C47 and C60 separately.

6. Remediation Acceptance Criteria

The remediation works will be validated as meeting an acceptable standard for the proposed land use which is agricultural. The validation will be undertaken based on visual inspections, field screening, sample analysis and review of disposal dockets as discussed in Section 10.

The remediation acceptance criteria (RAC) for the identified COPC have been derived based on the understanding that the site will be used for agricultural purposes which will include animal grazing (pastoral) and crop growth. Taking into consideration the site will be used as a school, it is assumed that no mass production of crops for consumption will occur but that some crops grown at the site will be consumed.

The NSW EPA endorsed National Environment Protection Council, *National Environment Protection (Assessment of Site Contamination) Measure* 1999, as amended 2013 (NEPC 2013) provide health investigation levels (HIL), health screening levels (HSL), ecological investigation levels (EIL) and ecological screening levels (ESL) which were provided in DP (2018) for a residential site with plant uptake, which includes primary schools on the basis that soil contact is likely to be more prevalent at an agricultural school when compared to less conservative criteria as presented in Schedule B1, of the National Environment Protection Council, *National Environment Protection (Assessment of Site Contamination) Measure* 1999, as amended 2013 (NEPC 2013).

Whilst the NEPC (2013) does not provide criteria for agricultural land use, it does however reference overseas criteria including Canadian soil quality guidelines for agricultural land use which have been adopted in the first instance for metals, PAHs, PCBs and soil pH. It is noted that the criterion for benzo(b,j+k)fluoranthene (0.1 mg/kg) is marginally above the laboratory Practical Quantitation Limit (PQL) (0.2 mg/kg), therefore the PQL will be adopted as the criterion.

For all other organic contaminants for agricultural land use, recorded concentrations above the PQLs shall be adopted in the first instance. This is adopted on the initial presumption that background concentrations for these primarily man-made compounds would be below the PQL, noting that there may be some local exceptions (eg. select metals and PAH in some regional strata).

Detections above the adopted criteria will be further considered and either subject to further assessment (a human health and/or an environmental risk assessment) or subject to remediation.

6.1 Health Investigation and Screening Levels

The generic Health Investigation Levels (HILs) and Health Screening Levels (HSLs) are considered to be appropriate for the assessment of human health risk associated with contamination at the site. The adopted soil HILs and HSLs for the potential contaminants of concern are presented in Table 2, with inputs into their derivation shown in Table 1.

Table 1: Inputs to the Derivation of HILs and HSLs

Variable	Input	Rationale
Potential exposure pathway	Ingestion and dermal contact, Inhalation of dust / fibres	The National Environment Protection Council, *National Environment Protection (Assessment of Site Contamination) Measure, Schedule B1 – Guideline on Investigation Levels for Soil and Groundwater* (NEPC, 2013) provides assessment levels for various soil, groundwater and vapour contaminants. Taking into account the nature of the proposed

		development (agricultural high school) which is likely to require a greater frequency of access to soils (compared to a typical high school), the adopted SAC comprises health investigations levels / health screening levels (HIL / HSL) for category 'A' sites including primary schools and in turn more sensitive direct contact / ingestion / inhalation soil contact exposure scenarios which is considered by DP to be suitably representative for the site. It also allows for home grown produce (< 10% fruit and vegetable intake.
Soil Type	Sand	The dominant soil type observed in surface soils during the DSI (DP, 2018a) is silty sand.
Depth to contamination	0 m to <1 m	Considers the most sensitive exposure pathways (direct contact / ingestion / inhalation) accordingly.

Table 2: HIL in mg/kg

Contaminants		HIL- A
Metals	Copper	6,000
	Nickel	400
	Lead	300
	Zinc	7,400
PAH	Benzo(a)pyrene TEQ [1]	3

Note: 1. Sum of carcinogenic PAH

6.2 Ecological Investigation Levels

Ecological Investigation Levels (EILs) and Added Contaminant Limits (ACLs), where appropriate, have been derived in NEPC (2013) for only a short list of contaminants comprising As, Cu, Cr (III), DDT, naphthalene, Ni, Pb and Zn. The adopted EILs, derived using the *Interactive (Excel) Calculation Spreadsheet* (Standing Council on Environment and Water (SCEW) website (http://www.scew.gov.au/node/941)) are shown in the following Table 4, with inputs into their derivation shown on Table 3.

Table 3: Inputs to the Derivation of EILs

Variable	Input	Rationale
Age of contaminants	"Aged" (>2 years)	Given the potential sources of soil contamination are from historic use, the contamination is considered as "aged" (>2 years);
pH	6.4	Based on approximate median from the DSI (DP, 2018a)
CEC	1 cmolc/kg	Based on median from the DSI (DP, 2018a)
Clay content	10 %	Conservative value for initial screen
Traffic volumes	low	The site is considered to be located within a low traffic area
State/Territory	New South Wales	-

Table 4: EIL in mg/kg

Analyte		EIL
Metals	Copper	410
	Lead	1100
	Nickel	6
	Zinc	190

6.3 Agricultural Guideline Levels

In the absence of an agricultural guideline value in Australia, the RAP has adopted NEPC (2013) endorsed Canadian soil quality guidelines presented in Table 5 below.

Table 5: Agricultural guideline levels (from Canadian soil quality guidelines)

Analyte	Agricultural Guideline (mg/kg)
Copper	63
Lead	70
Nickel	45
Zinc	250
Pyrene	0.1
Benzo(a)anthracene	0.1
Benzo(b,j+k)fluoranthene	0.1
Indeno(1,2,3-c,d)pyrene	0.1
Dibenzo(a,h)anthracene	0.1
Benzo(a)pyrene TEQ	5.3

6.4 Asbestos in Soil

NEPC (2013) defines the various asbestos types as follows:

Bonded ACM: Asbestos containing material which is in sound condition, bound in a matrix of cement or resin, and cannot pass a 7 mm x 7 mm sieve.

FA: Fibrous asbestos material including severely weathered cement sheet, insulation products and woven asbestos material. This material is typically unbonded or was previously bonded and is now significantly degraded and crumbling.

AF: Asbestos fines including free fibres, small fibre bundles and also small fragments of bonded ACM that pass through a 7 mm x 7 mm sieve.

Health Screening Levels (HSLs) for asbestos in soil, which are based on likely exposure levels for different scenarios, have been adopted in NEPC (2013) from the Western Australian Department of Health (WA DoH) publication Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia 2009 (WA DoH 2009).

On the basis of the proposed land use (agricultural school), and in accordance with Table 6, Schedule B1, NEPC (2013) the following asbestos HSLs have been adopted:

Table 6: Health Screening Levels for Asbestos Contamination in Soil (% w/w)

Form of Asbestos	HSL A
Bonded ACM	0.01%
FA and AF	0.001 %
All Forms of Asbestos	No visible asbestos for surface soil

6.5 Summary of RAC

Table 7 below provides a summary of RAC for the site.

Table 7: Summary of RAC

Analyte	HIL (mg/kg)	EIL (mg/kg)	Agricultural (mg/kg)
Copper	6,000	410	63
Nickel	400	1100	70
Lead	300	6	45
Zinc	7,400	190	250
Benzo(a)pyrene TEQ	3	-	5.3
Pyrene	-	-	0.1
Benzo(a)anthracene	-	-	0.1
Benzo(b,j+k)fluoranthene	-	-	0.1
Indeno(1,2,3-c,d)pyrene	-	-	0.1
Dibenzo(a,h)anthracene	-	-	0.1

6.6 Aesthetic Material Requirements

It is a requirement of NEPC (2013) to manage soil containing refuse that otherwise complies with the RAC. These include highly malodorous soils, putrescible material that may degrade over time (and release odours or gases), soils containing residue from animal burial and material that may present a physical risk to humans including glass or metal fragments which may break the skin surface.

Management requirements are presented in this RAP for soils containing non-aesthetic material (see Section 7.9) which are to be managed based on visual identification of the presence of non-aesthetic material in soil. Soils containing putrescible material (excluding some landscaping media) is unlikely to be suitable for use as fill and should only be used subject to assessment by the Environmental Consultant and endorsement by the Auditor.

7. Assessment of Remediation Options

7.1 Remediation Goal

The ultimate goal/objective of the remediation will be to render the site compatible with the proposed land use (school).

7.2 Extent of Remediation

Based on the findings of the DSI and the delineation investigation, the extent of remediation required in the remainder of the site is defined as follows:

- Fill at location BH6 should be placed in an on-site containment cell in accordance with Section 8.3 of this RAP. The dimensions of filling to be removed is 5 m x 5 m to base of filling;
- Fill within yellow shaded areas excluding fill in the vicinity of BH6 is generally suitable for reuse at the site and should be managed in accordance with Section 8.4 of this RAP. Depending on the findings of the additional investigation works (data gaps) it may be necessary to manage fill in C26 separately;
- Fill within the purple areas exceed adopted criteria for bonded and friable asbestos. As such, fill in the purple areas will require remediation (i.e. placed in an on-site containment cell) in accordance with Section 8.5 of this RAP. Depending on the findings of the additional investigation works (data gaps) it may be necessary to manage fill in C27, C34, C41, C47 and C60 separately; and
- Anthropogenic material has been recorded in fill in several test pits across the south western portion of the site. As discussed in Section 5.6 it is necessary to manage potentially inherent soil aesthetic issues in the retention of any of the fill containing anthropogenic material at the site.

7.3 Remediation Options Assessment

The preferred hierarchy for remediation of soil at contaminated sites in a decreasing order of preference, as set out in NEPC (2013) and outlined in NSW EPA *Contaminated Land Management Guidelines for the NSW Site Auditor Scheme* 3rd Edition, 2018 (NSW DEC, 2006) is:

1) Onsite treatment of excavated soil (so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level); and
2) Offsite treatment of excavated soil (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).

If the above is not practicable:

3) Consolidation and isolation of the contaminant by containment within a properly designed barrier; and

4) Removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material.

DP assessed selected remediation alternatives, taking into considerations their applicability for the Site, time constraints, economic feasibility, and potential environmental and health impacts. Off-site treatment is generally not viable for the contaminants observed at the site, therefore this option is not further considered at this time. The remediation options evaluation is summarised in Table 8 below.

Table 8: Remediation Options Evaluation

Remediation Option	Assessment – Asbestos	Assessment – Metals and Benzo(a)pyrene
On-site treatment	ACM impact in fill soil can be remediated to reduce the quantity of ACM fragments to levels below remediation criteria. Treatment cannot however completely eliminate the presence of ACM in such soils. As such, the reuse of treated and validated material does require some restrictions, i.e. treated and validated material must be placed either below a slab / building or at least 0.5 m below an unconsolidated surface (eg: in a field). This is further discussed below (on-site burial of material at depth). It is noted that if asbestos fines and friable asbestos AF/FA is identified at the site, this material cannot be treated and will require disposal.	Not technically viable for metals and benzo(a)pyrene exceedances.
	Suitable	**Unsuitable**
On-site burial of material at depth	All filling material identified in the delineation works as passing RAC as well as material treated and validated to remove ACM can be placed at depth at the site, either below a slab / building or at least 0.5 m below an unconsolidated surface (eg: in a field). On-site reuse through burial involves excavation and appropriate placement at depth within suitable land use areas within the site. Geotechnical suitability is based on the proportion of oversized (>150 mm) and organic material being below required guidelines. Over excavation of the proposed placement area may be required to achieve the proposed site level. It is noted that this method differs from containment (next option down) which is for material that exceeds the RAC and has more cap/cover requirements. DP also notes that this option will result in asbestos fragments remaining buried on the site (albeit below guideline values). This may have an implication during construction as subcontractors working on the site may encounter asbestos. SafeWork NSW may require that all contractors working below the site surface (i.e. excavating) be asbestos licenced contractors. It is considered that the implementation of a post construction Environmental Management Plan (EMP)	Leaching tests undertaken as part of the delineation investigation confirm that metals are generally leachable, but benzo(a)pyrene does not appear to be.

Remediation Option	Assessment – Asbestos	Assessment – Metals and Benzo(a)pyrene
	is prudent for the areas of the site where asbestos and construction demolition waste will remain.	
	Suitable for material below criteria	**Potentially suitable, however further leachate testing is required**
Consolidation and isolation within a properly designed containment cell	Asbestos impacted material may be placed in a constructed containment cell on site, at a depth where construction and/or future works will not disturb the cell (nominally minimum 0.5 m to the top of the cell or more). Richard Crookes Constructions has undertaken an estimate of fill volume and estimate approximately 7,900 m^3 of *in situ* fill is to be placed into the containment cell. There will be a requirement for a Long-Term Environmental Management Plan (LTEMP) that must be made legally enforceable and publicly notified. The LTEMP is required to be incorporated into the certificate of title, under Section 88B of the Conveyancing Act 1919 and Section 10.7 planning certificate. As the EMP is the responsibility of the land owner to implement, the EMP must also be agreed by the land owner. It will be necessary to seek Council approval prior to burial. On-site reuse through burial involves excavation and appropriate placement at depth within a cell constructed at depth at the site. The cell will require a low permeability top, basal and side wall membrane (i.e. clay with a maximum hydraulic conductivity of 1 x 10^{-9} m/second) and a cover comprising a coloured geotextile cover layer to both act as an impermeable cover and a physical marker for any future excavation works. As mentioned above, a minimum soil capping thickness of 0.5 m is required above the geotextile cover. Some geotechnical advice may be required regarding the acceptable amount of organics and oversize material that can be placed within the cell.	Leaching tests undertaken as part of the delineation investigation confirm that metals are generally leachable, but b(a)p does not appear to be.

Remediation Option	Assessment – Asbestos	Assessment – Metals and Benzo(a)pyrene
	Suitable	**Potentially suitable, however further leachate testing is required**
Removal to an approved facility	Off-site disposal is technically a straight forward option and could be completed in a relatively short time scale prior to development of the site. The option would remove from the site any maintenance and risk legacy associated with impacted soils. It is noted that it will be necessary to validate the resultant excavation after removal of impacted soils; if further impact is identified additional soil will need to be removed and disposed of until validation sample results pass the RAC.	Off-site disposal is technically a straight forward option and could be completed in a relatively short time scale prior to development of the site. The option would remove from the site any maintenance and risk legacy associated with impacted soils. It is noted that it will be necessary to validate the resultant excavation after removal of impacted soils; if further impact is identified additional soil will need to be removed and disposed of until validation sample results pass the RAC.
	Suitable	**Suitable**

8. Remediation Methodology

8.1 Place Filling at Depth

Filling at location BH6 and within yellow areas (see Drawing 1, Appendix A) is suitable for retention on site at depth. Therefore, it is recommended that all filling material that passes the RAC is placed at depth at the site as follows:

- Below hard stand, eg: a slab or building; or
- At a minimum 0.5 m depth below unconsolidated ground cover.

The greater depth for unconsolidated areas of the site is to prevent exposure of the material during minor excavation works such as utility installation and maintenance and landscaping.

The location of the re-use of site won fill should be surveyed and documented as part of the LTEMP and the site Asbestos Register.

The filling that passes RAC should not be used as fill in proposed or future service conduits.

It is noted that this method differs from containment which encompasses more engineered cap/cover construction requirements.

8.2 Prepare Containment Cell

The following material shall be placed in a containment cell at the site:

- Filling at location BH6; and
- Filling within the purple areas (see Drawing 1, Appendix A).

The containment cell requires the following:

- A suitable size to house all impacted material and taking into account soil bulking factor;
- Survey of the excavated cell;
- The cell will require a low permeability top, basal and side wall membrane (i.e. clay with a maximum hydraulic conductivity of 1 x 10^{-9} m/second);
- The Remediation Contractor is required to prepare a Construction Quality Assurance plan (CQA) which would confirm the cell's suitability to contain the material including permeability. The CQA is to consider how the cell will be constructed, including any stability and safety requirements during and post construction. It is noted that suppliers of clay and geotextile may be used to inform or make up part of the CQA by providing test data to confirm hydraulic conductivity values and other physical parameters such as particle size distribution and so on;
- The Remediation Contractor shall place the impacted material into the cell; after placement of the material, the surface of the impacted material shall be covered using a coloured geotextile cover layer to act as a physical marker for any future excavation works;
- Suitable soil cover shall be placed above the geotextile cover;

- the top of the containment cell (i.e. the geotextile cover) shall be a minimum 0.5 m below the final site level, or at a depth (0.5 m or greater) which is appropriate to avoid the top of the containment being disturbed during construction or any future works (such as utilities and conduit works); and
- The final level of the top of the cell as constructed will also be surveyed.

The Remediation Specification should be referred to for the design and construction of the cell.

The Remediation Contractor shall survey the base and top of the containment cell and confirm the construction of the cell in as-built. It will be necessary to include the survey as part of the Validation Report and the LTEMP. If a containment cell is required and after the area for the cell has been determined a work method statement should be prepared by DP to provide clear instruction to the remediation contractor on the requirements for construction.

8.3 Validate the Excavation after Removal of Filling

After removal of all filling in the central southern portion of the site it will be necessary for the Environmental Consultant to validate the extent of the excavation in accordance with the validation plan (refer to Section 10).

8.4 Management of Soil Aesthetics

As discussed in Section 6.6, it is a requirement of the NEPC (2013) to manage soil containing refuse that otherwise complies with the RAC. These include highly malodorous soils, putrescible material that may degrade over time (and release odours or gases), soils containing residue from animal burial and material that may present a physical risk to humans including glass or metal fragments which may break the surface of the skin. Such material containing soil aesthetic issues should be managed as follows:

- Placement in the containment cell if it comprises material already allocated for placement in the cell (ACM impacted material above RAC that will not be subject to treatment or disposal); and
- If the material is treated and some visible aesthetic material remains evident, placement of the material in the same manner as treated and validated ACM impacted material (i.e. minimum 0.1 m below hardstanding and 0.5 m below non-hardstanding areas subject to review of construction details (depth of footings etc.).

It is noted that material containing putrescible material (excluding some landscaping media) is unlikely to be suitable for use as fill and should only be used subject to assessment by the Environmental Consultant and following endorsement by the Auditor.

9. Remediation Strategy

The detailed procedures and sequence for the remediation work will rest with the contractor and will depend upon the equipment to be used and the overall sequence of the remediation or development. If a containment cell is to be constructed the Remediation Specification should be referred to for the detailed process. It is the contractor's responsibility to devise a safe work method statement and to implement proper controls that enable the personnel undertaking the remediation to work in a safe environment. This RAP does not relieve the contractor(s) of their ultimate responsibility for occupational

health and safety of their workforce and to prevent contamination of areas outside the immediate workspace. This RAP sets out the minimum standards and guidelines for remediation that will need to be used in preparing a method statement.

Any asbestos remediation works must be undertaken by an appropriately licensed asbestos Remediation Contractor and in accordance with *Work Health and Safety Regulation NSW 2017* and any other applicable SafeWork NSW or Safe Work Australia regulations or guidelines.

DP recommends that the asbestos Remediation Contractor must be licensed for Class B asbestos removal. A Class B licence is suitable for the remediation related to areas impacted with asbestos given that asbestos at the site has been identified in the bonded (non-friable) form (i.e. ACM in good condition). Considering the nature of the site it is recommended that air quality monitoring is undertaken during bonded ACM removal work by DP.

In the event that significant quantities of AF or FA are observed during the remediation, the UFP (Section 11) will apply.

The licensed asbestos Remediation Contractor must give written notice to SafeWork NSW at least five days before remediation work commences.

9.1 Site Establishment

Prior to the implementation of remediation, the site is to be established in accordance with all NSW legislative requirements. A Remediation / Construction Environmental Management Plan and Asbestos Management Plan (AMP) are to be prepared prior to work commencing; the AMP should be prepared by a NSW Licenced Asbestos Assessor (LAA).

A Site Management Plan (SMP) detailing overall site management, environmental management (including soil, air and water) and occupational health and safety (OH&S) plans is also required to be prepared by the Contractor (refer to Section 11 for further detail).

Air quality monitoring for airborne asbestos fibres using the Membrane Filter Method in accordance with the *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres* (NOHSC: 3003, April 2005) is to be conducted prior to commencement of works (baseline) and on a daily basis when works involving the excavation, transport or placement of asbestos impacted and potentially impacted soils/materials are being conducted within the site. The Environmental Consultant is to conduct the air quality monitoring or manage the works through an experienced contractor. If friable asbestos is recorded at any stage of the remediation works, air quality monitoring will be required to be carried out by a suitably licensed asbestos assessor.

The client will be notified by the Environmental Consultant of any laboratory detections of airborne asbestos fibres during the course of the works. In the event of detections, the Remediation Contractor should make appropriate modifications to works methods, as required.

9.2 Minimisation of Cross-Contamination

Appropriate measures should be adopted, as required, to eliminate or at least minimise the potential for cross contamination. In addition to the recommendations provided in the following sections for

management of the remediation works, plant movement within areas of active remediation should be restricted and monitored to ensure vehicles do not unnecessarily pass over validated surfaces or through contaminated areas.

9.3 Waste Disposal

A waste classification assessment should be carried out in accordance with NSW EPA (2014) *Waste Classification Guidelines, Part 1: Classifying Waste* (EPA, 2014) for any material requiring offsite disposal. The scope of the assessment will depend on the volume and type of material requiring disposal.

9.4 Contingency Plan

9.4.1 Stockpiling of Contaminated Materials

Potentially contaminated material shall be stockpiled at a suitable designated location. Dust control is required for all stockpiled materials and should include light conditioning with water (spray) for exposed materials or covering with anchored geotextile or similar.

All stockpiles of contaminated material which may be required to remain on the site overnight shall be demarcated to clearly delineate their boundaries and be adequately secured in order to reduce the risk of sediment runoff and dust blow. Should the stockpiles remain for over 48 hours they should be appropriately managed to prevent fugitive dust leaving the site (eg: light wetting or covering with anchored geotextile depending on weather conditions). The defined stockpile footprint area will be subject to validation upon completion of the remediation works (refer to Section 10).

9.5 Excess Contaminated Materials (Asbestos)

If excess contaminated materials containing asbestos above the RAC is generated during the remediation works, i.e. the storage capacity of the containment cell has been reached, these shall be subject to a waste classification and disposed of offsite in accordance with Section 9.7.

9.6 Loading and Transporting of Spoil

All transport of waste and disposal of materials must be conducted in accordance with the requirements of the *POEO* Act (1997). All required licences and approvals required for disposal of the material will be obtained prior to removal of the materials from the site.

Transport of spoil shall be via a clearly delineated, pre-defined haul route.

Removal of waste materials from the site shall only be carried out by a licensed contractor holding the appropriate licence, consent or approvals to dispose of the waste materials according to the classification outlined in the NSW EPA *Waste Classification Guidelines* (2014) and with the appropriate approvals obtained from the NSW EPA, if required.

The proposed waste transport route will be notified to the local Council and truck dispatch shall be logged and recorded by the Contractor for each load leaving the site. A record of the truck dispatch will

be provided to the PR. Asbestos transporters and facilities receiving asbestos waste in NSW weighing more than 100 kilograms, or consisting or more than 10 square metres of asbestos sheeting in one load must track and report this waste to the EPA using WasteLocate[3].

9.7 Disposal of Material

A waste classification assessment should be carried out in accordance with NSW EPA (2014) *Waste Classification Guidelines, Part 1: Classifying Waste* (EPA, 2014) for any material requiring off-site disposal. The scope of the assessment will depend on the volume and type of material requiring disposal and is anticipated to include the following at a minimum:

- Waste classification samples should be generally collected for excavated materials at the following frequencies:
  - <500 tonnes – three samples;
  - 500 to 1,000 tonnes – four samples;
  - 1,000 to 2,000 tonnes – five samples;
  - 2,000 to 3,000 tonnes – seven samples; and
  - 3,000 to 4,000 tonnes – ten samples.

  For material greater than 4,000 tonnes, the number of samples should be proportional to the sampling density provided above for 3,000 to 4,000 tonnes.
- Samples should be collected systematically, at evenly spaced sample locations using a shovel or an excavator bucket where a shovel cannot reach the centre of the stockpile. The soil samples should be representative of soil conditions more than 0.3 m below the surface of the stockpile. Compositing samples can only be undertaken for inorganic analysis.
- Soils should also be analysed for the following at a minimum:
  - Metals (arsenic, cadmium, copper, mercury, molybdenum, nickel, lead, zinc);
  - Hexavalent chromium;
  - Total cyanide;
  - Volatile organic compounds (VOCs – 20% of samples if five samples or more required);
  - Acid herbicides (20% of samples if five samples or more required);
  - Semi-VOCs (SVOCs) incl. phthalates, 2,4-DNT & nitrobenzene, organochlorine and organophosphorus pesticides (OC/OP), total phenols, and polycyclic aromatic hydrocarbons (PAH) (20% of samples if five samples or more required); and
  - Total recoverable hydrocarbons (TRH) C_{10} – C_{36}; and
  - Asbestos using method AS4954-2004 (qualitative identification) using a 50 g sample bag.

  Additional analytes may be required depending on soil conditions observed on the site. Relevant data provided in previous investigations and provided as an appendix to this report (Appendix C) can also be used if the data relates to the portion of the site that the waste was removed from;

  As mentioned previously, analysis of composite samples can only be undertaken for inorganic analysis;

[3] http://www.epa.nsw.gov.au/your-environment/waste/transporting-asbestos-waste-tyres/tracking-asbestos-waste-locate

- Soil analytical results are to be assessed against CT1 and CT2 criteria provided in Table 1 in EPA (2014) guidance. If exceedances are observed and Toxicity Characteristic Leaching Procedure (TCLP) criteria is available in Table 2 of EPA (2014) guidance, TCLP analysis can be undertaken on the relevant soil samples and assessed against criteria provided in Table 2;
- Soils excavated from portions of the site with known asbestos impact (AF/FA and ACM areas) should be considered to represent asbestos impacted soil and should be classified as Special Waste. For soils in pre-validation areas, if asbestos is sighted during excavation works, the material should be classified as Special Waste, otherwise soil samples should be analysed for asbestos using the above frequencies and using method AS4954-2004 (qualitative identification); and
- The findings of the waste classification assessment should be documented in a waste classification report that provides the material description, a drawing showing the material location, an approximate volume, the waste classification and any special conditions, if any.

Details of all contaminated and spoil materials removed from the site shall be documented by the Contractor with copies of weighbridge slips, trip tickets and consignment disposal confirmation where appropriate) provided to the Environmental Consultant and the Principal's Representative. A site log will be maintained by the PR to track disposed loads against on-site origin.

9.8 Reuse of Site Won Fill

Fill has been observed in the south western portion of the site that contains asbestos and anthropogenic material which passes the RAC and is suitable for re-use on the site. To manage potential aesthetic issues, fill from the south western portion of the site would be managed as follows:

- Placed a minimum 0.1 m below the ground surface below hardstanding (which may well be met by the hardstanding itself); or
- At a depth of 0.5 m below soft cover e.g. paddocks/fields, gardens and landscaping.

The purpose of the minimum 0.1 depth to place treated material is to meet the requirements of WA DoH (2009) guidelines which require that the top 0.1 m of the site is visibly free of asbestos. Whilst treated and validated / pre-validated material has been demonstrated to meet the RAC, the presence of some asbestos below the RAC may occur.

The location of the re use of site won fill should be surveyed and documented as part of the LTEMP and the site Asbestos Register.

The above depths are subject to review of construction details, including depth of footings. It is intended that the above depths minimise the risk of any disturbance of the soil during construction works. In the case of in areas of landscaping this includes, landscaping activities and minor construction works (e.g. construction of sheds and garages amongst other things). This also ensures that no long-term management or notice can be avoided. It is also noted that soil containing aesthetically undesirable material (see Section 6.6) but passes the RAC would also be reused in the same manner.

9.9 Materials for Use in Backfilling and Imported Fill

9.9.1 General Requirements

Any additional material required for redevelopment works, including backfilling of remedial excavations shall be either:

- uncontaminated material from the site (i.e.: materials meeting the RAC); or
- imported material, which is to be analysed and certified as Virgin Excavated Natural Materials (VENM) or Excavated Natural Materials (ENM) if accepted by Council to do so, as well as meeting the RAC via a validation certificate by the Contractor. The material and material management should also comply with relevant legislation (eg: POEO Act 1997). The Contractor is required to document where imported fill was placed at the site.

Materials used on site should also meet other requirements (eg: geotechnical and salinity requirements or any specific fill management plan which is devised for the site).

9.9.2 VENM Testing Requirements

VENM proposed to be imported must include analyses of samples at the appropriate density specified in Table 4 below. As the NSW EPA has no specific VENM assessment criteria (in terms of contaminant thresholds), VENM should be reviewed based on the source site history and observations of the material.

Table 9 includes sampling densities for (a) source sites where VENM comprising of soil is intended to be exported, and (b) large deep excavation source sites where VENM comprising bedrock is intended to be exported. These sites include road tunnel infrastructure sites (tunnel spoil sites) where spoil is not classified under a Resource Recovery Exemption.

A reduced sampling density is applicable for bedrock VENM, which is considered as having a lower potential for contamination than overlying soil (subject to the source site conditions and history). If material other than excavated bedrock is to be exported from these sites (i.e.: soil overlying bedrock), the density for soil VENM will apply for the soil portion of the imported material.

Assessment of inorganic contaminants should be conducted with reference to the published background ranges for typical Australian soils in Berkman (1989) *Field Geologists Manual* and/or ANZECC (1992) (see Table 10). Assessment of organic contaminants should be conducted with reference to their analytical practical quantitation limits (ie.: no detections exceeding these limits).

VENM must be accompanied by a VENM validation report from a suitably qualified environmental consultant, or alternatively the appointed Environmental Consultant can undertake the VENM validation.

Table 9 – Sampling and Analytical Requirements for VENM, ENM and RRO Material

Filling/ Natural	Material Quantity (m^3)	Minimum Sample number/ Frequency[4, 5]	Minimum Analyte suite to include[1, 2]	Additional analysis as required[3]
Soil VENM	<5,000	1 per 2,000 m^3, with a minimum of three samples	- metals - PAH - TRH - BTEX - phenol - PCB - OCP - asbestos (50g – Absence / Presence)	- Any contaminant considered potentially present in the material based on site information
	5,000-50,000	1 per 2,000 m^3		
Bedrock VENM[5]	NA	1 per 50,000 m^3, with a minimum of five samples		

Notes:

1. Not all samples necessarily require testing for all analytes (not relevant for ENM).
2. Metals = arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc. BTEX = benzene, toluene, ethyl benzene, total xylenes OCP = Organochlorine Pesticides (a scheduled chemical). PAH = Polycyclic Aromatic Hydrocarbons. PCB = Polychlorinated Biphenyls. TRH = Total Recoverable Hydrocarbons (including Total Petroleum Hydrocarbons).
3. Based on advice from a qualified consultant.
4. Including exempt and non-exempt tunnel spoil sites. A reduced sampling density is applicable for VENM bedrock source sites based on the material comprising excavated bedrock, which is considered as having a lower potential for contamination than overlying soil.
5. Higher frequency of testing should be adopted in area of higher contamination potential (such as service stations).
6. A reduced analytical suite may be applicable based on the material type to be imported. This will be determined by the appointed environmental consultant.

Table 10 – Reference Contaminant Values for Virgin Excavated Natural Material (VENM)

Contaminant [1]	Berkman (1989) [2]	ANZECC [3]
Metals		
Arsenic (total)	1-50	0.2-30
Cadmium	1	0.04-2
Chromium (III)	5-1,000	0.5-110
Copper	2-100	1-190
Lead	2-200	<2-200
Mercury	0.03	0.001-0.1
Nickel	5-500	2-400
Zinc	10-300	2-180
TRH $C_6 – C_{10}$ $C_{10} – C_{16}$ $C_{16} – C_{34}$ $C_{34} – C_{40}$	For all organic analytes, the analytical practical quantitation limits are used as the reference levels for VENM assessment. Special consideration may be given to low levels of naturally occurring TRH or PAH in shale.	

Contaminant [1]	Berkman (1989) [2]	ANZECC [3]
BTEX Benzene Toluene Ethyl Benzene Xylene		
Total Phenols		
PAH Total Benzo(a)Pyrene		
PCB		
OPP		
OCP aldrin dieldrin aldrin + dieldrin chlordane DDT (including DDD, DDE, DDT) Heptachlor		
Asbestos	No asbestos present	

Notes:

1. Contaminant concentrations must also be evaluated against NEPC (2013)
2. Berkman (1989) Field Geologists Manual
3. Australian and New Zealand Environment and Conservation Council/National Health and Medical Research Council (ANZECC/NHMRC): Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (1992), Environmental Soil Quality Guidelines Background A [ANZECC A];

9.9.3 ENM Testing Requirements

ENM must be verified in accordance with the ENM Order (EPA, 2014) and should include analyses of samples at the appropriate density specified in Table 11 below. In addition, the relevant “chemical and other attributes” in the ENM Order (including EC parameters) must be verified to comply with the concentration threshold values specified in Table 4 of the ENM Order.

ENM must be accompanied by an ENM validation report from a suitably qualified environmental consultant, or alternatively the appointed Environmental Consultant can undertake the ENM validation.

The recipient of materials classified under the ENM Order must abide by the conditions of the corresponding NSW EPA Resource Recovery Order under Part 9, Clauses 91 and 92 of the Protection of the Environment Operations (Waste) Regulation 2014, the excavated natural material exemption 2014 (the ENM Exemption).

Table 11 – Sampling and Analytical Requirements for ENM and RRO Material

Filling/ Natural	Material Quantity (m^3)	Minimum Sample number/ Frequency[4, 5]	Minimum Analyte suite to include[1, 2]	Additional analysis as required[3]
Excavated Natural Material	Any volume	Based on the ENM Order 2014 issued by NSW EPA	Mercury, cadmium, lead, arsenic, chromium (total), copper, nickel, zinc, electrical conductivity, pH, PAH, TPH, BTEX, rubber, plastic, bitumen, paper, cloth, paint and wood and Asbestos (500 ml NEPM)	- OCP plus any contaminant considered to potentially be present in the material based on site information

Notes:

7. Not all samples necessarily require testing for all analytes (not relevant for ENM).
8. Metals = arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc. BTEX = benzene, toluene, ethyl benzene, total xylenes OCP = Organochlorine Pesticides (a scheduled chemical). PAH = Polycyclic Aromatic Hydrocarbons. PCB = Polychlorinated Biphenyls. TRH = Total Recoverable Hydrocarbons (including Total Petroleum Hydrocarbons). .
9. Based on advice from a qualified consultant.
10. Including exempt and non-exempt tunnel spoil sites. A reduced sampling density is applicable for VENM bedrock source sites based on the material comprising excavated bedrock, which is considered as having a lower potential for contamination than overlying soil.
11. Higher frequency of testing should be adopted in area of higher contamination potential (such as service stations).
12. A reduced analytical suite may be applicable based on the material type to be imported. This will be determined by the appointed environmental consultant.

9.9.4 Resource Recovery Order Testing Requirements

Material which complies with an appropriate general Resource Recovery Order (RRO) which allows application to land may be suitable for import to site. The RRO may include specifications, record-keeping, reporting and other requirements which need to be met. All RROs are made under clause 93 of the *Environmental Operations (Waste) Regulation 2014.*

All RRO material will be required to have the following completed to determine suitability for import:

- Samples will require to be collected at the frequency specified in Table 12;
- Samples will require to be tested for all analytes specified in Table 12;
- Laboratory reported concentrations of chemical analytes shall be compared against NEPC (2013) criteria for low density residential land use;
- All Resource Recovery Exempt material found to be compliant will require written approval from the Environmental Consultant and the Auditor prior to import;
- A specific waste exemption as may be granted by the NSW EPA. The EPA grants resource recovery orders and resource recovery exemptions where the application of a waste material to land is a bona-fide, fit-for-purpose, re-use opportunity rather than a means of waste disposal. A specific application would need to be made in this case;
- Tunnel Spoil material classified under the NSW EPA Resource Recovery Order Under Part 9, Clause 93 (and the Resource Recovery Exemption Part 9, Clauses 91 and 92) of

the Environmental Operations (Waste) Regulation 2014 (Tunnel Spoil Exemptions) as outlined below:

- Tunnel spoil exemptions where that material is excavated bedrock (i.e.: from Road Infrastructure Project Sites). Samples of bedrock material classified under a tunnel spoil exemption should be analysed at the frequency provided for bedrock VENM sites specified in Table C1, Appendix C; and
- Laboratory reported concentrations of chemical analytes shall be compared against the criteria provided in the ENM Order.

Resource Recover Exempt material including tunnel spoil material and recycled recovered aggregate is subject to approval from the auditor and may require additional testing.

Table 12 – Sampling and Analytical Requirements for ENM and RRO Material

Filling/ Natural	Material Quantity (m^3)	Minimum Sample number/ Frequency[4, 5]	Minimum Analyte suite to include[1, 2]	Additional analysis as required[3]
Excavated Natural Material	Any volume	Based on the ENM Order 2014 issued by NSW EPA	Mercury, cadmium, lead, arsenic, chromium (total), copper, nickel, zinc, electrical conductivity, pH, PAH, TPH, BTEX, rubber, plastic, bitumen, paper, cloth, paint and wood and Asbestos (500 ml NEPM)/	- OCP plus any contaminant considered potentially present in the material based on site information
Material classified under other Resource Recovery Order	Any volume	Based on the specific RRO issued by NSW EPA and also 1 per 2000 m^3 with a minimum of three samples for all analytes listed in addition to that specified within the RRO	As per the specific RRO issued by NSW EPA and must include the following minimum analyte suite: - heavy metals, PAH, TRH, BTEX, phenol, PCB OCP, Asbestos (500 ml NEPM)[6]	- Any contaminant considered potentially present in the material based on site information

Notes:

13. Not all samples necessarily require testing for all analytes (not relevant for ENM).
14. Metals = arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc. BTEX = benzene, toluene, ethyl benzene, total xylenes OCP = Organochlorine Pesticides (a scheduled chemical). PAH = Polycyclic Aromatic Hydrocarbons. PCB = Polychlorinated Biphenyls. TRH = Total Recoverable Hydrocarbons (including Total Petroleum Hydrocarbons).
15. Based on advice from a qualified consultant.
16. Including exempt and non-exempt tunnel spoil sites. A reduced sampling density is applicable for VENM bedrock source sites based on the material comprising excavated bedrock, which is considered as having a lower potential for contamination than overlying soil.
17. Higher frequency of testing should be adopted in area of higher contamination potential (such as service stations).
18. A reduced analytical suite may be applicable based on the material type to be imported. This will be determined by the appointed environmental consultant.

10. Validation Plan

10.1 Validation Scope

The objective of the validation plan is to assess the results of post remediation testing against the RAC stated within this RAP (Section 6).

The RAC (Section 6) includes requirements for aesthetic material ie. highly malodorous soils, putrescible material that may degrade over time and release odours or gases, soils containing residue from animal burial and material that may present a physical risk to humans including glass or metal fragments which may break the skin surface. Aesthetic material is to be visually identified by the Environmental Consultant and then managed in accordance with Section 8.4.

The validation assessment will be conducted in accordance with Data Quality Objectives (DQOs) and Quality Assurance/Quality Control (QA/QC) procedures to demonstrate the repeatability and reliability of the results.

The following DQOs will be adopted in the validation works and documented in the Validation Report. The DQOs are based on those provided in Appendix B, Schedule B2 of NEPC (2013). The DQO process is outlined as follows:

- State the Problem;
- Identify the Decision;
- Identify Inputs to the Decision;
- Define the Boundary of the Assessment;
- Develop a Decision Rule;
- Specify Acceptable Limits on Decision Errors; and
- Optimise the Design for Obtaining Data.

A checklist of Data Quality Indicators (DQI) will be completed as part of the validation assessment.

10.2 Validation of Stockpiles

All soils requiring validation for asbestos will be validated as follows:

Collect validation samples (10 L and 500 mL) at the rate of one sample per 20 m^3 which meets with NEPC (2013) sampling requirements for stockpiles. In the event that ACM is observed, record the weight, size and condition of the ACM.

10.3 Validation of Excavations for Asbestos

The following validation works will be carried out by the Environmental Consultant:

- Visual inspection of the extent of the excavation;

- If any ACM is observed during the visual inspection, an additional 0.15 m of soil will be removed below the observed ACM or in natural strata if encountered sooner;
- The excavation surface (where no further excavations are required) will be validated as follows:
  - on a 5 m x 5 m grid basis; and
  - including targeted sampling where ACM was observed.
- Sampling of the side walls of excavations will be undertaken at 5 m lateral and 1 m depth intervals. Sampling shall be conducted with reference to NEPC (2013) and DoH (2009) guidelines and shall include collection of ~10 L bulk samples and a 500 mL sample for each ~10 L bulk sample for laboratory analysis of AF and FA.
- Field screening and laboratory assessment results shall be used to calculate the asbestos %w/w and compare against the RAC.

The findings of the validation exercise will be documented for each excavation / remediation area(s) and ACM pipe trench excavation in an asbestos Clearance Certificate.

10.4 Validation of Stockpile Footprints and Haul Roads

The footprint of stockpiles and haul roads, when rendered redundant, should be validated as follows:

- Validation of stockpile footprints and redundant roads will be undertaken after removal of the stockpile(s) and (in the case of the haul roads) when remediation works has been completed or the route is rendered redundant;
- Validation samples will be collected and analysed at a rate of one sample per 25 m^2 of stockpile footprint area;
- Sampling shall be conducted with reference to NEPC (2013) and DoH (2009) guidelines and shall include collection of ~10 L bulk samples and a 500 mL sample for each ~10 L bulk sample for laboratory analysis of AF and FA;
- Where it is not possible to treat the stockpile or haul road, the surface soils shall be scraped off, classified for waste disposal purposes and disposed of to a licensed waste facility. Once the soils have been removed, a visual inspection of the underlying soil surface should be completed. Depending on the findings of the visual inspection, targeted samples may be required; and
- Analyse samples (where collected) for asbestos and validate to the adopted RAC. If asbestos is reported in any form in the validation sample, it will be necessary to further excavate and re-validate the stockpile/haul road until the validation results are within the adopted RAC.

10.5 Quality Assurance Plan

10.5.1 Sample Collection and Handling

The general sampling procedures comprise:

- The use of stainless steel or disposable sampling equipment;

- Decontamination of sampling equipment prior to the collection each sample by removing soil residue from sampling equipment with a wetted down brush or towel;
- Labelling of the sample containers with individual and unique identification including Project No. and Sample No.;
- The use of chain-of-custody documentation so that sample tracking and custody can be cross-checked at any point in the transport of samples from the field until hand-over to the appointed laboratory; and
- Soil samples collected for asbestos analysis for validation purposes should be collected from the same sample location as the 10 L sample for field gravimetry analysis for ACM (if one is required), but *not* from the sieved fractions from the gravimetry analysis process. The soil sample is to be placed into a 500 mL capacity sealable bag and labelled with the sample name, date collected and project reference. A smaller 50 g bag is sufficient for waste classification purposes, only (refer to Section 9.3)

10.5.1.1 Field Gravimetry Analysis

Where field gravimetry analysis is required of 10 L soil samples for ACM, the following procedure should be followed with reference to WA DoH (2009):

- Samples to be measured into a 10 L bucket, weighed and the weight recorded (with the scale 'zeroed' for the weight of the bucket);
- Samples should then be screened manually (wearing appropriate personal protective equipment – see Section 11.3) on-site through a 7 mm sieve and/or spread out for inspection on a contrasting colour material tarpaulin;
- Fragments of PACM removed and recorded (weight, dimensions and condition). ACM in poor condition is recorded as FA; and
- The identified ACM and FA is weighed to calculate asbestos soil concentrations as per Section 4.1.7 of WA DoH (2009) guidelines.

If a soil sample is required for asbestos analysis from the same sample location, the sample should be collected representative of the same soil subject to field gravimetry analysis, but *not* from the sieved fractions from the gravimetry analysis process.

10.5.2 Field QA/QC

Appropriate sampling procedures will be undertaken to prevent cross contamination. These include:

- Standard DP operating procedures are followed;
- Samples are stored under secure, temperature-controlled conditions;
- Chain-of-custody documentation is employed for the handling, transport and delivery of samples to the selected laboratory; and
- Proper disposal of contaminated soil, fill or surface water originating from the site.

No field replicates are proposed for asbestos analysis. If other contaminants are identified (e.g. an Unexpected Find), field replicates (inter and intra) shall be collected at a minimum rate of 20% / one replicate pair (inter and intra) per 20 samples.

10.5.3 Laboratory QA/QC

A NATA accredited laboratory will be used to conduct analysis.

10.5.4 Achievement of Data Quality Objectives

Based on fulfilment of the data quality objectives, an assessment of the overall data quality will be presented in the final validation report.

11. Site Management Plan

As mentioned in Section 9, it is the responsibility of the Contractor to develop a Site Management Plan (SMP) detailing overall site management, environmental management (including soil, air and water) and occupational health and safety (OH&S) plans. This section provides a brief summary of some of the items which need to be included in the Contractor's plans.

Works shall comply with all legislative requirements including, but not limited, to those set out under the following Acts (and subsequent amendments and regulations):

- Environmentally Hazardous Chemicals Act (1985);
- *Hazardous Chemicals* Act (1985) (under review);
- Environmental Offences and Penalties Act (1989);
- Agricultural and Veterinary Chemicals Act (1994);
- *Protection of the Environment Operations* Act (POEO) (1997) and associated exclusions;
- *Pesticide* Act (1999);
- Work Health and Safety Act 2011;
- *OHS Amendment (Dangerous Goods)* Act 2003 (including OHS Amendment (Dangerous Goods) Regulation 2005); and
- *POEO Amendment* Act 2005 (including POEO Amendment (Scheduled Activities and Waste) Regulation 2008).

11.1 Site Operations

The schedule of remedial works, including timing and staging is to be prepared by the Contractor to meet the requirements of this RAP.

Remediation works will be restricted to the hours set out by Council.

It is the site owner/developers responsibility to ensure that appropriate personnel are appointed to manage and conduct the remediation and validation works. This will include:

- The Principal's Representative (PR – NSW Department of Education), who is responsible for overseeing the implementation of this RAP;

- The Contractor, who is responsible for overseeing the implementation of this RAP, conducting the remedial works (may be subcontracted) and managing the site; and
- An Environmental Consultant, who will be responsible for providing advice as required for the remedial works and undertaking the validation works in accordance with this RAP.

Other parties who may be employed to assist in the implementation of this RAP include, but are not limited to, occupational hygienist(s) and licensed asbestos contractor(s).

The Contractor will be responsible for preparing a list of contacts for the works, including emergency contacts for the site operations and provision of signage at the site to allow the public to contact nominated site personnel out of hours.

11.2 Environmental Management

The work shall be undertaken with all due regard to the minimisation of environmental effects and to meet all statutory requirements. The Contractor shall have in place an Environmental Management Plan (EMP) which addresses the following items:

- Site stormwater management plan;
- Soil management plan;
- Noise control plan;
- Dust control plan;
- Odour control plan; and
- Contingency measures for environmental incidents.

The Contractor shall also be responsible to ensure that the site works comply with the following conditions:

- fugitive dust leaving the confines of the site is minimised;
- no water containing suspended matter or contaminants leaves the site in a manner which could pollute the environment;
- vehicles shall be cleaned and secured so that no mud, soil or water are deposited on any public roadways or adjacent areas;
- spoil is managed in accordance with this RAP; and
- noise and vibration levels at the site boundaries comply with the legislative requirements.

11.3 Occupational Health and Safety

The Contractor should develop a site emergency response plan (ERP) and work health and safety management plan (WHS). This will ensure the safety of the personnel working on site, given any likely emergency situation which may occur. The WHS and ERP should include emergency phone numbers and details of local emergency facilities.

Appropriate fencing and signage should be installed around and within the site to prevent unauthorised access to the site, restricted access remedial areas (eg: asbestos remediation areas) and deep excavations. Signage should be appropriate to inform of the occurrence of asbestos remediation works.

All asbestos works will be conducted by an appropriately licensed asbestos contractor and in accordance with SafeWork requirements.

All personnel on site should be required to wear the following personnel protective equipment (PPE) at all times (as a minimum):

- Steel-capped boots;
- High visibility clothing; and
- Hard hat meeting AS1801-1981 requirements.

The following additional PPE will be worn as required:

- All PPE required by the Licenced asbestos contractor (eg: P2 disposable dust mask or a particulate half-face mask with a P3 filter, disposal coveralls);
- Hearing protection meeting AS1270-1988 requirements when working around machinery or plant equipment if noise levels exceed exposure standards;
- Safety glasses or safety goggles with side shields meeting AS1337-1992 requirements (as necessary, particularly during demolition);
- Disposable coveralls (if necessary) to prevent contact with splashed contaminated soil, materials or water;
- Nitrile work gloves meeting AS2161-1978 requirements or heavy duty gauntlet gloves; and
- Any additional protection identified by the Environmental Consultant.

All contractors are required to show compliance with the Work Health and Safety Regulation 2011, including the preparation of a Site Safety Management Plan and Safe Work Method Statements.

12. Unexpected Finds

If unexpected conditions are encountered during site works (such as buried tanks and further suspected unexpected, contaminated soil including additional ACM or FA/AF), the following general approach will be adopted:

- Stop work in the area of impact and barricade area to prevent access;
- The Remediation Contractor is to contact the principal's representative (PR – NSW Department of Education) or their Project Manager and the Environmental Consultant. The PR or their Environmental Consultant should in turn inform the project Auditor;
- The Environmental Consultant will make an assessment of the severity/extent of the unexpected find in terms of the potential impact to human health and the environment. If the suspected contamination includes potentially volatile contamination, the Environmental Consultant will screen the soil sample (headspace test) using a Photo-Ionization Detector (PID);
- The Environmental Consultant will liaise with the PR as required;

- The Environmental Consultant will provide advice to the PR and the auditor regarding the recommended course of action and the remedial strategy proposed; and
- The Remediation Contractor is to implement the agreed management/remedial strategy.

In the event that the unexpected finds includes significant quantities of AF/FA, a NSW Licenced Asbestos Assessor (LAA) will be required to assess the site along with the Environmental Consultant. The LAA must undertake air quality monitoring for all removal work for AF/FA.

13. Validation Reporting

A validation assessment report will be required once the remediation works have been completed and should be prepared by the environmental consultant in accordance with EPA NSW *Guidelines for Reporting on Contaminated Land: Contaminated Land Guidelines* (2020). The validation report(s) may be prepared in a staged manner, depending on the Project Programme.

The objective of the validation report will be to document that the site has been remediated to a suitable standard for the proposed redevelopment and that no related adverse human health and environmental effects have occurred as a result of the works. The validation report will include:

- Documentation of the implementation of the Remedial Strategy;
- Documentation of the DQOs;
- Details of the location and total estimated volume of materials excavated and replaced within the site and volume of material removed from the site for disposal as well as the tonnages reported by the licensed landfill;
- Photographic record during the works and of final excavations;
- Survey records of excavations and final levels after fill placement;
- Drawings showing contamination assessment sample locations and validation sample locations;
- Detailed analytical results;
- Details of materials imported to the site, as required; and
- Details, including survey records, of the final cover.

The Auditor will likely require that the investigation of the heritage area and the existing road alignments should be completed as well as remediation works, where required, prior to conclusions being made on the site's suitability.

14. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report (or services) for this project at Londonderry Road, Richmond in accordance with DP's proposal SYD171265 dated 5 April 2018 and acceptance received from Phil Baigent of Conrad Gargett Pty Ltd dated 18 April 2018 and associated variations. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of NSW Department of Education for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the subsurface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Subsurface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.
DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

The contents of this report do not constitute formal design components such as are required, by the Health and Safety Legislation and Regulations, to be included in a Safety Report specifying the hazards likely to be encountered during construction and the controls required to mitigate risk. This design process requires risk assessment to be undertaken, with such assessment being dependent upon factors relating to likelihood of occurrence and consequences of damage to property and to life. This, in turn, requires project data and analysis presently beyond the knowledge and project role respectively of DP. DP may be able, however, to assist the client in carrying out a risk assessment of potential hazards contained in the Comments section of this report, as an extension to the current scope of works, if so requested, and provided that suitable additional information is made available to DP. Any such risk assessment would, however, be necessarily restricted to the (geotechnical/ environmental/groundwater) components set out in this report and to their application by the project designers to project design, construction, maintenance and demolition.

Appendix A

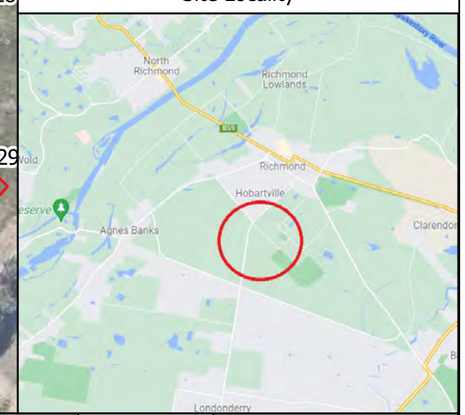
Drawings 1 and 2

Legend

- Site boundary 2021
- Interpolated fill extent
- Test Pit Location
- Fill visual delineation pits
- DP DSI test pits

50 0 50 100 150 200 m

Site Locality



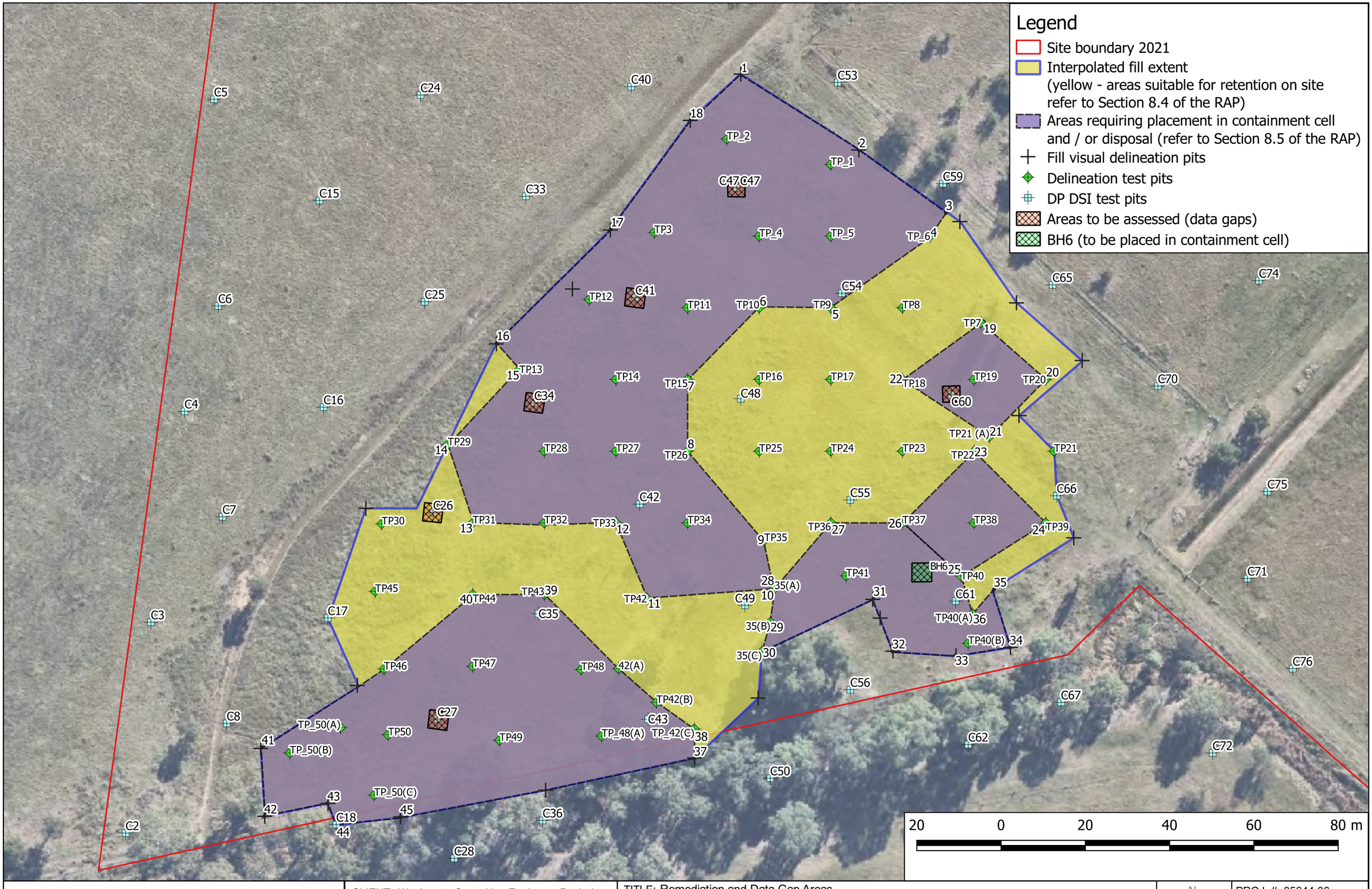
Douglas Partners
Geotechnics | Environment | Groundwater

CLIENT: Woolacotts Consulting Engineers Pty Ltd		
OFFICE: Macarthur	DRAWN BY: EME	
SCALE: As shown	DATE: 23/09/2021	

TITLE: Site Locality, Test Pit Locations and Investigation Area
Centre of Excellence in Agricultural Education (CoE)
Vines Drive, Richmond

N
MGA

PROJ. #:	85644.06
DRAWING No:	1
REVISION:	1



Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Woolacotts Consulting Engineers Pty Ltd		
OFFICE: Macarthur	DRAWN BY: EME	
SCALE: As shown	DATE: 30/09/2021	

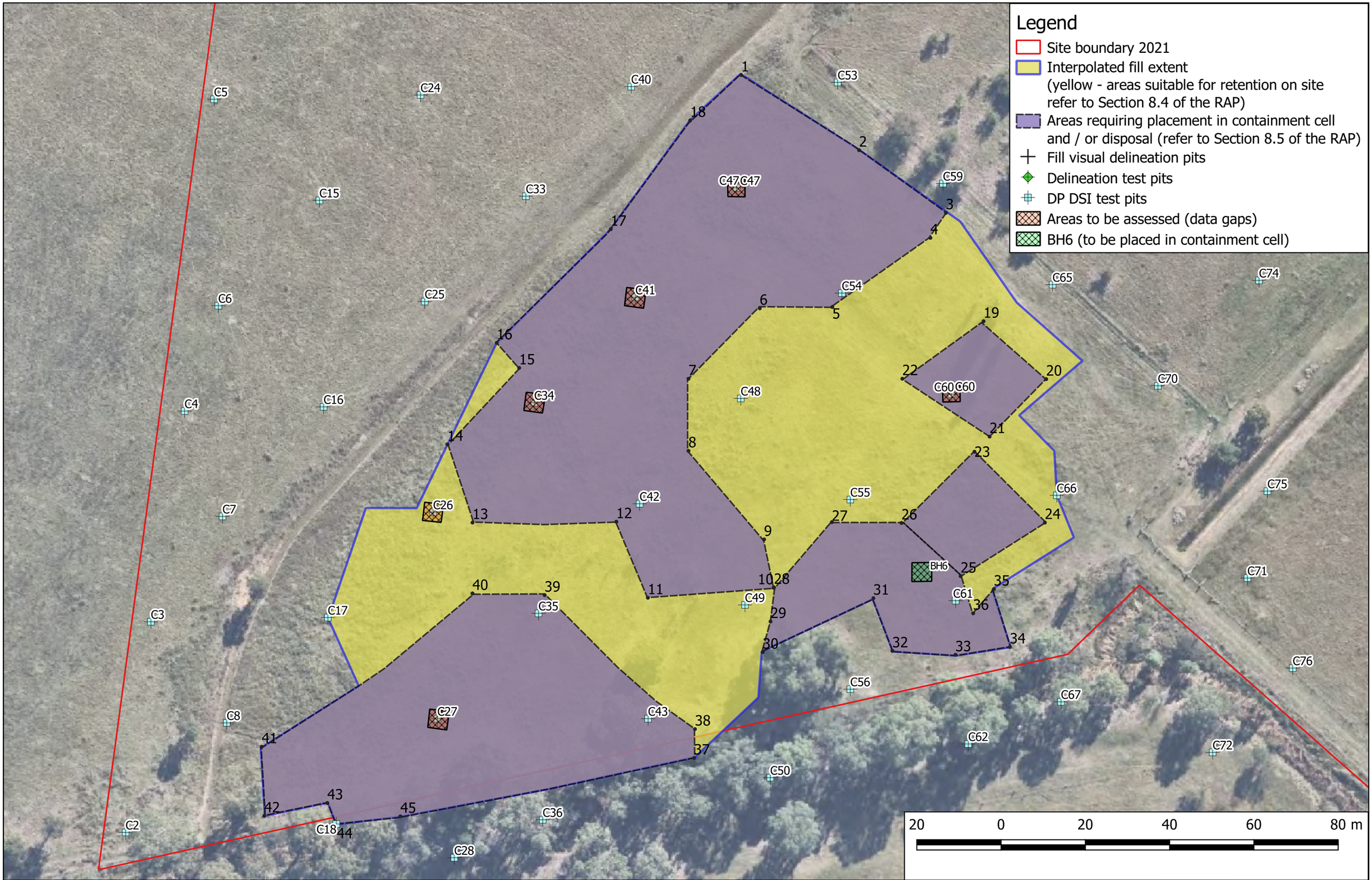
TITLE: Remediation and Data Gap Areas
Centre of Excellence in Agricultural Education (CoE)
Vines Drive, Richmond

MGA

PROJ. #:	85644.06
DRAWING No:	2
REVISION:	0

Point	Eastings	Northings
1	290721	6278181
2	290749	6278163
3	290770	6278148
4	290766	6278142
5	290743	6278126
6	290726	6278125
7	290709	6278109
8	290709	6278092
9	290727	6278071
10	290729	6278059
11	290699	6278057
12	290691	6278075
13	290657	6278075
14	290651	6278093
15	290668	6278111
16	290663	6278117
17	290690	6278144
18	290709	6278170
19	290779	6278122
20	290793	6278109
21	290780	6278095
22	290759	6278109
23	290776	6278091
24	290793	6278075
25	290773	6278062
26	290759	6278074
27	290743	6278075
28	290729	6278059
29	290728	6278051
30	290726	6278044
31	290752	6278057
32	290757	6278044
33	290772	6278043
34	290785	6278045
35	290781	6278059
36	290776	6278053
37	290710	6278019
38	290710	6278026
39	290674	6278057
40	290657	6278058
41	290607	6278021
42	290608	6278005
43	290623	6278008
44	290625	6278003
45	290640	6278005
C26	290648	6278077

C27	290649	6278028
C34	290672	6278103
C41	290696	6278128
C47	290720	6278154
C60	290771	6278105



Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: Woolacotts Consulting Engineers Pty Ltd	TITLE: Remediation Area Coordinates (refer to separate spreadsheet in Appendix) Centre of Excellence in Agricultural Education (CoE) Vines Drive, Richmond	PROJ. #: 85644.06
	OFFICE: Macarthur / DRAWN BY: EME		DRAWING No: 3
	SCALE: As shown / DATE: 30/09/2021		REVISION: 0

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Appendix B

Proposed Development

NSW GOVERNMENT EDUCATION

NBRSARCHITECTURE.

RICHARD CROOKES CONSTRUCTIONS

Issue

No.	Date	Description	Chkd
7	26/02/2021	CONCEPT DESIGN	SJF
8	14/01/2021	PRELIMINARY	
9	25/01/2021	PRELIMINARY	
10	04/03/2021	CONCEPT DESIGN	SJF
11	23/03/2021	DRAFT SCHEMATIC	SJF
12	30/03/2021	DESIGN FREEZE	SJF
13	09/04/2021	DRAFT EIS SCHEMATIC	SJF
14	05/05/2021	SCHEMATIC DESIGN	SJF

Architect
NBRSARCHITECTURE.

Sydney
61 2 9922 2344 nbrsarchitecture.com

Nominated Architect:
Andrew Duffin NSW 5602
NBRS & Partners Pty Ltd VIC 51197

ABN 16 002 247 565

Project

Centre of Excellence in Agricultural Education

at

HAWKESBURY

for

DEPARTMENT OF EDUCATION

Drawing Title

Proposed Site Plan

PRELIMINARY

Date 5/05/2021 4:18:42 PM

Scale As indicated @ A1

Drawing Reference

20417-NBRS-A-SD-0102

Revision

14

0 10 20 30 40 50 60 70 80 90 100

Appendix C

Summary Tables

Table 1- Summary of Bulk Soil Sampling and Analytical Results

Sample Number	Weight of 10 Litre Bulk Sample (kg)	Number of fragments > 7mm	Condition of Fragments (good/poor)	Size range of Fragment (mm)	Weight of Screened ACM (g)	Concentration of asbestos in ACM in soil (% w/w)*	ACM >7mm (g) Estimation in Laboratory	ACM >7mm (% w/w) Estimation in Laboratory	Weight of 500mL Sample (g)	Weight of AF or FA (g)**	Concentration of FA and AF in soil (% w/w)
HSL A for Asbestos in soil	-	-	-	-	-	0.010			-	-	0.001
HSL C for Asbestos in soil	-	-	-	-	-	0.020			-	-	0.001
TP1/0-0.3	15.0	3	Good	34-104	78.8	**0.079**	-	<0.01	859.67	–	<0.001
TP2/0-1.0	18.6	3	Good	56-120	74.4	**0.060**	-	<0.01	763.35	0.0679	**0.0089**
TP2/1-1.3	16.7	6	Good	39-106	156.5	**0.141**	-	<0.01	784.56	0.0931	**0.0119**
TP3/0-0.4	20.5	0	-	-	-	-	-	<0.01	800.39	–	<0.001
TP4/0-0.3	14.1	0	-	-	-	-	-	<0.01	641.94	0.0218	**0.0034**
TP5/0-0.4	16.3	3	Good	41-139	164.7	**0.152**	-	<0.01	838.58	–	<0.001
TP6/0-0.25	12.8	0	-	-	-	-	-	<0.01	874.63	–	<0.001
TP7/0-0.3	16.4	0	-	-	-	-	-	<0.01	873.77	–	<0.001
TP8/0-0.28	11.9	0	-	-	-	-	-	<0.01	870.97	–	<0.001
TP9/0-0.2	13.9	0	-	-	-	-	-	<0.01	877.21	–	<0.001
TP10/0-0.2	10.7	0	-	-	-	-	-	<0.01	786.88	–	<0.001
TP11/0-0.2	14.8	1	Good	83	29.4	**0.030**	-	<0.01	912.1	–	<0.001
TP12/0-1.0	15.0	4	Good	47-76	60.1	**0.060**	-	<0.01	783.18	0.0028	<0.001
TP12/1-1.2	12.2	11	Good	30-112	184.6	**0.227**	0.7734	**0.0948**	816.09	-	<0.001
TP13/0-0.2	18.1	0	-	-	-	-	-	<0.01	809.39	-	<0.001
TP14/0-0.27	15.5	1	Good	107	56.8	**0.055**	-	<0.01	888.45	-	<0.001
TP15/0-0.2	14.0	0	-	-	-	-	-	<0.01	713.08	-	<0.001
TP16/0-0.2	12.2	0	-	-	-	-	-	<0.01	694.98	-	<0.001
TP17/0-0.3	13.7	0	-	-	-	-	-	<0.01	744	-	<0.001
TP18/0-0.17	11.9	0	-	-	-	-	-	<0.01	818.38	-	<0.001
TP19/0-0.25	13.9	2	Good	66-70	26.9	**0.029**	-	<0.01	721.92	-	<0.001
TP20/0-0.3	12.1	0	-	-	-	-	-	<0.01	814.17	-	<0.001
TP21/0-0.6	10.8	0	-	-	-	-	-	<0.01	836.17	-	<0.001
TP21(A)/0-0.25	12.6	0	-	-	-	-	-	<0.01	891.62	-	<0.001
TP22/0-0.4	11.6	0	-	-	-	-	-	<0.01	783.49	-	<0.001
TP23/0-0.33	11.9	0	-	-	-	-	-	<0.01	762.83	-	<0.001
TP24/0-0.55	13.9	0	-	-	-	-	-	<0.01	718.31	-	<0.001

HSL A for Asbestos in soil	Table 7 of Schedule B(1), NEPC (2013) for residential use
HSL C for Asbestos in soil	Table 7 of Schedule B(1), NEPC (2013) for Recreational use
*	Based on % w/w asbestos in soil assuming 15% asbestos in ACM
**	Based on the weight of asbestos in FA and AF as calculated by Envirolab. Values exclude calculated weight of bonded ACM greater than > 7mm in samples
-	Not applicable as no asbestos was detected
Bold	Concentration exceeds SAC

Table 1- Summary of Bulk Soil Sampling and Analytical Results

Sample Number	Weight of 10 Litre Bulk Sample (kg)	Number of fragments > 7mm	Condition of Fragments (good/poor)	Size range of Fragment (mm)	Weight of Screened ACM (g)	Concentration of asbestos in ACM in soil (% w/w)*	ACM >7mm (g) Estimation in Laboratory	ACM >7mm (% w/w) Estimation in Laboratory	Weight of 500mL Sample (g)	Weight of AF or FA (g)**	Concentration of FA and AF in soil (% w/w)
HSL A for Asbestos in soil	-	-	-	-	-	0.010			-	-	0.001
HSL C for Asbestos in soil	-	-	-	-	-	0.020			-	-	0.001
TP25/0-0.21	13.4	0	-	-	-	-	-	<0.01	791.57	-	<0.001
TP26/0-0.17	11.0	0	-	-	-	-	-	<0.01	791.1	-	<0.001
TP27/0-0.69	14.3	2	Good	82-146	60	0.063	-	<0.01	751.14	-	<0.001
TP28/0-0.31	14.6	1	Good	67	19.2	0.020	-	<0.01	640.4	-	<0.001
TP28/0.31-0.53	13.8	0	-	-	-	-	-	<0.01	939.99	-	<0.001
TP29/0-0.32	13.3	0	-	-	-	-	-	<0.01	752.67	-	<0.001
TP30/0-0.3	15.4	0	-	-	-	-	-	<0.01	788.88	-	<0.001
TP31/0-0.42	13.7	0	-	-	-	-	-	<0.01	841.93	-	<0.001
TP32/0-0.4	13.6	0	-	-	-	-	-	<0.01	729.23	-	<0.001
TP33/0-0.27	11.9	0	-	-	-	-	-	<0.01	756.85	-	<0.001
TP34/0-1.0	14.1	5	Good	140-220	634.3	0.675	-	<0.01	870.51	-	<0.001
TP35/0-0.18	13.8	0	-	-	-	-	-	<0.01	851.51	-	<0.001
TP35(A)/0-0.1	10.3	0	-	-	-	-	-	<0.01	854.81	-	<0.001
TP35(B)/0-0.17	10.6	0	-	-	-	-	-	<0.01	660.25	-	<0.001
TP35(c)/0-0.7	14.3	0	-	-	-	-	-	<0.01	818.56	-	<0.001
TP36/0-0.21	10.2	0	-	-	-	-	-	<0.01	792.5	-	<0.001
TP37/0-0.39	11.1	0	-	-	-	-	-	<0.01	848.85	-	<0.001
TP38/0-1.0	17.8	0	-	-	-	-	-	<0.01	857.45	-	<0.001
TP38/1.0-2.0	11.6	10	Good	48-146	320.8	0.415	-	<0.01	828.77	-	<0.001
TP38/2-2.2	12.4	5	Good	18-239	247.6	0.300	-	<0.01	270.37	-	<0.001
TP39/0-0.12	12.0	0	-	-	-	-	-	<0.01	821.91	-	<0.001
TP40/0-0.38	11.3	0	-	-	-	-	-	<0.01	918.95	-	<0.001
TP40(A)/0-0.21	12.6	0	-	-	-	-	-	<0.01	876.45	-	<0.001
TP40(B)/0-0.4	12.8	0	-	-	-	-	0.8434	0.102	827.21	-	<0.001
TP41/0-0.28	11.5	1	Good	87	43.9	0.057	-	<0.01	772.63	-	<0.001
TP42/0-0.42	12.9	0	-	-	-	-	-	<0.01	817.48	-	<0.001
TP42(A)/0-1.0	11.2	0	-	-	-	-	-	<0.01	808.73	-	<0.001

HSL A for Asbestos in soil	Table 7 of Schedule B(1), NEPC (2013) for residential use
HSL C for Asbestos in soil	Table 7 of Schedule B(1), NEPC (2013) for Recreational use
*	Based on % w/w asbestos in soil assuming 15% asbestos in ACM
**	Based on the weight of asbestos in FA and AF as calculated by Envirolab. Values exclude calculated weight of bonded ACM greater than > 7mm in samples
-	Not applicable as no asbestos was detected
Bold	Concentration exceeds SAC

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HSL A for Asbestos in soil	-	-	-	-	-	0.010			-	-	0.001
HSL C for Asbestos in soil	-	-	-	-	-	0.020			-	-	0.001
TP42(B)/0-0.69	14.2	0	-	-	-	-	-	<0.01	916.3	-	<0.001
TP42(C)/0-0.3	12.6	0	-	-	-	-	-	<0.01	901.36	-	<0.001
TP43/0-0.3	12.4	0	-	-	-	-	-	<0.01	944.82	-	<0.001
TP44/0-0.2	10.3	0	-	-	-	-	-	<0.01	712.54	-	<0.001
TP45/0-0.27	11.4	0	-	-	-	-	-	<0.01	761.29	-	<0.001
TP46/0-0.2	12.8	0	-	-	-	-	-	<0.01	805.54	-	<0.001
TP47/0-0.57	14.8	2	Good	46-92	40.1	0.041	-	<0.01	702.48	-	<0.001
TP48/0-0.56	12.1	5	Good	45-160	226.9	0.281	-	<0.01	800.26	-	<0.001
TP48(A)/0-0.72	12.1	1	Good	70	13.5	0.017	-	<0.01	803.49	-	<0.001
TP49/0-0.52	14.1	0	-	-	-	-	-	<0.01	921.42	-	<0.001
TP50/0-0.98	12.7	9	Good	44-266	496.6	0.587	-	<0.01	948.46	-	<0.001
TP50(A)/0-0.9	14.0	7	Good	27-160	131	0.140	0.6013	0.0787	763.91	-	<0.001
TP50(B)/0-0.72	12.1	15	Good	34-114	200.6	0.249	4.324	0.5553	778.65	-	<0.001
TP50(C)/0-0.98	13.1	0	-	-	-	-	-	<0.01	833.17	-	<0.001
TP55/0-0.8	11.2	0	-	-	-	-	-	<0.01	883.47	-	<0.001

HSL A for Asbestos in soil	Table 7 of Schedule B(1), NEPC (2013) for residential use
HSL C for Asbestos in soil	Table 7 of Schedule B(1), NEPC (2013) for Recreational use
*	Based on % w/w asbestos in soil assuming 15% asbestos in ACM
**	Based on the weight of asbestos in FA and AF as calculated by Envirolab. Values exclude calculated weight of bonded ACM greater than > 7mm in samples
-	Not applicable as no asbestos was detected
Bold	Concentration exceeds SAC

Sample	Depth	Strata	Date	Metals: Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	TRH: TRH C6 - C10	vTPH C6 - C10 lessBTEX (F1)
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
				4	0.4	1	1	1	0.1	1	1	25	25
HIL/HSL A				100	20	100	6000	300	40	400	7400	-	45
EIL/ESL A				100	-	410	45	1100	-	6	190	-	180
Management Limit				-	-	-	-	-	-	-	-	-	700
Direct Contact				-	-	-	-	-	-	-	-	4400	4400
Canadian CEQGs - Agricultural (HH & Env)				12	1.4	64	63	70	6.6	45	250	-	-
BH3	0.2	Topsoil	27/09/2021	6	<0.4	5	11	80	<0.1	4	61	<25	<25
BH6	0.5	Fill	27/09/2021	<4	<0.4	11	12	44	<0.1	10	44	<25	<25
BH6	1	Fill	27/09/2021	<4	<0.4	12	11	45	0.1	10	200	<25	<25
BH9	0.1	Topsoil	27/09/2021	<4	<0.4	3	2	4	<0.1	2	4	<25	<25
C5	0-0.1	Topsoil / fill	25/01/2018	<4	<0.4	6	<1	4	<0.1	<1	2	<25	<25
C6	0-0.1	Topsoil / fill	29/01/2018	<4	<0.4	3	<1	5	<0.1	1	3	<25	<25
C10	0-0.1	Topsoil / fill	25/01/2018	<4	<0.4	2	<1	3	<0.1	<1	3	<25	<25
C12	0-0.1	Topsoil / fill	25/01/2018	<4	<0.4	3	4	19	<0.1	1	7	<25	<25
C13	0-0.1	Topsoil / fill	25/01/2018	<4	<0.4	3	<1	4	<0.1	1	2	<25	<25
C15	0-0.1	Topsoil / fill	25/01/2018	<4	<0.4	2	<1	3	<0.1	<1	2	<25	<25
C17	0-0.1	Topsoil / fill	18/01/2018	<4	<0.4	8	17	170	0.2	5	400	<25	<25
C20	0-0.1	Topsoil / fill	23/01/2018	<4	<0.4	2	<1	3	<0.1	<1	3	<25	<25
C22	0-0.1	Topsoil / fill	25/01/2018	<4	<0.4	3	<1	3	<0.1	<1	3	<25	<25
C25	0-0.1	Topsoil / fill	25/01/2018	<4	<0.4	2	<1	4	<0.1	<1	4	<25	<25
C26	0-0.1	Topsoil / fill	29/01/2018	<4	<0.4	5	11	98	<0.1	4	110	<25	<25
C26	0.4-0.5	Topsoil / fill	29/01/2018	4	0.9	12	63	410	0.8	8	530	<25	<25
C27	0.9-1.0	Topsoil / fill	18/01/2018	28	2	33	290	1700	<0.1	29	2400	<25	<25
C27	1.9-2	Topsoil / fill	18/01/2018	20	3	25	380	1000	<0.1	24	3700	<25	<25
C29	0-0.1	Topsoil / fill	23/01/2018	<4	<0.4	2	<1	3	<0.1	<1	2	<25	<25
C32	0-0.1	Topsoil / fill	25/01/2018	<4	<0.4	2	<1	3	<0.1	1	2	<25	<25
C34	0-0.1	Topsoil / fill	24/01/2018	<4	<0.4	4	15	110	0.1	3	86	<25	<25
C35	0-0.1	Topsoil / fill	29/01/2018	<4	<0.4	4	22	320	0.2	2	150	<25	<25
C38	0-0.1	Topsoil / fill	23/01/2018	<4	<0.4	3	<1	4	<0.1	1	3	<25	<25
C40	0-0.1	Topsoil / fill	25/01/2018	<4	<0.4	2	<1	9	<0.1	<1	3	<25	<25
C41	0-0.1	Topsoil / fill	24/01/2018	<4	0.6	8	49	510	6.3	5	290	<25	<25
C43	0-0.1	Topsoil / fill	18/01/2018	<4	<0.4	4	7	100	<0.1	3	75	<25	<25
C44	0-0.1	Topsoil / fill	23/01/2018	<4	<0.4	3	<1	3	<0.1	1	2	<25	<25
C46	0-0.1	Topsoil / fill	25/01/2018	<4	<0.4	2	<1	5	<0.1	<1	3	<25	<25
C47	0.4-0.5	Topsoil / fill	22/01/2018	12	1	28	82	590	0.7	14	730	<25	<25
C48	0-0.1	Topsoil / fill	24/01/2018	<4	<0.4	5	18	43	<0.1	3	160	<25	<25
C51	0.0-0.5	Topsoil / fill	23/01/2018	<4	<0.4	2	<1	3	<0.1	<1	3	<25	<25
C54	0-0.1	Topsoil / fill	22/01/2018	<4	<0.4	2	3	38	<0.1	1	30	<25	<25
C55	0-0.1	Topsoil / fill	22/01/2018	<4	<0.4	3	2	36	<0.1	1	23	<25	<25
C56	0-0.1	Topsoil / fill	18/01/2018	<4	<0.4	3	1	13	1.4	5	12	<25	<25
C58	0-0.1	Topsoil / fill	23/01/2018	<4	<0.4	2	<1	2	<0.1	2	2	<25	<25
C59	0-0.1	Topsoil / fill	22/01/2018	<4	<0.4	2	3	81	<0.1	1	14	<25	<25
C60	0-0.1	Topsoil / fill	22/01/2018	5	3	11	26	230	0.5	7	880	<25	<25
C64	0-0.1	Topsoil / fill	23/01/2018	<4	<0.4	4	2	7	<0.1	3	20	<25	<25
C65	0-0.1	Topsoil / fill	22/01/2018	<4	<0.4	2	<1	6	<0.1	1	4	<25	<25
C66	0.4-0.5	Topsoil / fill	22/01/2018	<4	<0.4	2	<1	3	<0.1	1	3	<25	<25
C68	0-0.1	Topsoil / fill	23/01/2018	<4	<0.4	4	2	6	<0.1	3	19	<25	<25
C69	0-0.1	Topsoil / fill	23/01/2018	<4	<0.4	7	2	6	<0.1	2	11	<25	<25
C71	0-0.1	Topsoil / fill	17/01/2018	<4	<0.4	3	<1	4	<0.1	1	3	<25	<25
C73	0-0.1	Topsoil / fill	23/01/2018	<4	<0.4	4	3	8	<0.1	2	18	<25	<25
C74	0-0.1	Topsoil / fill	23/01/2018	<4	<0.4	3	2	7	<0.1	2	17	<25	<25
C78	0.2-0.3	Topsoil / fill	23/01/2018	<4	<0.4	3	1	3	<0.1	2	4	<25	<25
C79	0-0.1	Topsoil / fill	17/01/2018	<4	<0.4	4	<1	5	<0.1	2	5	<25	<25
C80	0-0.1	Topsoil / fill	17/01/2018	<4	<0.4	2	<1	4	<0.1	2	2	<25	<25
C83	0.4-0.5	Topsoil / fill	17/01/2018	<4	<0.4	3	1	11	<0.1	2	5	<25	<25
C84	0-0.1	Topsoil / fill	17/01/2018	<4	<0.4	2	<1	2	<0.1	3	<1	<25	<25
C89	0-0.1	Topsoil / fill	18/01/2018	<4	<0.4	2	<1	5	<0.1	<1	4	<25	<25
C90	0-0.1	Topsoil / fill	17/01/2018	<4	<0.4	2	<1	4	<0.1	<1	3	<25	<25
C95	0-0.1	Topsoil / fill	17/01/2018	<4	<0.4	2	<1	4	<0.1	<1	7	<25	<25
C97	0-0.1	Topsoil / fill	22/01/2018	<4	<0.4	2	<1	3	<0.1	<1	5	<25	<25
C102	0-0.1	Topsoil / fill	18/01/2018	<4	<0.4	2	2	6	<0.1	1	17	<25	<25
C103	0-0.1	Topsoil / fill	17/01/2018	<4	<0.4	2	<1	5	<0.1	<1	4	<25	<25
C105	0-0.1	Topsoil / fill	19/01/2018	<4	<0.4	2	<1	3	<0.1	<1	2	<25	<25
C108	0-0.1	Topsoil / fill	19/01/2018	<4	<0.4	2	2	6	<0.1	2	18	<25	<25
C109	0-0.1	Topsoil / fill	18/01/2018	<4	<0.4	4	3	9	<0.1	3	18	<25	<25
C111	0.4-0.5	Topsoil / fill	22/01/2018	<4	<0.4	1	<1	1	<0.1	3	1	<25	<25
C113	0-0.1	Topsoil / fill	19/01/2018	<4	<0.4	1	<1	3	<0.1	<1	4	<25	<25
C115	0-0.1	Topsoil / fill	19/01/2018	<4	<0.4	2	3	21	<0.1	2	18	<25	<25
C118	0-0.1	Topsoil / fill	22/01/2018	<4	<0.4	1	<1	3	<0.1	<1	4	<25	<25
C119	0-0.1	Topsoil / fill	19/01/2018	<4	<0.4	2	2	7	<0.1	1	6	<25	<25
C121	0-0.1	Topsoil / fill	19/01/2018	<4	<0.4	1	1	12	<0.1	<1	5	<25	<25
C122	0.1-0.2	Topsoil / fill	19/01/2018	<4	<0.4	5	27	100	<0.1	15	45	<25	<25
C126	0-0.1	Topsoil / fill	19/01/2018	<4	<0.4	2	<1	4	<0.1	1	3	<25	<25
C127	0-0.1	Topsoil / fill	17/01/2018	<4	<0.4	1	<1	4	<0.1	<1	3	<25	<25
C129	0-0.1	Topsoil / fill	17/01/2018	<4	<0.4	1	<1	8	<0.1	<1	3	<25	<25
Stockpile 1	-	Topsoil / fill	23/01/2018	<4	<0.4	9	5	14	<0.1	4	14	<25	<25
Stockpile 2	-	Topsoil / fill	23/01/2018	<4	<0.4	6	7	6	<0.1	5	24	<25	<25
BH5	0.5	Silty Sand	28/09/2021	<4	<0.4	9	16	130	0.7	6	190	<25	<25
C2	0.4-0.5	Natural	29/01/2018	<4	<0.4	3	<1	2	<0.1	1	1	<25	<25
C4	0.4-0.5	Natural	29/01/2018	<4	<0.4	4	<1	2	<0.1	<1	<1	<25	<25
C7	0.4-0.5	Natural	29/01/2018	<4	<0.4	2	<1	2	<0.1	1	<1	<25	<25
C8	0.4-0.5	Natural	18/01/2018	<4	<0.4	12	16	25	<0.1	4	23	<25	<25
C11	0.4-0.5	Natural	25/01/2018	<4	<0.4	3	<1	1	<0.1	2	<1	<25	<25
C14	0.4-0.5	Natural	23/01/2018	<4	<0.4	3	<1	1	<0.1	2	<1	<25	<25
C19	0.4-0.5	Natural	23/01/2018	<4	<0.4	3	<1	2	<0.1	4	2	<25	<25
C21	0.4-0.5	Natural	23/01/2018	<4	<0.4	4	<1	1	<0.1	1	<1	<25	<25
C23	0.1-0.2	Natural	25/01/2018	<4	<0.4	9	4	5	<0.1	3	4	<25	<25
C31	0.4-0.5	Natural	25/01/2018	<4	<0.4	3	<1	2	<0.1	2	2	<25	<25
C33	0.4-0.5	Natural	25/01/2018	<4	<0.4	3	<1	2	<0.1	2	<1	<25	<25
C39	0.4-0.5	Natural	25/01/2018	<4	<0.4	2	<1	2	<0.1	<1	2	<25	<25
C45	0.4-0.5	Natural	25/01/2018	<4	<0.4	3	<1	2	<0.1	2	1	<25	<25
C49	0.4-0.5	Natural	22/01/2018	<4	<0.4	3	<1	5	<0.1	3	7	<25	<25
C52	0.4-0.5	Natural	25/01/2018	<4	<0.4	3	<1	2	<0.1	2	2	<25	<25
C53	0.4-0.5	Natural	22/01/2018	<4	<0.4	4	<1	2	<0.1	1	3	<25	<25
C57	0.4-0.5	Natural	23/01/2018	<4	<0.4	3	1	4	<0.1	2	6	<25	<25
C61	0.4-0.5	Natural	18/01/2018	<4	<0.4	3	1	4	<0.1	2	6	<25	<25
C63	0.3-0.4	Natural	23/01/2018	<4	<0.4	12	3	8	<0.1	3	16	<25	<25
C70	0.4-0.5	Natural	23/01/2018	<4	<0.4	2	<1	2	<0.1	2	1	<25	<25
C75	0.4-0.5	Natural	17/01/2018	<4	<0.4	3	<1	2	<0.1	1	1	<25	<25
C76	0.4-0.5	Natural	17/01/2018	<4	<0.4	4	<1	3	<0.1	1	2	<25	<25
C88	0.4-0.5	Natural	17/01/2018	<4	<0.4	4	<1	2	<0.1	2	<1	<25	<25
C101	0.4-0.5	Natural	18/01/2018	<4	<0.4	4	<1	3	<0.1	1	7	<25	<25
C110	0.4-0.5	Natural	18/01/2018	<4	<0.4	2	<1	3	<0.1	3	3	<25	<25
C116	0.9-1.0	Natural	18/01/2018	<4	<0.4	3	3	4	<0.1	4	4	<25	<25
C117	0.4-0.5	Natural	19/01/2018	<4	<0.4	2	<1	3	<0.1	2	7	<25	<25
C120	0.4-0.5	Natural	19/01/2018	<4	<0.4	2	<1	2	<0.1	4	<1	<25	<25
C123	0.9-1.0	Natural	19/01/2018	<4	<0.4	3	1	5	<0.1	3	4	<25	<25
C125	0.4-0.5	Natural	19/01/2018	<4	<0.4	2	1	3	<0.1	3	4	<25	<25

Sample	Depth	TRH: TRH C10 - C14	TRH C15 - C28	TRH C29 - C36	TRH >C10-C16	TRH >C10 - C16less Naphthalene (F2)	TRH >C16-C34	TRH >C34-C40	Total +ve TRH (>C10-C40)	BTEX: Benzene	Toluene	Ethylbenzene	m+p-xylene	o-Xylene	naphthalene	Total +ve Xylenes
		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
		50	100	100	50	50	100	100	50	0.2	0.5	1	2	1	1	1
HIL/HSL A					-	110	-	-		0.5	160	55				40
EIL/ESL A					120	-	300	2800		50	85	70				105
Management Limit					-	1000	2500	10000		-	-	-	-	-	-	-
Direct Contact					3300	-	4500	6300		100	14000	4500				-
Canadian CEQGs - Agricultural (HH & Env)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BH3	0.2	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
BH6	0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
BH6	1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
BH9	0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C5	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C6	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C10	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C12	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C13	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C15	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C17	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C20	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C22	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C25	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C26	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C26	0.4-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C27	0.9-1.0				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C27	1.9-2				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C29	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C32	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C34	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C35	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C38	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C40	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C41	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C43	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C44	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C46	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C47	0.4-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C48	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C51	0.0-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C54	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C55	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C56	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C58	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C59	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C60	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C64	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C65	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C66	0.4-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C68	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C69	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C71	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C73	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C74	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C78	0.2-0.3	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C79	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C80	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C83	0.4-0.5				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C84	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C89	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C90	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C95	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C97	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C102	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C103	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C105	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C108	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C109	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C111	0.4-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C113	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C115	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C118	0-0.1	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C119	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C121	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C122	0.1-0.2				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C126	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C127	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C129	0-0.1				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
Stockpile 1	-	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
Stockpile 2	-	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
BH5	0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C2	0.4-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C4	0.4-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C7	0.4-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C8	0.4-0.5				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C11	0.4-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C14	0.4-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C19	0.4-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C21	0.4-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C23	0.1-0.2	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C31	0.4-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C33	0.4-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C39	0.4-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C45	0.4-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C49	0.4-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C52	0.4-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C53	0.4-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C57	0.4-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C61	0.4-0.5				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C63	0.3-0.4	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C70	0.4-0.5	<50	<100	<100	<50	<50	<100	<100	<50	<0.2	<0.5	<1	<2	<1	<1	<1
C75	0.4-0.5				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C76	0.4-0.5				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C88	0.4-0.5				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C101	0.4-0.5				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C110	0.4-0.5				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C116	0.9-1.0				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C117	0.4-0.5				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C120	0.4-0.5				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C123	0.9-1.0				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1
C125	0.4-0.5				-	-	-	-		<0.2	<0.5	<1	<2	<1	<1	<1

Sample	Depth	PAHs: Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b,j+k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenzo(a,h)anthracene	Benzo(g,h,i)perylene	Total +vePAH's	Benzo(a)pyrene TEQ calc (zero)	Benzo(a)pyrene TEQ calc(half)	Benzo(a)pyrene TEQ calc(PQL)
		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
		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.05	0.1	0.1	0.1	0.05	0.5	0.5	0.5
HIL/HSL A		3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	3	3
EIL/ESL A		170	-	-	-	-	-	-	-	-	-	-	0.7	-	-	-	-	-	-	-
Management Limit		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Direct Contact		1400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Canadian CEQGs - Agricultural (HH & Env)		8.8	-	-	-	43	2.5	50	0.1	0.1	-	0.2	20	0.1	0.1	-	-	-	-	5.3
BH3	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
BH6	0.5	0.1	0.4	0.4	0.3	5.7	1.1	12	11	3.7	3.8	7.8	5.8	4.8	0.7	5.4	63	8.2	8.2	8.2
BH6	1	<0.1	0.4	0.4	0.1	3	0.7	8.7	9	2.7	2.8	6.6	5.3	4	0.6	4.4	48	7.3	7.3	7.3
BH9	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C5	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C6	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C10	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C12	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C13	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C15	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C17	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C20	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C22	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C25	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C26	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.2	<0.1	0.1	<0.2	0.08	<0.1	<0.1	<0.1	0.56	<0.5	<0.5	<0.5
C26	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.2	<0.1	<0.1	<0.2	0.07	<0.1	<0.1	<0.1	0.4	<0.5	<0.5	<0.5
C27	0.9-1.0	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	0.5	0.5	0.2	0.2	0.4	0.2	0.1	<0.1	0.2	2.5	<0.5	<0.5	<0.5
C27	1.9-2	<0.1	<0.1	<0.1	<0.1	0.8	0.2	1.4	1.4	0.6	0.6	1	0.6	0.3	<0.1	0.4	7.5	0.9	0.9	0.9
C29	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C32	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C34	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C35	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C38	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C40	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C41	0-0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.4	0.4	<0.1	0.1	0.2	0.1	<0.1	<0.1	0.1	1.5	<0.5	<0.5	<0.5
C43	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.2	<0.1	<0.1	<0.2	0.05	<0.1	<0.1	<0.1	0.4	<0.5	<0.5	<0.5
C44	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C46	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C47	0.4-0.5	<0.1	0.1	<0.1	<0.1	1	0.2	2	1.9	0.5	0.8	1	0.89	0.6	<0.1	0.6	10	1.2	1.2	1.2
C48	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C51	0.0-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C54	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C55	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.7	0.9	0.3	0.5	1	0.61	0.5	<0.1	0.5	4.9	0.8	0.8	0.8
C56	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C58	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C59	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C60	0-0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.2	0.2	<0.1	0.1	<0.2	0.07	<0.1	<0.1	<0.1	0.71	<0.5	<0.5	<0.5
C64	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C65	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C66	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C68	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C69	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C71	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C73	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C74	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C78	0.2-0.3	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C79	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C80	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C83	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C84	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C89	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C90	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C95	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C97	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C102	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C103	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C105	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C108	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C109	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C111	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C113	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C115	0-0.1	<0.1	0.1	<0.1	<0.1	0.5	0.1	0.8	0.8	0.4	0.4	0.5	0.3	0.1	<0.1	0.2	4.3	<0.5	<0.5	<0.5
C118	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C119	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C121	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C122	0.1-0.2	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	0.2	0.2	<0.1	0.1	<0.2	<0.05	<0.1	<0.1	<0.1	0.64	<0.5	<0.5	<0.5
C126	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C127	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C129	0-0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
Stockpile 1	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
Stockpile 2	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
BH5	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C2	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C4	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C7	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C8	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C11	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C14	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C19	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C21	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C23	0.1-0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C31	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C33	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C39	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C45	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C49	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C52	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C53	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C57	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C61	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C63	0.3-0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C70	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C75	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C76	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C88	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C101	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C110	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C116	0.9-1.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C117	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C120	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C123	0.9-1.0	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5
C125	0.4-0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.05	<0.1	<0.1	<0.1	<0.05	<0.5	<0.5	<0.5

NAD: No asbestos detected

				Phenols																	OCP & OPP																		PCBs			pH and CEC					Asbestos	
Sample	Depth	Strata	Date	Total Phenolics (as Phenol)	HCB	alpha-BHC	gamma-BHC	beta-BHC	Heptachlor	delta-BHC	Aldrin	Heptachlor Epoxide	gamma-Chlordane	alpha-chlordane	Endosulfan I	pp-DDE	Dieldrin	Aldrin + Dieldrin	Endrin	pp-DDD	Endosulfan II	pp-DDT	Endrin Aldehyde	Endosulfan Sulphate	Methoxychlor	Total +ve DDT+DDD+DDE	Azinphos-methyl (Guthion)	Bromophos-ethyl	Chlorpyriphos	Chlorpyriphos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Parathion	Ronnel	Total +ve PCBs (1016-1260)	pH1:5 soil:water	Exchangeable Ca	Exchangeable K	Exchangeable Mg	Exchangeable Na	Cation Exchange Capacity	Sample mass tested	Asbestos ID in soil	Trace Analysis
				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	mg/kg	pH Units	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	g	-	-
				5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		0.1	0.1	0.1	0.1	1			
HIL/HSL A				100	10				6				50	50	270	-	-	6	10	-	270	-		270	300	240													1	-	-	-	-	-	-	-	-	-
EIL/ESL A				-	-				-				-	-	-	-	-	-	-	-	-	180		-	-	180													-	-	-	-	-	-	-	-	-	-
Management Limit				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-													-	-	-	-	-	-	-	-	-	-
Direct Contact				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-													-	-	-	-	-	-	-	-	-	-
Canadian CEQGs - Agricultural (HH & Env)				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	6 to 8	-	-	-	-	-	-	-	-
BH3	0.2	Topsoil	27/09/2021	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 30g	NAD	NAD
BH6	0.5	Fill	27/09/2021	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 45g	NAD	NAD
BH6	1	Fill	27/09/2021	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 45g	NAD	NAD
BH9	0.1	Topsoil	27/09/2021	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 45g	NAD	NAD
C5	0-0.1	Topsoil / fill	25/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C6	0-0.1	Topsoil / fill	29/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 50g	NAD	NAD
C10	0-0.1	Topsoil / fill	25/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C12	0-0.1	Topsoil / fill	25/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C13	0-0.1	Topsoil / fill	25/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C15	0-0.1	Topsoil / fill	25/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C17	0-0.1	Topsoil / fill	18/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 35g	NAD	NAD
C20	0-0.1	Topsoil / fill	23/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C22	0-0.1	Topsoil / fill	25/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C25	0-0.1	Topsoil / fill	25/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C26	0-0.1	Topsoil / fill	29/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 40g	NAD	NAD
C26	0.4-0.5	Topsoil / fill	29/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 45g	NAD	NAD
C27	0.9-1.0	Topsoil / fill	18/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**2**	**0.2**	**0.2**	<0.1	**1**	<0.1	**0.4**	<0.1	<0.1	<0.1	**3.4**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 30g	NAD	NAD
C27	1.9-2	Topsoil / fill	18/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**1**	<0.1	<0.2	<0.1	**0.3**	<0.1	**0.3**	<0.1	<0.1	**0.2**	**1.6**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 30g	NAD	NAD
C29	0-0.1	Topsoil / fill	23/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C32	0-0.1	Topsoil / fill	25/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C34	0-0.1	Topsoil / fill	24/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C35	0-0.1	Topsoil / fill	29/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 40g	NAD	NAD
C38	0-0.1	Topsoil / fill	23/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C40	0-0.1	Topsoil / fill	25/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C41	0-0.1	Topsoil / fill	24/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C43	0-0.1	Topsoil / fill	18/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 55g	NAD	NAD
C44	0-0.1	Topsoil / fill	23/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C46	0-0.1	Topsoil / fill	25/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C47	0.4-0.5	Topsoil / fill	22/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.1**	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.3	**0.1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**7.4**	**14**	**0.2**	**0.65**	<0.1	**15**	-	-	-
C48	0-0.1	Topsoil / fill	24/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C51	0.0-0.5	Topsoil / fill	23/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C54	0-0.1	Topsoil / fill	22/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C55	0-0.1	Topsoil / fill	22/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C56	0-0.1	Topsoil / fill	18/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 40g	NAD	NAD
C58	0-0.1	Topsoil / fill	23/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C59	0-0.1	Topsoil / fill	22/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**6.4**	**0.8**	**0.1**	**0.22**	<0.1	**1.1**	-	-	-
C60	0-0.1	Topsoil / fill	22/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C64	0-0.1	Topsoil / fill	23/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C65	0-0.1	Topsoil / fill	22/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C66	0.4-0.5	Topsoil / fill	22/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C68	0-0.1	Topsoil / fill	23/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C69	0-0.1	Topsoil / fill	23/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C71	0-0.1	Topsoil / fill	17/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 45g	NAD	NAD
C73	0-0.1	Topsoil / fill	23/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C74	0-0.1	Topsoil / fill	23/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C78	0.2-0.3	Topsoil / fill	23/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C79	0-0.1	Topsoil / fill	17/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 30g	NAD	NAD
C80	0-0.1	Topsoil / fill	17/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 30g	NAD	NAD
C83	0.4-0.5	Topsoil / fill	17/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 40g	NAD	NAD
C84	0-0.1	Topsoil / fill	17/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 35g	NAD	NAD
C89	0-0.1	Topsoil / fill	18/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 40g	NAD	NAD
C90	0-0.1	Topsoil / fill	17/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 45g	NAD	NAD
C95	0-0.1	Topsoil / fill	17/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 35g	NAD	NAD
C97	0-0.1	Topsoil / fill	22/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C102	0-0.1	Topsoil / fill	18/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 50g	NAD	NAD
C103	0-0.1	Topsoil / fill	17/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 20g	NAD	NAD
C105	0-0.1	Topsoil / fill	19/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 50g	NAD	NAD
C108	0-0.1	Topsoil / fill	19/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 45g	NAD	NAD
C109	0-0.1	Topsoil / fill	18/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 40g	NAD	NAD
C111	0.4-0.5	Topsoil / fill	22/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C113	0-0.1	Topsoil / fill	19/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 45g	NAD	NAD
C115	0-0.1	Topsoil / fill	19/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**0.1**	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 45g	NAD	NAD
C118	0-0.1	Topsoil / fill	22/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C119	0-0.1	Topsoil / fill	19/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 30g	NAD	NAD
C121	0-0.1	Topsoil / fill	19/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 40g	NAD	NAD
C122	0.1-0.2	Topsoil / fill	19/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 30g	NAD	NAD
C126	0-0.1	Topsoil / fill	19/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 40g	NAD	NAD
C127	0-0.1	Topsoil / fill	17/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 35g	NAD	NAD
C129	0-0.1	Topsoil / fill	17/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 35g	NAD	NAD
Stockpile 1	-	Topsoil / fill	23/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
Stockpile 2	-	Topsoil / fill	23/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
BH5	0.5	Silty Sand	28/09/2021	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 40g	NAD	NAD
C2	0.4-0.5	Natural	29/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 55g	NAD	NAD
C4	0.4-0.5	Natural	29/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 50g	NAD	NAD
C7	0.4-0.5	Natural	29/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 45g	NAD	NAD
C8	0.4-0.5	Natural	18/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 50g	NAD	NAD
C11	0.4-0.5	Natural	25/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C14	0.4-0.5	Natural	23/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C19	0.4-0.5	Natural	23/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C21	0.4-0.5	Natural	23/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C23	0.1-0.2	Natural	25/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C31	0.4-0.5	Natural	25/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**5.4**	**0.1**	<0.1	<0.1	<0.1	<1	-	-	-
C33	0.4-0.5	Natural	25/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C39	0.4-0.5	Natural	25/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C45	0.4-0.5	Natural	25/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C49	0.4-0.5	Natural	22/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C52	0.4-0.5	Natural	25/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C53	0.4-0.5	Natural	22/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C57	0.4-0.5	Natural	23/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C61	0.4-0.5	Natural	18/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 50g	NAD	NAD
C63	0.3-0.4	Natural	23/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C70	0.4-0.5	Natural	23/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	-	-	-
C75	0.4-0.5	Natural	17/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**6.3**	**0.1**	<0.1	<0.1	<0.1	<1	Approx. 60g	NAD	NAD
C76	0.4-0.5	Natural	17/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 30g	NAD	NAD
C88	0.4-0.5	Natural	17/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**6.5**	**0.4**	<0.1	<0.1	<0.1	<1	Approx. 55g	NAD	NAD
C101	0.4-0.5	Natural	18/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 40g	NAD	NAD
C110	0.4-0.5	Natural	18/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 25g	NAD	NAD
C116	0.9-1.0	Natural	18/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 30g	NAD	NAD
C117	0.4-0.5	Natural	19/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 30g	NAD	NAD
C120	0.4-0.5	Natural	19/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 45g	NAD	NAD
C123	0.9-1.0	Natural	19/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**7.3**	**0.8**	**0.2**	**0.2**	<0.1	**1.2**	Approx. 35g	NAD	NAD
C125	0.4-0.5	Natural	19/01/2018	<5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	-	-	-	-	-	Approx. 30g	NAD	NAD

NAD: No asbestos detected

8 APPENDIX C: ECCELL WASTE MANAGEMENT PLAN

CONSTRUCTION WASTE MANAGEMENT PLAN (CWMP)

HAWKESBURY CENTRE OF EXCELLENCE

REVISION NUMBER:

DRAFT

REPORT DATE:

28/04/2021

SUBMITTED TO:

JOE HANNA

RICHARD CROOKES

PRESENTED BY:

JO DRUMMOND

ECCELL ENVIRONMENTAL MANAGEMENT
35 WAVERLY CRST, BONDI JUNCTION 2022
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TABLE OF CONTENTS

DISCLAIMER
This report is based on information provided by Richard Crookes Pty Ltd. To that extent this report relies on the accuracy of the information provided to the consultant This report is not a substitute for legal advice on the relevant environmental related legislation, which applies to businesses, contractors or other bodies. Accordingly, EcCell Environmental will not be liable for any loss or damage that may arise out of this project.

DOCUMENT CONTROL				
ISSUE NUMBER	DATE	COMMENT	AUTHOR	REVIEW
DRAFT 01	23/04/2021	Issue	Simon Lunn	Jo Drummond
DRAFT 02	28/04/2021	2nd Issue	Simon Lunn	Jo Drummond

INTRODUCTION

OVERVIEW

This Construction Waste Management Plan (CWMP) has been prepared by EcCell Environmental on behalf of the School Infrastructure NSW (the Applicant). It accompanies an Environmental Impact Statement (EIS) in support of State Significant Development Application (SSD-15001460) for the Hawkesbury Centre of Excellence (the site).

The purpose of this CWMP is to meet the key waste requirements issues of the Secretary's Environmental Assessment Requirements (SEARs) Section 4.12 (8) of the *Environmental Planning Assessment Act 1979* and will:

a) Identify, quantity and classify waste streams to be generated during construction.
b) Identify appropriate servicing arrangements (including but not limited to, waste management, loading zones, mechanical plant) for the site.
c) To ensure storage and collection of waste is designed and managed having appropriate regard to space, location, amenity and ongoing management of waste management facilities.
d) Describe measures to be implemented to manage, reuse, and recycle and safely dispose of the waste.
e) To maximise reuse and recycling of construction materials and materials from development.
f) To encourage building design techniques in general which minimise waste generation.
g) To minimise the amount of waste being deposited to landfill with targets to reuse or recycle at least 90% of construction and demolition waste as per the EFSG DG02 2.7.1 Construction and demolition waste requirements.
h) Address relevant requirements of the Waste Classification Guidelines (EPA, 2014).

PROJECT DESCRIPTION

This state significant development application seeks approval for construction and operation of a new Centre of Excellence (CoE) in Agricultural Education on Vines Drive, Richmond (Lot 2 DP1051798) (Figure 1) within the Western Sydney University (Hawkesbury Campus) site, Richmond NSW.
The CoE will provide new agricultural / STEM teaching facilities with general learning and administration spaces to be utilised by rural, regional, metropolitan and international school students. The CoE will accommodate up to 325 students and up to 20 full-time employees consisting of farm assistants, administration staff and teachers and up to five itinerant staff members. The CoE will also include short-term on-site accommodation facilities for up to 60 visiting students and teaching professionals from regional and rural NSW.
The CoE will include five science laboratories, ten general learning spaces, practical teaching areas, breakout areas, botany room, administration block and accommodation facilities. It will also include covered outdoor learning areas, dining / recreation hall, canteen and kitchen, agricultural plots, significant landscaping spaces, car parking and provision of necessary infrastructure.

The EIS seeks development consent for the following works:

- Three academic blocks (Block B, C and D).
- Short-term, dormitory site accommodation with capacity for 62 patrons (Block F).

- Dining hall, recreation space and canteen (Block E).
- Administrative building (Block A).
- Support facilities for management and maintenance of site.
- External works to accommodate circulation and covered walkways between buildings.
- Pedestrian walkways.
- Student and staff amenities.
- Covered Outdoor Learning Areas.
- Staff car parking area and mini-bus drop off and pick up area.
- Short-term accommodation car parking area.
- Green House or Glass house
- Various agricultural plots and associated agricultural workshop.
- Provision of waste facility area.
- Installation of all essential services including stormwater management devices where required.
- Operation of the CoE site.

Figure 1 – Approximate Site Location (*Source: Google Maps)*

RESPONSE TO SEARS

The CWMP is required by the Secretary's Environmental Assessment Requirements (SEARs) for SSD. This table identifies the SEARs and relevant reference within this report.

Table 1 - SEARs Requirement & CWMP Page Reference

SEARs Item	Report Reference
Classification of the waste.	Page 7-9 PROJECT PHASE
Estimates / details of the quantity of each classification of waste to be generated during the construction of the project, including bulk earthworks and spoil balance.	Page 7-9 PROJECT PHASE

Handling of waste including measures to facilitate segregation and prevent cross contamination.	Page 4 ROLES AND RESPONSIBILITIES
Management of waste including estimated location and volume of stockpiles.	Page 7-9 PROJECT PHASE
Waste minimisation and reuse.	Page 4 ROLES AND RESPONSIBILITIES
Lawful disposal or recycling locations for each type of waste.	Page 3 SERVICING ARRANGMENTS
Contingencies for the above, including managing unexpected waste volumes.	Page 3 SERVICING ARRANGMENTS

NSW LEGISLATIVE REQUIREMENTS AND GUIDELINES

Relevant key legislation and guidelines applicable to the project include:

- Protection of the Environment Operations Act 1997
- Protection of the Environment (General) Operations Act 1998
- Waste Avoidance and Resource Recovery Act 2014
- Protection of the Environment Operations (Waste) Regulation 2014
- Waste Classification Guidelines (EPA, 2014)
- NSW Department of Planning and Environment, Secretary's Environmental Assessment Requirements (SEARs)

WASTE MANAGEMENT STRATEGIES

SERVICING ARRANGMENTS

The current legislation determines that the generator of waste is the owner of the waste until the waste crosses a calibrated weighbridge into a licensed facility. Waste contractors to demolition and construction contractors are the primary transporters of waste off-site, accordingly, waste contractors will be required to provide verifiable monthly reports on waste reused, reprocessed or recycled (diverted from landfill) or waste sent to landfill. These reports have a direct bearing on the generator's compliance with the relevant regulations.

The CWMP will be implemented on site throughout including singularly or collectively the demolition, construction and fit out phases.

A Waste Data File must be maintained on-site and all entries are to include:

- The classification of the waste
- The time and date of material removed
- A description of and the volume of waste collected
- The location and name of the waste facility that the waste is transferred to
- The vehicle registration and the name of the waste contractor's company

The Waste Data File will be made available for inspection to any authorized officer at any time during the life of the site works. At the conclusion of site works, the designated person will retain all waste documentation and make this validating documentation available for inspection.

Arrangement's will be made with the Waste Contractor to increase bin supply if there is an unexpected increase in waste generation.

CONSTRUCTION WASTE MANAGEMENT EQUIPMENT, BIN SIZES AND COLLECTION FREQUENCY

All waste will be removed by a licensed waste contractor using 15-meter bins on site. The construction and demolition waste will be removed when bins are full and within the construction site hours to reduce disturbance of the neighbours.

ROLES AND RESPONSIBILITIES

The waste management strategy for the project will operate over the design, procurement, and construction including fit out of the project and is detailed in Table 2.

Table 2 - Breakdown of Tasks and Responsibilities

Management Strategies	Responsibilities
Design:	
Use of modular components in design	Architect & Engineer
Use of prefabricated components in design	Architect & Builder
Design for materials to standard sizes	Architect & Subcontractors
Design for operational waste minimisation	Architect & Builder
Consider ways to avoid, reuse and recycle construction wastes	Subcontractors.
Procurement:	
Select recycled and reprocessed materials	Architect, Engineer, Builder & Sub Contractors
Select components that can be reused after deconstruction	Architect, Engineer & Builder
Prioritise suppliers that take back offcuts and unused product.	Sub-Contractors
Encourage contractors and subcontractors that use unneeded offcuts and unused product for use on other jobs	
Ordering the right quantities of materials (Purchasing Policy);	Sub-Contractors
Include prefabrication of materials	
Pre-construction:	
Waste management plan to be reviewed & approved prior to construction.	Builder
Contract a Waste Contractor	Waste Contractor
Construction on-site:	
Use the avoid, reuse, reduce, recycle principles	Builder & Waste Contractor
Minimisation of recurring packaging materials	Sub-contractors
Returning packaging to the supplier	Builder & Sub-contractor
Separation of recycling of materials off site	Waste Contractor
Audit and monitor the correct usage of bins	Builder & Waste Contractor
Audit and monitor the Waste Contractor	Builder
Avoiding construction waste	
Reduce extraneous packaging use reusable padding and careful packing.	
All packaging generated on site should be captured for reuse or recycling wherever possible.	Builder
Reuse formwork;	
Use modular components	
Use reuse non-returnable containers on the job site to the maximum extent possible	

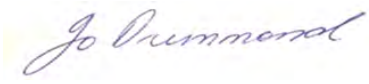
ON SITE WASTE MANAGEMENT REQUIREMENTS

There will be a designated waste storage area for the disposal and storage of construction waste prior to collection. This area will be located conveniently for the construction work team to use the bins as well as for waste contractors to collect. An indicative location has been provided in Appendix A. Other requirements include:

- The routes for movement of waste between work site and waste storage area are to be kept obstruction-free.
- The routes for movement of bins and waste between storage and collection points are marked in the site drawing, and will be kept obstruction-free (if waste is moved between the waste storage area(s).
- The waste bin collection point provided will be accessible for waste collection vehicles. There are no obstructions to turning or reversing, pulling up vehicles and lifting bins.
- Access for waste collection vehicles will not be compromised by construction-related activities vehicles or other consequences of construction staging.
- All waste not being reused on site will be removed during, or at the completion of, the construction stage.
- No waste will be left on site unless it is part of valid reuse on site, which is integral to and in place in the design.
- In order to manage noise levels, collection of waste from the construction site will only occur during hours approved for construction work.
- All vehicles entering or leaving the site must have their loads covered.
- All vehicles, before leaving the site, to be cleaned of dirt, sand and other materials, to avoid tracking these materials onto public roads.
- At the completion of the works, the work site is left clear of waste and debris.

WASTE MANAGEMENT PLAN APPLICATION

PROJECT:
New Centre of Excellence (CoE) in Agricultural Education
ADDRESS:
Vines Drive, Richmond (Lot 2 DP1051798) within the Western Sydney University (Hawkesbury Campus) site, Richmond NSW
OWNERS:
School Infrastructure NSW (SINSW)
DETAILS OF APPLICANT
Department of Education
DESCRIPTION OF BUILDINGS AND OTHER STRUCTURES CURRENTLY ON THE SITE:
This centre is planned to be built on a greenfield site and will be a completely new build.
BRIEF DESCRIPTION OF PROPOSAL:
The project consists of five science laboratories, ten general learning spaces, practical teaching areas, breakout areas, botany room, administration block and accommodation facilities. It will also include covered outdoor learning areas, dining / recreation hall, canteen and kitchen, agricultural plots, significant landscaping spaces, car parking and provision of necessary infrastructure.
IF MATERIALS / WASTE IS REUSED ON SITE OR OFF SITE, HOW WILL IT BE RE-USED:
There is minimal excavation of Excavated Natural Material (ENM), which will be used back on the site for landscaping. This material will be covered to reduce soil displacement and prevent air pollution.

	Name	Signed	Contact Number	Date
Prepared by:	Jo Drummond		0412214233	28/04/2021

PROJECT PHASE

EXCAVATION

Material Type on Site	Estimated Volume (m^3) or Weight (t) (Most Favourable → Least)			ON-SITE TREATMENT	OFF-SITE TREATMENT	
	Reuse	Recycling	Disposal	Proposed reuse and/or recycling collection methods	Disposal / Transport Contractor	Waste Depot, Recycling Outlet or Landfill site
Excavated Natural Material (ENM) Greenfield site		Reused Volume $50m^3$	Nil	Used for site levelling / cut & fill of the site.	N/A	N/A
Sub Total		**$50m^3$**		$50m^3$		
TOTAL	**$50m^3$**					

Narrative: There is minimal excavation of ENM, which will be used back on the site for landscaping. This material will be covered to reduce soil displacement and prevent air pollution.

There may be potential contaminated soils, refer to any contamination reports prior to excavation and re-use of materials on site

CONSTRUCTION

Material Type on Site	Estimated Volume (m^3) or Weight (t) (Most Favourable → Least)			ON-SITE TREATMENT	OFF-SITE TREATMENT	
	Reuse	Recycling	Disposal	Proposed reuse and/or recycling collection methods	Disposal / Transport Contractor	Waste Depot, Recycling Outlet or Landfill site
Concrete Brick Block-work & Tile		168m^3		Co-mingled Bins	TBA	Crushed for road base
Metals		88m^3		Co-mingled Bins	TBA	Scrap Metal Dealer for smelting
Timber off-cuts		180m^3		Co-mingled Bins	TBA	Recycled for chips and mulch
Cardboard		145m^3		Co-mingled Bins	TBA	Recycled into cardboard
Plasterboard		170m^3		Co-mingled Bins	TBA	Recycled as soil conditioner
Plastics, plastic packaging, paint drums*, containers		65m^3	35m^3	Co-mingled Bins	TBA	- Styrene and plastic to landfill * Paint drums nested and recycled
Pallets and Reels	70 units			Separated onsite	TBA	Returned to the supplier
Liquid Waste			22m^3	Separated onsite	TBA	Transferred to licenced landfill
General Waste			160m^3	Co-mingled Bins	TBA	Transferred to licenced landfill
Sub Total	**NB:70 units**	**816m^3**	**217m^3**			
TOTAL	**1033m^3**			**NB: Plus, an additional 70 pallets (single units returned to suppliers for reuse)**		

Narrative:

As the contracts for all contractors have not been let there are still those including the waste contractor to be advised (TBA).

All waste will be co-mingled and taken for off-site separation and reuse or recycling except pallets and reels.

APPENDIX A DEMOLITION AND CONSTRUCTION WASTE PLAN DRAWING

SYDNEY

LEVEL 3, 4 BROADCAST WAY
ARTARMON NSW 2064

PO BOX 1024
CROWS NEST NSW 1585

PHONE: +61 2 9902 4700
FAX: +61 2 9439 1114

NEWCASTLE

LEVEL 1, 118A BELFORD ST
BROADMEADOW NSW 2292

PO BOX 835
HAMILTON NSW 2303

PHONE: +61 2 9902 4700
FAX: +61 2 6766 3022

TAMWORTH

SUITE 1, 493 PEEL ST
TAMWORTH NSW 2340

PO BOX 576
TAMWORTH NSW 2340

PHONE: +61 2 6766 5225
FAX: +61 2 6766 3022

ACT

UNIT 1, 155 NEWCASTLE ST
FYSHWICK ACT 2609

PO BOX 771
FYSHWICK ACT 2609

PHONE: +61 2 6143 2900
FAX: +61 2 6280 8774

richardcrookes.com.au

Delivering Certainty

6.11 CONSTRUCTION SOIL & WATER MANAGEMENT SUB-PLAN

The Construction Soil & Water Management sub-Plan has been prepared Woolacotts Consulting Engineers for the Project.

It is not embedded in this document; it is supplied as an attached appendix so that it can be displayed/updated/revised in isolation if required.

School Infrastructure NSW

Centre of Excellence in Agricultural Education (CoE)

Soil and Water Management Sub-Plan

20-307 | 25 February 2022 | SSDA

Contents

Document control

Rev No	Date	Revision details	Approved	Verified	Prepared
A	21.02.2022	SSDA Submission	JC	JH	JH
B	25.02.2022	Revised for SSDA Submission	JC	JH	JH

1.0 Introduction

The new proposed Centre of Excellence in Agricultural Education (CoE) is to be located within the Western Sydney University site off Vines Drive, Richmond ('The Site'). Londonderry Road is located to the west of The Site and Vines Drive is located to the north-east of The Site. The total lease area is approximately 11.37ha. Refer to Figure 1 below for the site location and extent.

The proposed high school includes a single-story complex of 6 buildings and ancillary structures located mainly over the eastern side of the site.

The purpose of this report is to:

- Assess potential impacts on surface and groundwater, soil, related infrastructure and watercourses.
- Detail measures and procedures to minimise and manage the generation and off-site transmission of sediment, dust and fine particles.

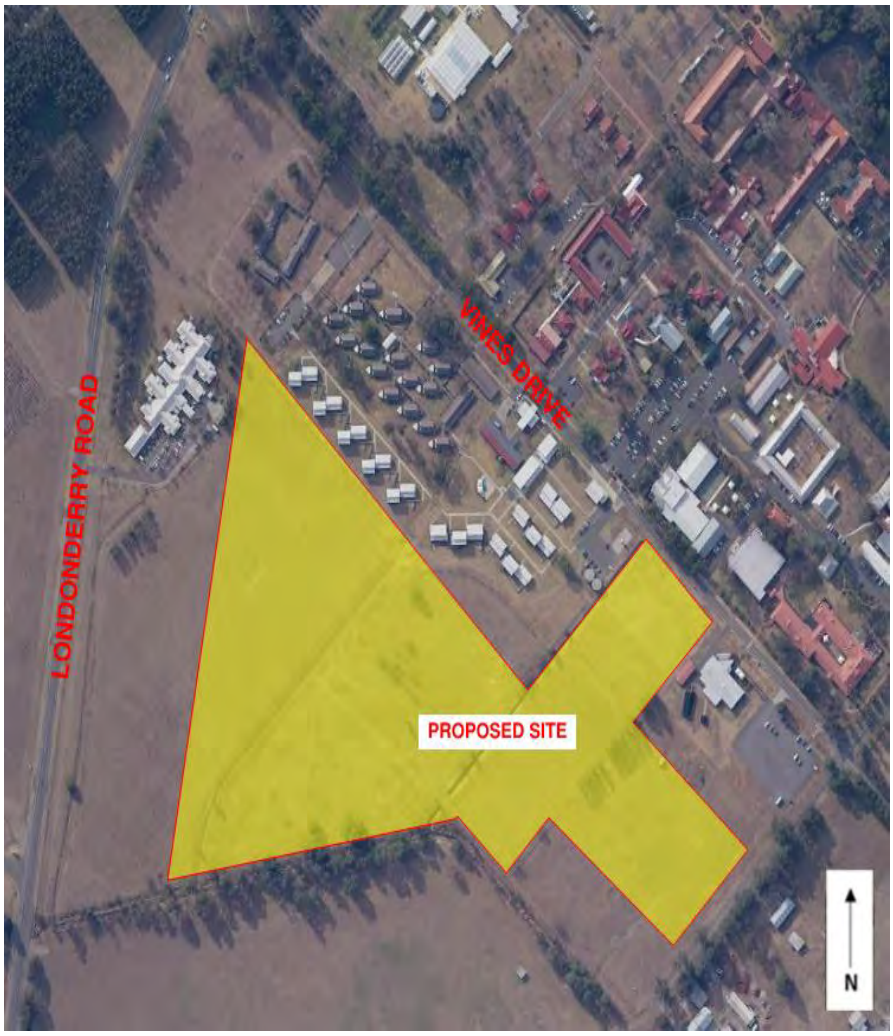


Figure 1 – Site location

The Soil and Water Management Sub-Plan satisfies the SSDA Condition B18 as outlined in Table 1 below.

Table 1 – Condition Satisfaction Table for SSDA Condition B18		
	Status	**Section**
(a) Be prepared by a suitably qualified expert, in consultation with Council;	Satisfied	The Soil and Water Management Sub-Plan has been prepared in accordance with Hawkesbury Development Control Plan – Appendix E – Civil Works Specification and Managing Urban Stormwater : Soils & Construction (4th edition, Landcom 2004). The report has been prepared by a qualified civil engineer and refer to Appendix B for the civil engineer's CV.
(b) Measures to ensure that sediment and other materials are not tracked onto the roadway by vehicles leaving the site;	Satisfied	Refer to Section 7.0 and Appendix A.
(c) Describe all erosion and sediment controls to be implemented during construction, including as a minimum, measures in accordance with the publication Managing Urban Stormwater: Soils & Construction (4th edition, Landcom 2004) commonly referred to as the 'Blue Book';	Satisfied	Refer to Section 7.0 and Appendix A.
(d) Provide a plan of how all construction works will be managed in a wet-weather events (i.e. storage of equipment, stabilisation of the Site);	Satisfied	Refer to Section 7.0 and Appendix A.
(e) Detail all of site flows from the site; and	Satisfied	Refer to Section 7.0 and Appendix A.
(f) Describe the measures that must be implemented to manage stormwater and flood flows for small and large sized events, including but not limited to 1 in 5-year ARI and 1 in 100-year ARI.	Satisfied	Refer to Section 7.0 and Appendix A.

2.0 Site Investigations

Soil and water information relating to The Site has been obtained from the following documents:

- Douglas Partners – *Factual Report on Geotechnical investigation*, Project 202196.00, dated 17 May 2021.
- Douglas Partners – *Preliminary Site Investigation (Contamination)*, Project 85644.00, dated 14 November 2016.
- Douglas Partners – *Additional Geotechnical Investigation*, Project 85644.02, dated 26 April 2021.
- Douglas Partners – *Detailed Asbestos Delineation Investigation*, Project 85644.06, dated 16 August 2018.
- Douglas Partners – *Detailed Site Investigation (Contamination)*, Project 85644.04, dated 22 March 2018.
- Douglas Partners – *Remediation Action Plan, Project 85644.05*, dated 20 May 2021.

3.0 Subsurface Soil Profile

The Site contains ‘very loose’ to ‘loose’ topsoil / filling at depths of approximately 1.0m to 1.5m below natural ground level. Beneath the layer of topsoil / filling is alluvial soils which comprise of ‘very stiff’ to ‘hard’ clays / silty clays and ‘medium dense’ to ‘very dense’ clayey sands / silty sands. The alluvial soils reach depths of approximately 17m to 19m below natural ground level. Beneath the soils is assumed to be either gravels or weathered bedrock.

For further information on the soil profile refer to the *Additional Geotechnical Investigation* report (dated January 2018).

4.0 Groundwater Conditions

Groundwater testing suggests that perched groundwater exists within the soils and that the regional groundwater table is deeper than observed. Long term monitoring will be required to confirm groundwater levels.

For further information on the groundwater conditions refer to the *Additional Geotechnical Investigation* report. (dated January 2018).

5.0 Soil and Groundwater Contamination

The Site has historically been used for agricultural purposes. In addition to agricultural use, a southern portion of The Site appears to have been backfilled with demolition waste and is contaminated. Detailed Site Investigation (Contamination) report by Douglas Partners (dated 18 March 2018) indicates, in the central-southern portion of The Site, the presence of filling containing anthropogenic material including bonded asbestos containing materials (ACM), isolated metals and benzo(a)pyrene exceedances above human health and ecological criteria.

Remediation of identified contaminants in the central-southern portion of The Site will be carried out in accordance with the Remediation Action Plan (RAP) by Douglas Partners (dated May 2021) to render The Site suitable for the proposed development, from a contamination perspective. The RAP details the remediation methodology and strategy that must be undertaken before any topsoil regeneration works commence within the central-southern portion of The Site.

Zinc and copper contamination was observed in the groundwater. However, the concentration of these contaminants is typical within the Sydney basin and are still relatively low in absolute terms. As such, the concentrations of Copper and Zinc are considered insignificant for the proposed development.

For further information on the contamination refer to the *Detailed Asbestos Delineation Investigation* report (dated 16 August 2018), the *Detailed Site Investigation* report (dated 22 March 2018), and the Remediation Action Plan (dated 20 May 2021).

6.0 Impact on Soil and Water

The proposed development will potentially impact The Site's soil and water during the construction of the building foundations, external pavements, car parks and landscaped areas.

Potential impacts include the erosion of soils and sedimentation getting into watercourses and the management of saline soils / groundwater.

With respect to the erosion of soils and sedimentation getting into watercourses, it is proposed to provide sediment and erosion control measures as detailed in section 7.0.

7.0 Erosion and Sediment Control

During construction, erosion and sediment control measures will be provided in accordance with the requirements of "Managing Urban Stormwater Soils and Construction, 4th Edition (Blue Book)". These measures will include silt fences on the low side of the site, silt traps at stormwater pits and temporary sedimentation basins. Dust control measures will also be provided.

Stormwater from the site will be collected by temporary diversion swales and then directed to temporary sediment basins which will allow sediments to settle to the base of the basin. After sediment settlement within the basins, the stormwater from the basins will be discharged to existing swales by using a sediment pump. The permanent on-site detention basins / dams will be used as temporary sedimentation basins during construction phase of the project and the basins have sufficient capacity to manage stormwater and flood flows for storm events up to 100-year ARI.

Other measures to be provided on site during construction include construction exits for all vehicles leaving the site, and revegetation of the site as soon as practicable. Erosion control measures must be inspected and maintained after each rain event and at intervals not exceeding two weeks. Refer to Appendix A for Soil and Water Management Plan and Erosion and Sediment Control Details drawings.

Indicative stabilised stockpile and equipment storage locations have been shown in Soil and Water Management Plan (Appendix A) and actual locations are to be determined by contractors.

Refer to the *Civil Engineering Report* by Woolacotts for further information on the proposed sediment and erosion control measures.

Appendix A

Drawings

NSW GOVERNMENT | EDUCATION

NBRSARCHITECTURE.

RICHARD CROOKES CONSTRUCTIONS

NOTES:

SEDIMENT BASIN

SOURCE - MANAGING URBAN STORMWATER : SOILS AND CONSTRUCTION VOLUME 1 FOURTH EDITION.

SOIL TYPE - D (ASSUMED)

SOIL DESCRIPTION - TYPE 'D' SOILS THAT CONTAIN A SIGNIFICANT PROPORTION OF FINE (<0.005mm) 'DISPERSIBLE' MATERIALS THAT WILL NEVER SETTLE UNLESS FLOCCULATED.

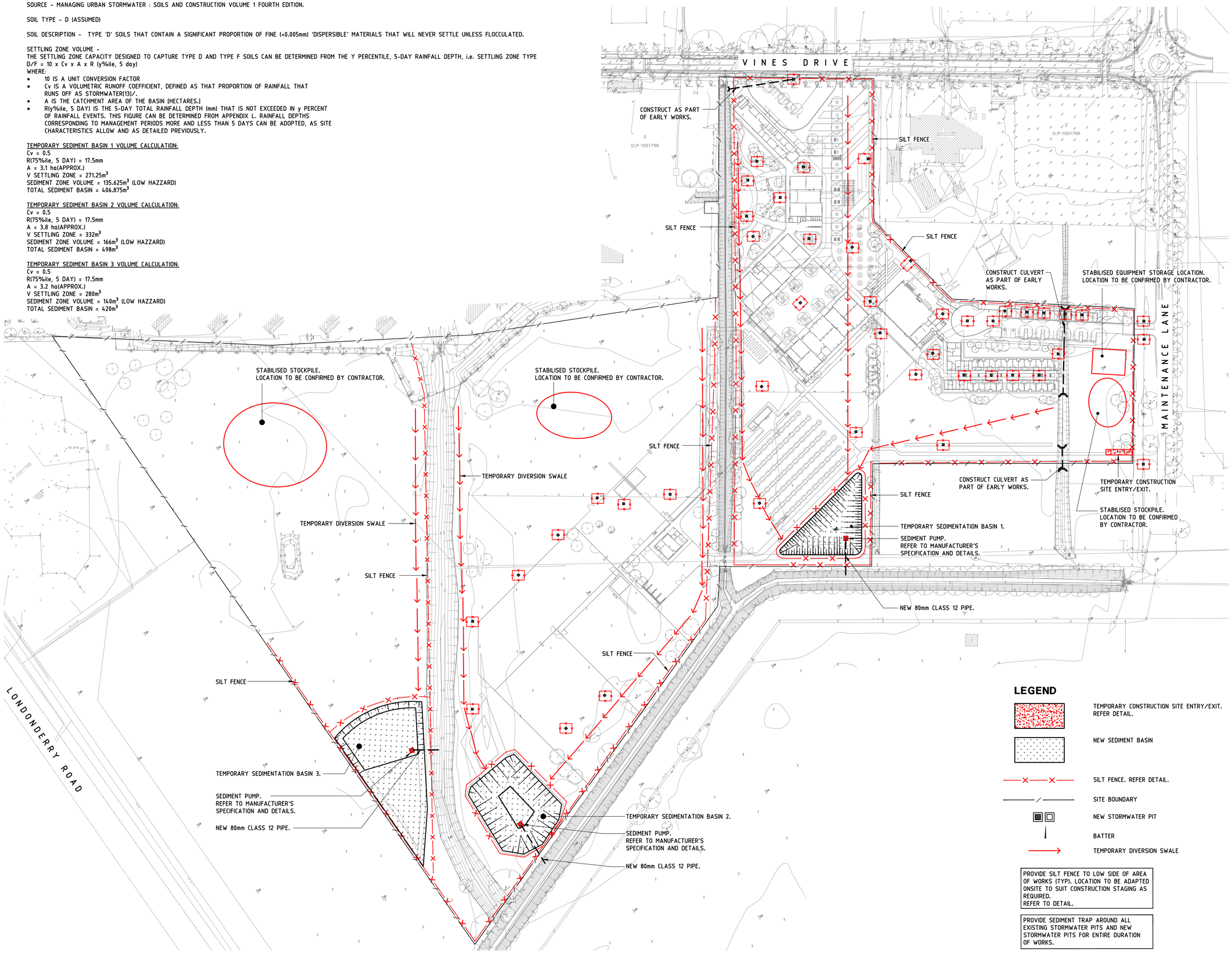
SETTLING ZONE VOLUME -
THE SETTLING ZONE CAPACITY DESIGNED TO CAPTURE TYPE D AND TYPE F SOILS CAN BE DETERMINED FROM THE Y PERCENTILE, 5-DAY RAINFALL DEPTH, i.e. SETTLING ZONE TYPE D/F = 10 x Cv x A x R (y%ile, 5 day)
WHERE:

- 10 IS A UNIT CONVERSION FACTOR
- Cv IS A VOLUMETRIC RUNOFF COEFFICIENT, DEFINED AS THAT PROPORTION OF RAINFALL THAT RUNS OFF AS STORMWATER[13]/.
- A IS THE CATCHMENT AREA OF THE BASIN (HECTARES.)
- R(y%ile, 5 DAY) IS THE 5-DAY TOTAL RAINFALL DEPTH (mm) THAT IS NOT EXCEEDED IN y PERCENT OF RAINFALL EVENTS. THIS FIGURE CAN BE DETERMINED FROM APPENDIX L. RAINFALL DEPTHS CORRESPONDING TO MANAGEMENT PERIODS MORE AND LESS THAN 5 DAYS CAN BE ADOPTED, AS SITE CHARACTERISTICS ALLOW AND AS DETAILED PREVIOUSLY.

TEMPORARY SEDIMENT BASIN 1 VOLUME CALCULATION:
Cv = 0.5
R(75%ile, 5 DAY) = 17.5mm
A = 3.1 ha(APPROX.)
V SETTLING ZONE = 271.25m^3
SEDIMENT ZONE VOLUME = 135.625m^3 (LOW HAZZARD)
TOTAL SEDIMENT BASIN = 406.875m^3

TEMPORARY SEDIMENT BASIN 2 VOLUME CALCULATION:
Cv = 0.5
R(75%ile, 5 DAY) = 17.5mm
A = 3.8 ha(APPROX.)
V SETTLING ZONE = 332m^3
SEDIMENT ZONE VOLUME = 166m^3 (LOW HAZZARD)
TOTAL SEDIMENT BASIN = 498m^3

TEMPORARY SEDIMENT BASIN 3 VOLUME CALCULATION:
Cv = 0.5
R(75%ile, 5 DAY) = 17.5mm
A = 3.2 ha(APPROX.)
V SETTLING ZONE = 280m^3
SEDIMENT ZONE VOLUME = 140m^3 (LOW HAZZARD)
TOTAL SEDIMENT BASIN = 420m^3



LEGEND

- TEMPORARY CONSTRUCTION SITE ENTRY/EXIT. REFER DETAIL.
- NEW SEDIMENT BASIN
- SILT FENCE. REFER DETAIL.
- SITE BOUNDARY
- NEW STORMWATER PIT
- BATTER
- TEMPORARY DIVERSION SWALE

PROVIDE SILT FENCE TO LOW SIDE OF AREA OF WORKS (TYP). LOCATION TO BE ADAPTED ONSITE TO SUIT CONSTRUCTION STAGING AS REQUIRED.
REFER TO DETAIL.

PROVIDE SEDIMENT TRAP AROUND ALL EXISTING STORMWATER PITS AND NEW STORMWATER PITS FOR ENTIRE DURATION OF WORKS.

Woolacotts. CONSULTING ENGINEERS
T +61 2 8203 1500 I www.woolacotts.com.au
Suite 6.02 Level 6, 67 Albert Ave, Chatswood NSW 2067

Job No.	Approved	Verified	Prepared
20-307	JC/AP	JH	AD

Issue

No.	Date	Description	Chkd
C	21.07.21	TEMPORARY SITE ENTRY AMENDED.	
D	03.09.21	DRAFT 50% PROGRESS ISSUE	
E	20.09.21	50% PROGRESS ISSUE	
F	12.11.21	95% PROGRESS ISSUE	
G	19.11.21	100% APPROVED ISSUE	
H	04.02.22	DRAFT FINAL ISSUE FOR REVIEW	
I	25.02.22	ISSUED FOR APPROVAL	

Architect

NBRSARCHITECTURE.
Sydney
61 2 9922 2344 nbrsarchitecture.com

Nominated Architect:
Andrew Duffin NSW 5602
NBRS & Partners Pty Ltd VIC 51197 ABN 16 002 247 565

Project

Centre of Excellence in Agricultural Education

at
HAWKESBURY

for
DEPARTMENT OF EDUCATION

Drawing Title

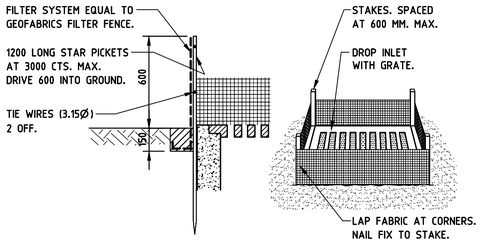
SOIL AND WATER MANAGEMENT PLAN

Date FEBRUARY 2022
Scale 1:1000 FOR A1

Drawing Reference H-CV-DW-0301

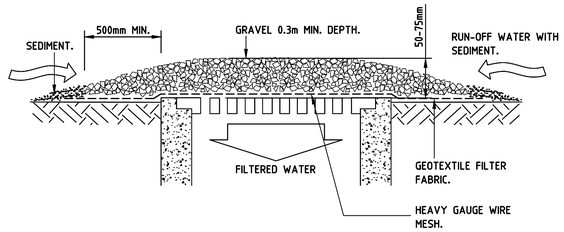
Revision I

0 10 20 30 40 50 60 70 80 90 100



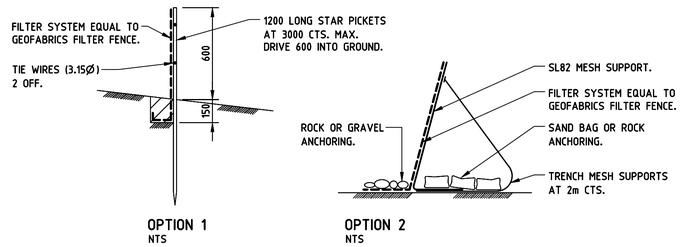
GEOTEXTILE FILTER FABRIC DROP INLET SEDIMENT TRAP.

TO BE PROVIDED AT GRATED PITS WITHIN PERVIOUS AREAS.



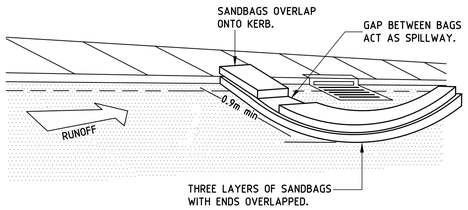
WIRE MESH AND GRAVEL DROP INLET SEDIMENT TRAP.

TO BE PROVIDED AT GRATED PITS WITHIN IMPERVIOUS AREAS.



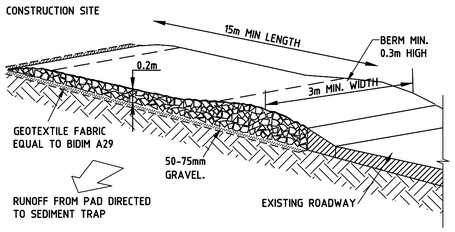
SILT FENCE DETAILS

TO BE PLACED AROUND LOW SIDE OF PROPERTY BOUNDARY AND AROUND STORMWATER INLET STRUCTURES TO PREVENT SOIL WASHING OFF SITE.



TYPICAL SANDBAG KERB INLET SEDIMENT TRAP

TO BE LOCATED AROUND EXISTING KERB INLET PIT



TEMPORARY CONSTRUCTION ENTRY/EXIT

TO BE LOCATED AT VEHICLE EXIT FROM SITE

NBRSARCHITECTURE.

RICHARD CROOKES CONSTRUCTIONS

Woolacotts. CONSULTING ENGINEERS

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Job No.	Approved	Verified	Prepared
20-307	JC/AP	JH	AD

Issue

No.	Date	Description	Chkd
A	03.09.21	DRAFT 50% PROGRESS ISSUE	
B	20.09.21	50% PROGRESS ISSUE	
C	12.11.21	95% PROGRESS ISSUE	
D	19.11.21	100% APPROVED ISSUE	

Architect

NBRSARCHITECTURE.
Sydney
61 2 9922 2344 nbrsarchitecture.com

Nominated Architect:
Andrew Duffin NSW 5602
NBRS & Partners Pty Ltd VIC 51197 ABN 16 002 247 565

Project

Centre of Excellence in Agricultural Education

at

HAWKESBURY

for

DEPARTMENT OF EDUCATION

Drawing Title

EROSION AND SEDIMENT CONTROL DETAILS

Date NOVEMBER 2021

Scale 1:20 FOR A1

Drawing Reference H-CV-DW-0401

Revision D

Appendix B

Civil Engineer CV

John Htet

Project role: Civil/Structural Engineer

John commenced at Woolacotts in January 2018 as a graduate Civil/Structural Engineer. He had worked on Civil/Structural design for residential and subdivision developments for two years before he joined the company.

Since joining Woolacotts, John has modelled stormwater management systems for education facilities, correctional complexes, health and aged care facilities and residential developments using computer modelling programs, including DRAINS, XPRAFTS, HEC-Ras, and MUSIC.

John has used ROBOT, RAPT, Microstran, and Structural Toolkit to model structures for education and correctional centre projects. He has had a significant experience in structural inspection since he started working as a Civil/Structural Engineer.

John Htet is a Civil/Structural Engineer currently located in our Sydney office.

Education and qualifications

Bachelor of Engineering (Civil) - First Class Honours, 2014, University of New South Wales

Relevant project experience

Burwood Park Outdoor Stage - Role: Engineer

Structural, civil and hydraulic engineering services to a permanent outdoor stage at Burwood Park to host a range of community events.

Boundary Creek, Sydney Olympic Park - Role: Engineer

Design review of the proposed Gross Pollutant Trap upgrade at Boundary Creek as documented by Optimal Stormwater.

Central Linear Park, Sydney Olympic Park - Role: Engineer

Civil advanced concept and detail design for Linear Park, Central Precinct in Sydney Olympic Park.

Hargraves Lookout, Blackheath - Role: Engineer

Civil, structural and geotechnical engineering services to the Hargraves Lookout, Blackheath.

Penrith Boarding House - Role: Engineer

Structural, civil and hydraulic engineering services to Land and Housing Corporation's Penrith Boarding House project.

Todd Park Aquatic & Leisure Centre, Blakehurst - Role: Engineer

Detailed site investigation for propped regional aquatic facility at Todd Park, Blakehurst.

Sydney Water Depot - Role: Engineer

Structural and civil engineering services to the design development and concept plans.

Mick Doohan Reserve, Oran Park - Role: Engineer

New public park providing sports fields and general recreation facilities for the precinct.

Kelso Park North - Role: Engineer

Structural, civil and hydraulic engineering services to the Sports Master Plan.

Education
School Infrastructure

Post Approval Consultation Record

Identified Party to Consult:	Hawkesbury City Council
Consultation type:	Email
When is consultation required?	Prior to construction and operation
Why	Condition A8, B18
When was Consultation held	- CPL issued via email construction soil and water management plan 16/02/2022. - 16/02/2022 – CPL issue Construction Traffic and Pedestrian Management Sub-Plan (CTPMSP) to WSU/TfNSW and HCC.
Identify persons and positions who were Involved	- Andrew Johnston – Senior Town Planner - Colleen Haron – Senior Strategic Land Use Planner
Provide the details of the consultation	- Discussions regarding Hawkesbury city council's authority involvement in the project.
What specific matters were discussed?	- Dilapidation Report Issue
What matters were resolved?	-
What matters are unresolved?	- Nil
Any remaining points of disagreement?	- Nil
How will SINSW address matters not resolved?	- Nil

6.12 BIODIVERSITY MANAGEMENT SUB-PLAN

The Biodiversity Management sub-Plan has been prepared Alphitonia for the Project.

It is not embedded in this document; it is supplied as an attached appendix so that it can be displayed/updated/revised in isolation if required.

Alphitonia.

State Significant Development 15001460

The Centre of Excellence – Richmond
Agricultural College at Western Sydney University
Hawkesbury Campus, Vines Drive, Richmond
NSW 2753

Biodiversity Management Sub-Plan

Prepared for Richard Crookes Constructions on behalf of Schools Infrastructure NSW for the NSW Department of Education

Prepared by Alphitonia Pty Ltd

15 March 2022 – Version 1.2

Environmental Planning
Ecological Assessments
Bushfire Hazard Management
Project Management

ABN. 98 611 057 768

In the spirit of reconciliation, Alphitonia acknowledges all Traditional Custodians of country throughout Australia.

We pay respect to Elders past, present and emerging and acknowledge their continuing connection to land, sea and community.

Document Control and Authorship

Document Control:

Version	Description	Date	Author	Reviewer
1.0	For client review	16/02/2022	Brendan Pratt	Client
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Team Contributions:

Name	Qualification	Title	Contribution
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1 Introduction

1.1 Background

Alphitonia has been engaged by Richard Crookes Constructions, on behalf of the NSW Department of Education (DoE), to prepare a Biodiversity Management Sub-Plan (BMSP) to support the construction phase of State Significant Development (SSD) 15001460, the new Centre of Excellence – Richmond Agricultural College (the project) located at Part Lot 2 / DP1051798, Vines Drive, Richmond at Western Sydney University (Hawkesbury Campus), 2 College Street, Richmond, (the subject land).

The purpose of this BMSP is to provide strategies to minimise impacts on biodiversity during the construction phase of the project in order to improve biodiversity outcomes and assist the proponent meet statutory obligations under NSW and Commonwealth environmental legislation and polices. This BMSP has been prepared in line with and following review of the following project reports / documentation:

- NSW Government Department of Planning, Industry, and Environment (DPIE) Conditions of Consent for SSD 15001460 (Hawkesbury Centre of Excellence) as executed on 14 March 2022 by the Minister for Planning.
- Biodiversity Development Assessment Report, prepared for the project by Narla Environmental, dated 14/12/2021 (the BDAR)
- Arboricultural Impact Assessment Report: Centre of Excellence Rev G, prepared for the project by Sturt Noble Arboriculture, dated 13/12/2021 (the AIAR CoE)
- Arboricultural Impact Assessment Report: Vines Drive Upgrade Rev B, prepared for the project by Sturt Noble Arboriculture, dated 13/12/2021 (the AIAR Vines Drive)
- Approved Landscaped Plans: Centre of Excellence in Agricultural Education, Richmond Agricultural College Vines Drive, Richmond, NSW Department of Education, Detail Design prepared by NBRS Architecture & Partners Pty Ltd, dated 2021

This project comprises the development of new administrative, learning, dining, temporary accommodation, farming and aboriginal enterprise buildings, establishing several new dams, agricultural plots, and an orchard, as well as driveways, walkways and other hardstand areas. The project also involves creating access to Maintenance Lane, the widening of Vines Drive, and the upgrade works at the Clydesdale Road and Londonderry Road interfaces.

The BDAR stated that most vegetation within the subject land would require removal to accommodate the project, with the exception of 1) some trees requiring trimming only along Vines Drive and 2) the vegetation that would be managed as an Asset Protection Zone around the new buildings.

A Construction Environmental Management Plan (CEMP) is required prior to commencement of the construction phase of the project. This BMSP will form part of the CEMP satisfying condition of consent B14(g) and has been prepared to specifically address condition B19 of the Conditions of Consent for the project. Condition B19 is detailed in Table 1.

Table 1 Condition Satisfaction Table for SSD 15001460 Condition of Consent B19.

Condition B19. The Biodiversity Management Sub-Plan (BMSP) must address, but not be limited to, the following:	Response
a) *be prepared by a suitably qualified and experienced person/s;*	Refer to CV's at Appendix B for Brendan Pratt and Courtney Hill of Alphitonia Pty Ltd.
b) *identify areas of land where impacts on biodiversity are to be avoided as outlined in the Biodiversity Development Assessment Report prepared by Narla Environment[al] and dated 14 December 2021 (BDAR) and set out how these areas will be protected from construction impacts; and*	Narla Environmental did not identify in the BDAR, dated 14 December 2021, any areas of land where impacts on biodiversity are to be avoided.
c) *set out the measures identified in the BDAR to minimise, mitigate and manage impacts on biodiversity, including timing and responsibility for delivery of the measures.*	Refer to Sections 4 and 5 of this BMSP, in particular Table 6 which provides an overview of the biodiversity management tasks, timing for implementation, responsibility and general location.

1.2 Site description

The subject land is situated on approximately 11.98 ha of vacant land within the Western Sydney University Hawkesbury Campus in the suburb of Richmond in the Hawkesbury Local Government Area and within the Deerubbin Local Aboriginal Land Council area. It is bound by Vines Drive to the north, Maintenance Lane to the east, and existing university buildings, car parks and associated infrastructure to the northeast and northwest fronting Vines Drive. Agricultural grassland found within the subject land continues beyond the boundary to the south and west. Refer to the site plan at Figure 1.

The subject land is dominated by agricultural grassland with scattered areas of trees, including both native and exotic species. A mixture of mature native and exotic trees are found along both road reserves, with Vines Drive in particular consisting of manicured landscaping associated with the established infrastructure of Western Sydney University.

The majority of the subject land is located within an area that has been historically cleared and continues to be exposed to varying disturbances, including exotic weed invasion. Only a small fraction of the subject site has been identified to contain native vegetation cover. The majority of the subject land is to be disturbed as part of the project. Of note, contamination has been identified on the subject land and disturbance to vegetation is required for remediation efforts before the site is suitable as an operational school.

1.3 Measures to minimise, mitigate and manage impacts on biodiversity

The mitigation and minimisation management measures identified by Narla for the project to avoid and minimise potential impacts to local biodiversity values are provided in Table 18 of the BDAR. From Table 18, the relevant actions pertaining to this BMSP are:

- Assigning a Project Ecologist for vegetation clearing
- Hollow replacement
- Tree replacement, and
- Seed collection and propagation.

These measures are included in this BMSP and are set out in Sections 4 and 5 of this report, including a description of each action, timing, responsibility, and general location (as appropriate).

1.4 Aims and objectives

This BMSP aims to outline appropriate biodiversity management for pre-construction, construction, and post construction of the project to reduce the impact to biodiversity within the subject land and vicinity.

The biodiversity management objectives of this BMSP include the following:

- To identify the key biodiversity values of the subject site.
- To describe the impacts of the project on biodiversity of the subject land.
- To detail the tasks, timing and responsibility required to mitigate the impact to biodiversity from the project.
- To provide clear protocols and methods for pre-clearance surveys to be undertaken.
- To protect the welfare of fauna encountered during the construction phase of the project.
- To minimise impacts to fauna habitat from construction of the project.
- To encourage the reuse or recovery of existing natural resources from the subject land, such as hollows.

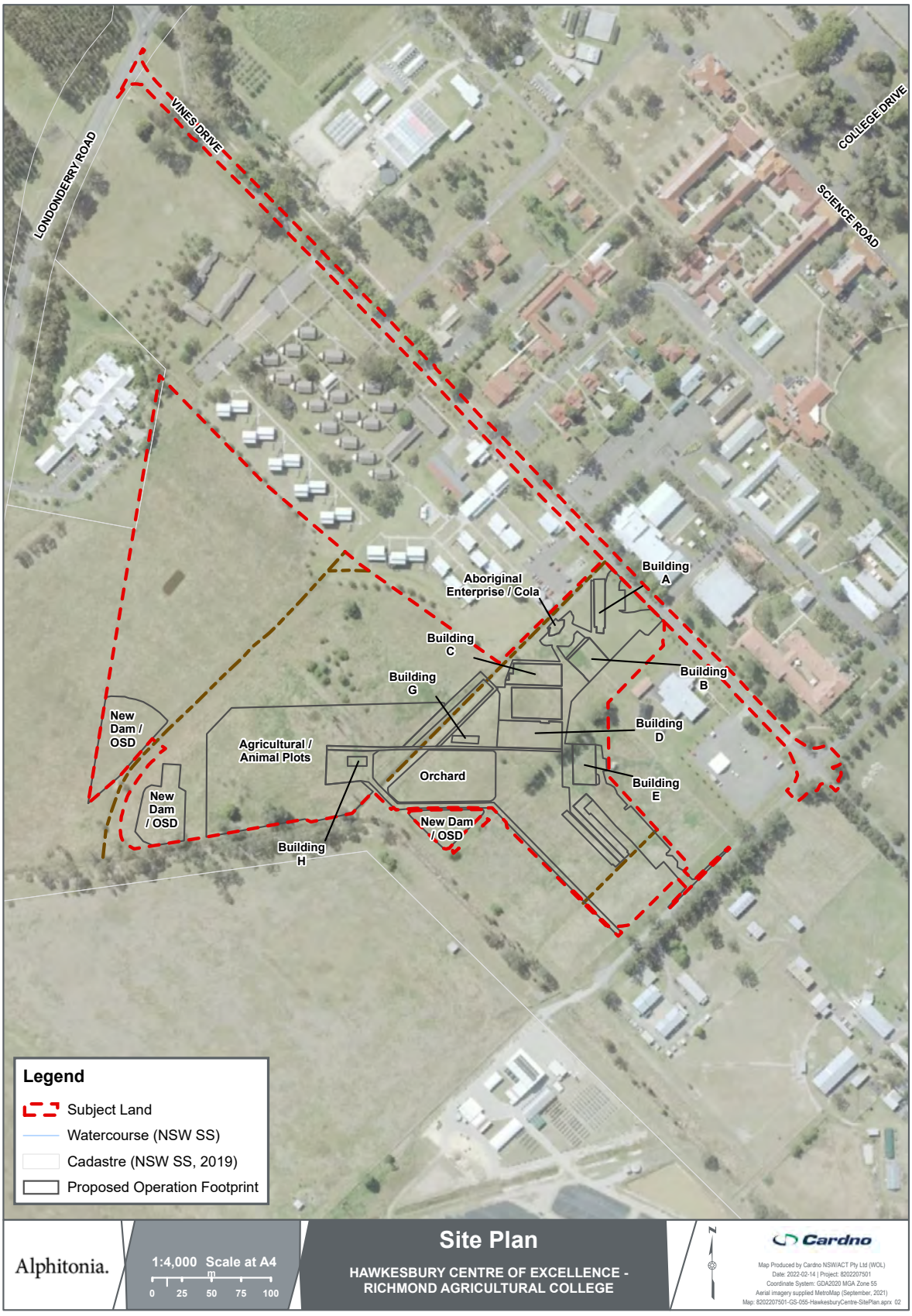

Figure 1 Site plan showing subject land with project building overlay.

2 Biodiversity Values

This section provides a brief overview of the biodiversity values within the subject land. For more detail on the ecology of the subject land and surrounds, refer to the BDAR and arborist reports prepared for the project as listed in Section 1 of this BMSP.

2.1 General site conditions

In general, the subject land is considered to be highly degraded with evidence of significant historical disturbance. The majority of the subject land is located within an area that has been historically cleared for agriculture and continues to be exposed to varying disturbances, including sheep grazing and exotic weed invasion. A small fraction of the subject land has been identified as containing native vegetation cover. In the BDAR, Narla reported:

- No Areas of Outstanding Biodiversity Value occurred on the subject land or surrounding area.
- The project is unlikely to result in a significant impact to any threatened species.

2.2 Threatened ecological communities

The BDAR identified one dominant native Plant Community Type (PCT) on the subject land: PCT 835 – Forest Red Gum Rough-barked apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion.

PCT 835 conforms to the endangered ecological community *River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions* listed under the Biodiversity Conservation Act 2016.

Although meeting most of the diagnostic criteria for the critically endangered community *Coastal Floodplain Eucalypt Forest of Eastern Australia* listed under the Environmental Protection and Biodiversity Conservation Act 1999, Narla determined the native vegetation within the subject land did not meet the minimum requirements to be protected under the Act due to 1) a native vegetation cover less than 30% and 2) the vegetation not being part of a large or contiguous patch. Refer to Section 3 of the BDAR.

2.3 Faunal habitat

2.3.1 Native vegetation cover and connectivity

More than 95% of the canopy layer of the subject land is absent / has been removed and minimal faunal habitat was found to be present across most of the subject land. Remnant patches of native vegetation are limited and generally homogenous in structure. While it is important to maintain remnant native vegetation where possible, a lack of structure and habitat complexity means that the likelihood of the subject land to support multiple faunal habitats is low (Catling et al., 2000; Lindenmayer et al., 1994). Similarly, it has been found that small native mammals respond positively to the existence of conspecifics within areas of remnant native vegetation (Johnstone et al., 2014).

The BDAR assessed the habitat connectivity and cover for fauna around the subject land with a buffer of 1500 m. The level of connectivity and extent of cover determines the suitability of the subject land to facilitate movement of fauna across their ranges, allowing for increased foraging capabilities, cover from predators and abundance of nesting sites which could increase the likelihood of faunal habitats within the subject land.

The BDAR identified large areas of connectivity and cover to the east, west and south of the subject land, as well as patches of native grasslands to the north which could harbour native species. Refer to Section 2 of the BDAR. Narla determined development of the subject land was unlikely to restrict movement of species throughout the surrounding landscape due to 1) the general degraded nature of the subject land with a number of exotic species present, and 2) the large areas of connectivity and cover available in the vicinity of the subject land.

2.3.2 Hollow-bearing trees

Several (14) hollow-bearing trees (HBT) have been identified within the subject land, ten of these along both road reserves. Refer to Figure 14 of the BDAR.

Hollow-bearing trees present an area of possible habitat for use by arboreal mammals and birds. The footings around these established trees have the potential to contain woody debris and leaf litter suitable for nesting and den sites and foraging resources.

2.3.3 Riparian areas

There are no significant riparian areas found within the subject land. A concrete-lined drainage swale runs north-south through the middle of the site. This is a human-made feature that offers minimal habitat value. Riparian areas are found directly adjacent the southern boundary of the subject land.

2.4 Threatened fauna

A number of threatened faunal species were predicted to occur within the subject land. Narla conducted targeted survey efforts for 14 of these species, those they determined had potential to occur within the subject land due to suitable habitat. None of these threatened species were identified by Narla within the subject land or its surrounds. Refer to Table 8 of the BDAR.

In undertaking survey efforts for the project, Narla reported capturing incidental recordings for three additional species: the Eastern Coastal Free-tailed Bat, Yellow-bellied Sheathtail Bat and Greater Broad-nosed Bat. All three are listed as vulnerable under the Biodiversity Conservation Act 2016.

Table 2 provides a list of the 14 identified threatened faunal species that have potential to occur within the subject land, as well as the three additional species identified incidentally by Narla during survey efforts.

Table 2 Threatened fauna with potential to occur within the subject land.

Class	Species	Common Name	Identified during targeted survey efforts
Amphibian			
	Litoria aurea	Green and Golden Bell Frog	No
Avian			

Class	Species	Common Name	Identified during targeted survey efforts
	Callocephalon fimbriatum	Gang-gang Cockatoo	No
	Haliaeetus leucogaster	White-bellied Sea-Eagle	No
	Hieraaetus morphnoides	Little Eagle	No
	Lophoictinia isura	Square Tailed Kite	No
	Ninox connivens	Barking Owl	No
	Ninox strenua	Powerful Owl	No
	Pandion cristatus	Eastern Osprey	No
	Tyto novaehollandiae	Masked Owl	No
Mammal			
	Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	Incidental recording
	Myotis macropus	Southern Myotis (Microbat)	No
	Petauroides volans	Greater Glider	No
	Petaurus norfolcensis	Squirrel Glider	No
	Phascolarctos cinereus	Koala	No
	Saccolaimus flaviventris	Yellow-bellied Sheathtail Bat	Incidental recording
	Scoteanax rueppellii	Greater Broad-nosed Bat	Incidental recording
Snail			
	Meridolum corneovirens	Cumberland Plain Land Snail	No

2.5 Threatened flora

A number of threated floral species were predicted to occur within the subject land. Narla conducted targeted survey efforts for five of these species, those they determined from site assessment had potential to occur within the subject land due to suitable habitat and correct geographic distribution. None of these threatened species were identified within the subject land or its surrounds through targeted survey efforts. Refer to Table 3.

Despite not being identified through survey efforts, *Pilularia novae-hollandiae* (Austral Pillwort) has been "assumed present" by Narla due to the presence of potential habitat within the subject land. As such, targeted surveys for this threatened species should occur within the appropriate DPIE survey period and if no appropriate surveys can be conducted, offsets are to be purchased for this species.

Table 3 Threatened flora with potential to occur within the subject land.

Species	Common Name	Identified during targeted survey efforts
Eucalyptus benthamii	Camden White Gum	No
Persicaria elatior	Tall Knotweed	No
Pilularia novae-hollandiae	Austral Pillwort	No – assumed present

Species	Common Name	Identified during targeted survey efforts
Cynanchum elegans	White-flowered Wax Plant	No
Pomaderris brunnea	Brown Pomaderris	No

3 Impacts to Biodiversity

This section briefly summarises the impacts to biodiversity, as assessed and identified in the BDAR prepared for the project by Narla, and the two AIAR's prepared by Sturt Noble Arboriculture. Biodiversity management tasks to minimise and mitigate the impacts to biodiversity from the project are described in Section 4 of this BMSP.

3.1 Vegetation clearing

The project will directly impact 11.27 ha of vegetation classed as PCT 835: Forest Red Gum Rough-barked apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion. Refer to Figures 11 and 13 of the BDAR for vegetation mapping and management zones / impact areas respectively and Table 3 for details of vegetation zones. Additionally, the portion of subject land along Vines Road and Maintenance Lane contain a number of mature (and juvenile) native and exotic trees. The AIAR's prepared by Sturt Noble Arboriculture for the project identified 11 trees required to be removed and 10 juvenile trees for transplantation. The majority of the trees within the road reserves are to be retained and may require minor (<10%) trimming / pruning during construction works.

The majority of the subject land identified as PCT 835 (11.04 ha or 98%) has been classed as "Grassland with exotic trees" (10.91 ha) and "Grassland with planted Casuarina glaucas" (0.16 ha). Overall, these two zones were deemed of low quality and considerably degraded. Of the 11.27 ha of PCT 835 mapped within the subject land and identified for vegetation clearing, a small portion (0.23 ha or 2%) was identified as "Remnant Canopy". Removal of vegetation from this zone would have an impact on the biodiversity within the subject land, albeit minor, as several potential habitat trees will be removed and the ground layer disturbed during the clearing works.

The majority of the subject land is designated for "total impact" / full clearing of vegetation from construction of the project. However, the vegetation within the subject land has been determined to be of low quality due to its poor structure / absence of native features, presence of exotic species, historical clearing events and evident agricultural disturbance. At the completion of the project, most of the subject land will remain as open space to be used for agricultural teaching and learning areas or open space around the school grounds. Through its design, the project would allow for movement of some native fauna through the subject land and the extensive landscaping to be undertaken (as part of the project) and would add habitat resources to the area.

3.2 Destruction or removal of hollows

The destruction or removal of hollows in the construction phase of the project will impact on biodiversity. Several hollow-bearing trees (HBT), with hollows ranging in size from small to large, were identified within the subject land. Figure 14 of the BDAR identifies 14 HBT within the subject land (and one beyond the southwest boundary but within the lease area of Part Lot 2 / DP1051798). Several trees, including HBT's, have been identified for removal or transplantation by Sturt Noble Arboriculture: 11 and 10 trees respectively.

The BDAR states that several HBT were located along the road reserves and select trimming is proposed for these habitat trees only with no hollow-bearing limbs to be removed. It is unclear from the reporting and

documentation how many hollows are present in each identified HBT, or which hollows would be viable habitat features. Additional hollows or tree habitat may be detected during the pre-clearing surveys.

3.3 Increased habitat for invasive species

The construction phase of the project could lead to an increase in the occurrence of exotic predatory species and invasive weeds (Klepeis et al., 2009). A rise in the amount of foot traffic and vehicle movements could inadvertently spread invasive weed species throughout the subject land via contaminated clothing, shoes and vehicles. The introduction and establishment of exotic weed species can lead to degradation in biodiversity by supressing native plant density and diversity.

Narla considered the indirect impacts from exotic weed invasion within the subject land and vicinity on the bioregional persistence of threatened species, threatened ecological communities and their habitats and determined no expected impact to same given the degraded nature of the site and usual practices for construction, such as the installation of temporary fencing / barriers.

As land management practices will change from agricultural land use to construction of the project there is the potential for a build-up of exotic weed species to occur. Appropriately managing exotic weed species during the construction phase of the project will positively impact biodiversity and is considered to lead to better project outcomes.

3.4 Habitat fragmentation

Generally, the removal of vegetation from an area contributes to fragmentation amongst the landscape as regions of scattered remnant vegetation become smaller and suffer reduced connectivity with adjacent habitats. Fragmentation can negatively impact biodiversity in several ways including the disruption of dispersal patterns (Brodie et al., 2015), the introduction of exotic species (Klepeis et al., 2009), altering social cohesion between conspecifics (Meurk, 1988), limiting gene flow (Clinchy, 1999) and diminishing physical health through a reduction in resource availability to populations (Fischer & Lindenmayer, 2007).

Due to the small, isolated patches of low-quality vegetation and heavily degraded nature of the subject land, and considering the available native vegetation and habitat connectivity in the vicinity as identified in the BDAR, the project is not considered to contribute to habitat fragmentation and is unlikely to interrupt connectivity for any threatened species.

3.5 Fauna displacement

The subject land contains habitat features that are suitable for use by both arboreal and terrestrial fauna. These features include large established trees, some with hollow bearing portions, leaf litter, soil and grassy plains that could contain fauna populations and would be at risk of displacement during construction.

The welfare of native fauna during the construction phase of the project, particularly when clearing vegetation, is a concern. Fauna can be injured or killed during clearing works, as well as suffer disruptions to key life cycle / breeding events. Indirect impacts from construction (e.g., noise and light pollution) can also affect faunal behaviour, such as foraging, adversely effecting individual health.

3.6 Fauna handling

During the clearing of vegetation fauna can become displaced and need to be physically relocated and handled. Incorrect handling methods and poor timing and procedures can lead to faunal injury, increased individual stress and even death.

4 Biodiversity Management

This section outlines and describes the biodiversity management tasks and protocols required to minimise, mitigate and manage the impacts to biodiversity from the project within specific management zones of the subject land. Monitoring and reporting requirements for the duration of the project, pertaining to biodiversity management, are also described.

4.1 Biodiversity Management Zones

To help direct the biodiversity management tasks of this BMSP, the subject land has been divided into three impact management zones. Table 4 identifies these zones and describes the specific characteristics of each. A site plan showing the locations of these zones within the subject land is provided at Appendix A.

Table 4 Biodiversity Impact Management Zones and their characteristics.

Zone	Description
High Impact Construction Management Zone	All areas of the subject site that are identified for new buildings, hardstand areas and water management infrastructure (On Site Detention basins), and their construction curtilage.
Low Impact Construction Management Zone	All areas of the subject site that, although will be impacted by the project, will have a lower level of construction activity occurring, and could have extensive periods of the construction program with no activity occurring.
Road Management Zone	All areas of Vines Drive and Maintenance Lane affected by road widening construction activities for the project

4.2 Biodiversity management tasks

This BMSP has determined the following management tasks are to be implemented for the project.

4.2.1 Assign a Project Ecologist and Project Bush Regenerator

Prior to commencement of vegetation removal or construction (whichever comes first), a suitably qualified ecologist and bush regenerator must be engaged for the project. Details of the ecologist and bush regeneration consultants including name, business name and contact details must be provided to the Certifier.

The Project Ecologist must be a qualified and experienced ecologist consultant (minimum 3 years of experience) with a minimum tertiary degree in Science, Conservation, Biology, Ecology, Natural Resource Management, Environmental Science or Environmental Management. The ecologist must be licensed with a current Department of Primary Industries Animal Research Authority permit and New South Wales Scientific License issued under the Biodiversity Conservation Act 2016.

The Project Bush Regenerator must have a minimum three years full time experience and a minimum TAFE Certificate Level IV Bush Regeneration qualification and / or a degree in Natural Areas Management (or the equivalent in experience).

4.2.2 Undertake replacement planting

Prior to the commencement of vegetation removal or construction (whichever comes first), a qualified bush regenerator is to be engaged to establish and implement a native vegetation seed collection program for the collection and propagation of seed from native plants (trees, shrubs and groundcover) approved for removal. The propagated native plants are to be utilised within the landscaped planting areas on site as directed by the Project Landscape Architect.

As a minimum, the plant propagation program is to replace the number of trees removed from the site on a 2:1 ratio.

If the seed collection and propagation program cannot be achieved due to the season and/or a lack of seed availability at the time vegetation removal is planned to commence, an alternative native plant procurement strategy is to be implemented. Any alternative strategy must ensure native plants are sourced from seeds collected within a 5 km radius of the subject land.

The Project Ecologist and / or Bush Regenerator are required to include plant provenance evidence in their reporting for the project.

4.2.3 Pre-clearing survey

Prior to any vegetation removal from the site, pre-clearance surveys are to be undertaken by the Project Ecologist. Surveys are to determine the presence or absence of native and threatened species, particularly *Pilularia novae-hollandiae* (Austral Pillwort) which has been "assumed present", and the location of any habitat features that can be retained and relocated to other suitable areas within the subject land. Pre-clearing surveys are to identify the following:

- A full quantification of the number of viable habitat hollows to be removed from the construction site during clearing activities.
- Fauna species likely to be present during construction and clearing.
- Fauna habitat features that can be retained (e.g., hollow portions of trees) and marking them with high visibility tape.
- Suitable locations to relocate fauna species, and habitat features that have been retained.
- Identify and mark all potential areas where fauna are likely to be present but not visible during the vegetation clearing (hollow bearing trees, habitat logs, foliage with active nests, large woody debris).

A report is to be prepared by the Project Ecologist after the pre-clearing survey to detail, map, tag and mark all survey findings and any additional measures that need to be taken to minimize harm to biodiversity within the subject land and vicinity.

4.2.4 Clearing supervision

Immediately prior to any vegetation clearing (within 2 hours) an inspection is to be undertaken by the Project Ecologist to identify any fauna that may be encountered during vegetation clearing or may need to be relocated prior to clearing operations.

During inspection, the Project Ecologist is to undertake the following tasks:

- Re-checking all trees and vegetation marked as potential fauna habitat in the pre-clearance survey.
- Checking for fauna in all trees and vegetation that is marked for removal.
- Check for any new dens or nests that might have been made after the preclearance survey was completed.
- Removing and relocating fauna as required.
- If possible – delineate on site a clear corridor where fauna are able to flee and relocate into nearby vegetation that is not identified for clearing.

The following methodology for vegetation clearing is to be followed throughout each of the biodiversity impact management zones:

- Prior to any clearing works the Project Ecologist is to conduct a toolbox talk with the arborist team to ensure all individuals involved understand the biodiversity values of the subject land.
- The Project Ecologist is to be onsite and supervising all vegetation clearing works.
- The Project Ecologist is to relocate any animals that cannot safely self-relocate.
- All areas to be retained need to be clearly marked with highly visible tape and align with areas set out in the pre-clearance surveys.
- Vegetation needs to be cleared in a way that allows any fauna that may be present to relocate safely from the clearance site to adjacent areas with minimal human interference.
- Clearing of smaller wooded vegetation and shrubs should be done using handheld tools such as chainsaws and brush cutters to allow movement of fauna, where practical.
- Habitat trees are to be cleared following the removal of all other vegetation to be removed onsite.
- Identified habitat trees should be 'soft felled': The soft felling technique is where any hollow or habitat bearing portions of the tree are cut by an arborist with the help of a crane or pulley system which is attached to the portion. Once cut, the portion can then be slowly lowered to the ground and inspected for fauna.

4.2.5 Management of displaced fauna

As part of the clearing process fauna can become displaced and will need to be relocated. In the event that fauna does become displaced or injured during clearing activities, the following tasks are to be undertaken:

- All handling of fauna should be conducted by the Project Ecologist supervising the clearing works. If the Project Ecologist is not available or onsite, WIRES NSW (Wildlife Information and Education Service - 1300 094 737) should be contacted for assistance.
- If possible, fauna should be allowed to self-relocate to adjoining areas of vegetation and only assisted if completely necessary.

- If necessary, the animal is to be captured, assessed and safely relocated to a predetermined spot within adjoining lands.

- Nocturnal species that do not self-relocate, such as possums and gliders, are to be secured and kept in a safe, cool and dark environment until they can safely be released at dusk.

- If an animal is found injured or injured at any point during the clearing process, clearing must halt so that the Project Ecologist can transport the injured animal to a veterinarian or wildlife carer.

- If an animal is found injured or injured at any point during the construction phase of the project outside of specified clearing activities, and the Project Ecologist is not available or onsite, WIRES NSW (Wildlife Information and Education Service - 1300 094 737) is to be contacted for assistance.

4.2.6 Hollow management and replacement

A key component of minimising the impact of the project to biodiversity within the subject land is the preservation of hollows and HBT's. If hollows are damaged or deemed to require removal, the implementation of a hollow habitat replacement program will be necessary to mitigate the impacts the removal of these will have on the landscape.

Several HBT were located along the road reserves of Vines Drive and Maintenance Lane. These habitat trees are identified for select minor (<10%) trimming, if required. No hollow-bearing limbs are identified to be removed.

If during the pre-clearance survey, it is determined that trees containing hollows require removal, where hollow dependent native fauna are found using existing hollows, a hollow habitat replacement program is to be implemented.

The hollow habitat replacement program is to be designed by the Project Ecologist, in consultation with the proponent, once the quality and quantity of the hollows that require replacement have been determined.

Compensatory tree hollows must be provided prior to the release of the hollow dependent fauna, unless the removed tree hollows can be relocated and installed on the same day they are removed.

Prior to commencement of the removal of a HBT, the proponent (or proponent's representative) must provide to the Certifier:

- Details on the size, type, number, and location of nest boxes required, or details on the relocation of the actual tree hollows.

- Installation location of replacement nest boxes or actual tree hollows, providing alternate habitat for hollow-dependent fauna displaced during clearing.

- Salvage and relocate any tree hollows approved for removal to appropriate locations on the same day and prior to the release of any native fauna found using the tree hollows

4.2.7 Natural material re-use

Where possible, all natural materials generated through clearing activities (e.g., logs, mulch, hollow sections if removed, etc) are to be re-used within the subject land. This will allow for the formation of habitat patches/islands to form over time.

Natural materials to be retained and re-used from vegetation clearing works are to be distributed to appropriate areas within the subject land under the direction of the Project Ecologist. Preferred locations are those close to the proposed 'On Site Detention' basins or suitable areas adjacent the riparian areas found along the south-western boundary of the subject land.

The re-use of these natural materials is not to compromise the eventual functioning of the agricultural (or other) activities of the school.

The locations for the re-use of natural material is to be confirmed in the pre-clearance survey report prepared by the Project Ecologist.

4.2.8 Exotic weed species management

There were a number of *High Threat Exotic* weed species recorded by Narla during field surveys in preparation of the BDAR. Table 5 lists these species and their control methods. There may be exotic weed species present in addition to those recorded within the subject land. Specific control measures for exotic weed species are provided in the *NSW Weed Control Handbook - A guide to weed control in non-crop, aquatic and bushland situations* (DPI, 2018).

It is anticipated that the "Low Impact Construction Management Zone" has the highest potential for exotic weed species build-up as there will be less frequent activity in this zone of the subject land, and hence can be overlooked for regular maintenance.

Weed control activities are only to be undertaken if substantial quantities of *High Threat Exotic* weed species are identified by the Project Ecologist or the Project Bush Regenerator through regular monitoring and reporting.

Table 5 Exotic weed species recorded within the subject land by Narla and their control methods.

Species Name	Common name	Control Method
Bidens pilosa	Cobbler's Peg	Hand removal or spray
Cenchrus clandestinus	Kikuyu	Hand removal or spray
Cinnamomum camphora **only for regenerating individuals and not for established trees in street planting*	Camphor Laurel	Cut & paint
Chloris gayana	Rhodes Grass	Hand removal or spray
Cyperus eragrostis	Nut Grass	Hand removal or spray
Eragrostis curvula	African Lovegrass	Hand removal or spray
Lantana camera	Lantana	Cut & paint or hand removal
Paspalum dilatatum	Paspalum	Hand removal or spray
Ligustrum lucidum	Broad-leaf Privet	Cut & paint or hand removal
Senecio madagascariensis	Fire Weed	Hand removal or spray

4.3 Monitoring and reporting

A report by the Project Ecologist is to be prepared after the pre-clearing survey to detail, map, tag and mark all of the survey findings, as well as any additional measures that need to be taken to minimise harm to the biodiversity within the subject land.

In addition to the pre-clearance surveys, a regular monitoring program is to be implemented for the subject land for the duration of the construction phase of the project. The Project Ecologist or Project Bush Regenerator is to inspect the site on a quarterly basis until the construction phase of the project is completed.

The monitoring will cover, but not be limited to, the following items:

- Exotic weed species that are regenerating within the subject land, their abundance and location.
- The health of any replacement planting for the project.
- Any activity during the construction phase of the project that is adversely impacting, or likely to adversely impact, the biodiversity of the subject land.

A brief report is to be prepared following each quarterly inspection by the Project Ecologist or Project Bush Regenerator. If exotic weed management is required on the site, the quarterly report will provide guidance for bush regeneration contractors to follow so that these invasive species can be appropriately treated.

A final report is to be submitted to the Certifier at the end of the construction phase of the project. The report is to be prepared by the Project Ecologist and is to cover, but not be limited to, the following:

- Activities and tasks undertaken during the construction phase of the project to manage the biodiversity of the subject land.
- The details of the replacement planting that occurred within the subject land, including provenance of seeds collected (if required), location of planting and evidence of the success of the planting at the end of the construction phase of the project.
- Activities to mitigate the removal of hollow-bearing trees (if required).
- Activities undertaken to re-use natural materials within the subject land, including the location of materials re-used.
- Management activities and tasks undertaken to control exotic weed species (if required).

5 Project Biodiversity Management Schedule

This section provides a summary of the biodiversity management tasks, protocols, timing and responsibility required to minimise, mitigate and manage the impacts to biodiversity from the project.

Table 6 sets out the biodiversity management tasks required for the project. General tasks and Monitoring and Reporting tasks apply across the whole of the subject land. Specific tasks required to appropriately manage impacts to biodiversity within the Road Management Zone and High and Low Impact Construction Management Zones, due to the particular nature of construction activities to be undertaken in these zones, are described. Refer to Appendix A for a site plan showing these Biodiversity Management Zones.

Table 6 Overview of the biodiversity management tasks, timing for implementation, responsibility and general location.

Task	Description	Timing	Responsibility
General Biodiversity Management Tasks			
Assign a Project Ecologist and Project Bush Regenerator	A suitably qualified ecologist and bush regenerator must be engaged for the project. The Project Ecologist must be a qualified and experienced ecologist consultant with a minimum tertiary degree in Science, Conservation, Biology, Ecology, Natural Resource Management, Environmental Science or Environmental Management. The ecologist must be licensed with a current Department of Primary Industries Animal Research Authority permit and New South Wales Scientific License issued under the BC Act. The Project Bush Regenerator must have a minimum three years full time experience and a minimum TAFE Certificate Level IV Bush Regeneration qualification and / or a degree in Natural Areas Management (or the equivalent in experience).	Prior to clearing works or construction, whichever comes first	Proponent
Undertake seed collection and replacement planting	The Project Bush Regenerator is to implement a native vegetation seed collection program for propagation of native plants approved for removal. The propagated native plants are to be utilised within the landscaped planting areas on site. The plant propagation program is to replace the number of trees removed from the site on a 2:1 ratio. If the seed collection and propagation program cannot be achieved due to the season and/or a lack of seed availability at the time vegetation removal is planned to commence, an alternative native plant procurement strategy is to be implemented.	Seed collection is to occur when available and before clearing activity occurs Planting is to occur once locations have been confirmed and plants are available	Project Bush Regenerator, Landscape Architect and Project Ecologist
Pre-clearing survey	Pre-clearance surveys are to be undertaken to determine the presence or absence of native and threatened species and the location of any habitat features that can be retained and relocated to other suitable areas within the subject land – see 4.2.3 of this BMSP for items to be included in pre-clearing surveys.	Prior to clearing works	Project Ecologist
Management of displaced fauna	Should fauna become displaced or injured during clearing activities, the task outlined in 4.2.5 of this BMSP are to be followed.	During construction phase	Proponent and Project Ecologist
Natural material re-use	Where possible, all natural materials generated through clearing activities (e.g., logs, mulch, hollow sections if removed, etc) are to be re-used within the subject land. This will allow for the formation of habitat patches/islands to form over time. Natural materials to be retained and re-used from vegetation clearing works are to be distributed to appropriate areas within the subject land under the direction of the Project Ecologist.	During construction phase	Proponent and Project Ecologist

Task	Description	Timing	Responsibility
	The re-use of these natural materials is not to compromise the eventual functioning of the agricultural (or other) activities of the school.		
Road Management Zone and High Impact Construction Management Zone			
Clearing supervision	An inspection is to be undertaken by the Project Ecologist to identify any fauna that may be encountered during vegetation clearing or may need to be relocated prior to clearing operations – see 4.2.4 of this BMSP for tasks and clearing methodology to be implemented during clearing activities.	2 hours prior to, and during clearing activities	Project Ecologist
Hollow management and replacement	If during the pre-clearance survey, it is determined that trees containing hollows require removal, where hollow dependent native fauna are found using existing hollows, a hollow habitat replacement program is to be implemented. Compensatory tree hollows must be provided prior to the release of the hollow dependent fauna, unless the removed tree hollows can be relocated and installed on the same day they are removed.	Prior to clearing works	Proponent and Project Ecologist
Low Impact Construction Management Zone			
Exotic Weed Species Monitoring	The Project Ecologist or Project Bush Regenerator is to inspect the site for exotic weed species that are regenerating within the subject land, their abundance and location.	Each quarter during construction phase	Project Ecologist or Project Bush Regenerator
Exotic Weed Species Control	Weed control activities are only to be undertaken if substantial quantities of *High Threat Exotic* weed species are identified by the Project Ecologist or Project Bush Regenerator through regular monitoring and reporting. Specific control measures for exotic weed species are provided in the *NSW Weed Control Handbook – A guide to weed control in non-crop, aquatic and bushland situations* (DPI, 2018).	During construction phase	Project Ecologist or Project Bush Regenerator
Monitoring and Reporting			
Pre-clearance survey report	A report is to be prepared after the pre-clearing survey to detail, map, tag and mark all of the survey findings, as well as any additional measures that need to be taken to minimise harm to the biodiversity within the subject land.	Prior to clearing works	Project Ecologist
Quarterly inspections	A regular monitoring program is to be implemented for the subject land. The Project Ecologist or Project Bush Regenerator is to inspect the site on a quarterly basis until the construction phase of the project is completed.	Each quarter during construction phase	Project Ecologist or Project Bush Regenerator
Quarterly report	A brief report is to be prepared following each quarterly inspection. If exotic weed management is required on the site, the quarterly report will provide guidance for bush regeneration contractors to follow so that these invasive species can be appropriately treated.	Each quarter during construction phase	Project Ecologist or Project Bush Regenerator
Final biodiversity management report	A final report is to be submitted to the Certifier at the end of the construction phase of the project. The report is to cover, but not be limited to, the following: • Activities and tasks undertaken during the construction phase of the project to manage the biodiversity of the subject land. • The details of the replacement planting that occurred within the subject land, including provenance of seeds collected (if required), location of planting and evidence of the success of the planting at the end of the construction phase of the project. • Activities to mitigate the removal of hollow-bearing trees (if required).	At completion of construction phase	Project Ecologist

Task	Description	Timing	Responsibility
	• Activities undertaken to re-use natural materials within the subject land, including the location of materials re-used. • Management activities and tasks undertaken to control exotic weed species (if required).		

6 References

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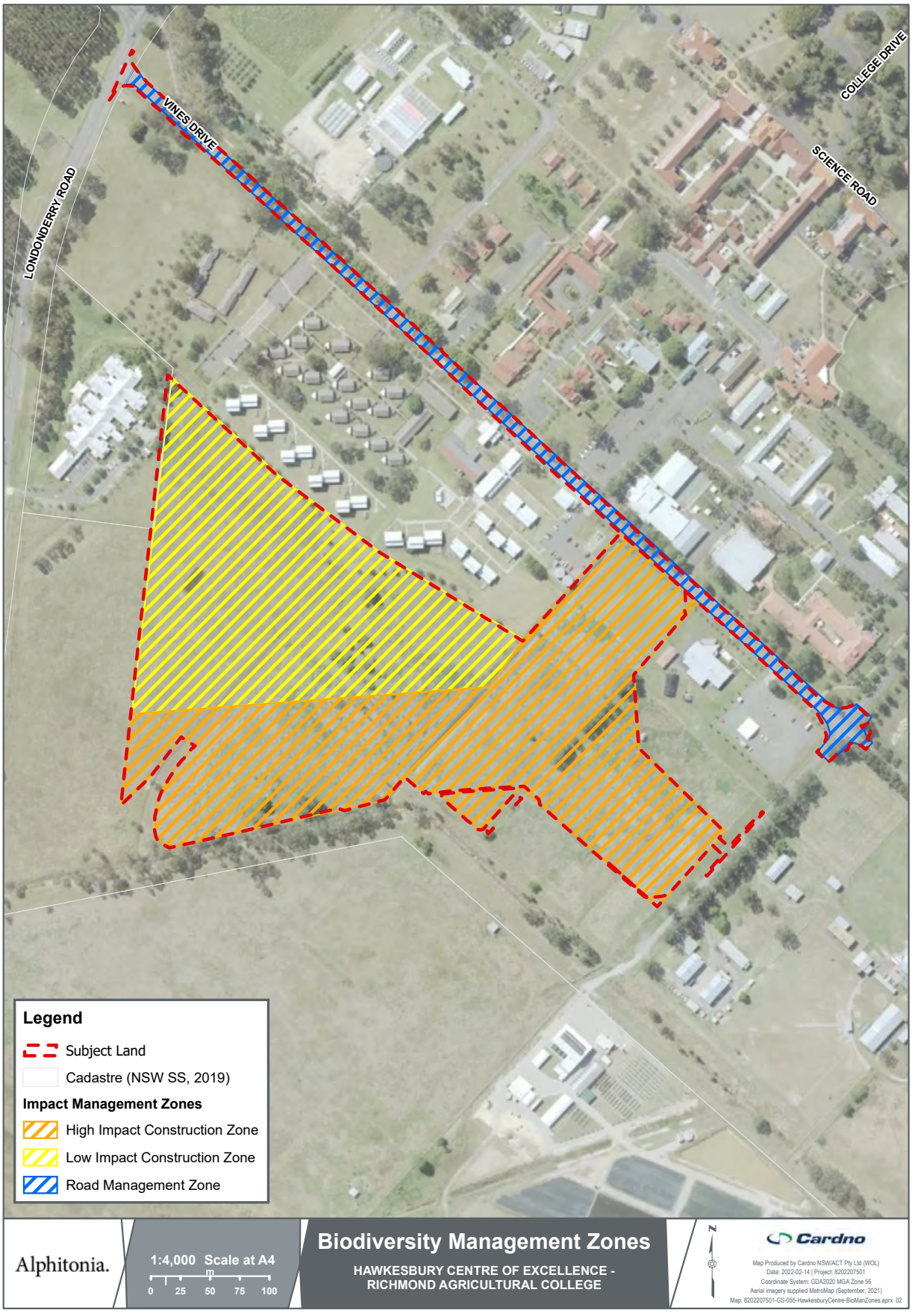
Appendix A Site Plan - Biodiversity Management Zones



Appendix B Curriculum Vitae

1) Brendan Pratt, Director at Alphitonia Pty Ltd

2) Courtney Hill, Ecologist at Alphitonia Pty Ltd

Brendan Pratt

Alphitonia.

Current Position
Director at Alphitonia Pty Ltd

Education
B.Sc. (Geoscience), University of Wollongong (2002)

Professional Associations
MEIANZ

Feb 2002 - Present

I have over 20 years of experience in environmental consulting, biodiversity assessment and conservation land management, bushfire hazard management, environmental and construction management, community consultation, and project management.

I have an extensive working knowledge of environmental legislation and policy requirements and I specialize in providing strategic, expert technical advice on complex projects to both private and government sectors across the lifecycle of a project.

Career Summary

Director

Alphitonia Pty Ltd

- Proven leadership ability through leading large multi-disciplinary teams and the supervision of over 80 individual staff from a variety of different backgrounds, ages and skill sets to perform services and provide deliverables within budget and to clients' expectations.
- Excellent communication, advocacy, negotiation and conflict-resolution skills, with a proven ability to find win-win solutions for clients and stakeholders.
- Excellent interpersonal skills and aptitude for teamwork evidenced through longstanding business partnerships and mutually beneficial project collaborations.
- Successfully plan and manage complex projects from initiation to completion, adhering to policy and legislative frameworks, within budget and timeframe constraints.

Notable projects:

- **Bushfire Hazard Mitigation Program** – SINSW, Department of Education Compliance and Safety, 2013 - present
    - Provided technical expertise and collaborated to prepare 700+ Bushfire Vegetation Maintenance Plans for NSW school sites.
    - Co-developed and implemented a bushfire risk matrix tool used to assess 200+ school sites against the threat of bushfire and make recommendations to improve bushfire resilience.
    - Prepared detailed scopes of work, based on in-depth bushfire risk assessment, for installation of Asset Protection Zones compliant with current guidelines and legislation, sensitive to site-specific constraints (e.g., ecology, community etc).

Tel. 0431 896 846
Email. brendan.pratt@alphitonia.com.au
Web. www.alphitonia.com.au
ABN. 98 611 057 768

- **Aboriginal Cultural Burn Pilot Program Proposal: Burning our Country, Protecting our People and Places** – Prepared for the NSW Department of Education, July 2020
    - Collaborated and consulted with Aboriginal and non-Aboriginal industry partners and stakeholders to prepare and deliver a proposal to undertake Cultural Burning on NSW school sites with a focus on cultural safety, environmental and community outcomes.
- Bushfire and ecology advice and consultation provided to SINSW for various State Significant Developments (e.g., Jordan Springs PS, Mainsbridge SSP, Alex Avenue PS, Samuel Gilbert PS, Canly Vale HS etc.)

Nov 2014 – Dec 2017

Environmental Planner

Cardno South Coast (NSW/ACT) Pty Ltd

- Management of a variety of planning and approvals projects.
- Provision of professional advice to support feasibility and due diligence investigations.
- Preparation of approvals documentation including Environmental Assessments, Review of Environmental Factors and Statements of Environmental Effects.
- Consultation with a range of public and private stakeholders.

May 2009 – Dec 2010

Environmental Planner

Building the Education Revolution Integrated Program Office (BER IPO)

The BER IPO was a public-private partnership through the Department of Education and Communities and the Department of Finance and Services. The BER IPO was responsible for the delivery of $3.3b worth of infrastructure to over 1,700 public school sites in NSW.

- Prepared a maintenance procedure for 375 bushfire affected school sites.
- Responsible for approving 'Review of Environmental Factors' and providing technical advice to private planning consultancies on how to produce their development applications.
- Successfully navigated initial application of controversial Nation Building and Jobs Plan (NBJP) Act. and SEPP (Infrastructure) 2007 on Department of Education land.
- Responsible for improving the quality of development applications in the areas of threatened species conservation, bushfire, and landscape modification in general.

Courtney Hill

Alphitonia.

Current Position
Junior Ecologist

Education
BConsBio(Hons), University of Wollongong (2018)

Diploma Conservation and Land Management, Yallah TAFE NSW (2013)

Cert II Animal Studies, Yallah TAFE NSW (2012)

Courtney is a Junior Ecologist with post-graduate experience in ecological and biodiversity assessments. Her knowledge of conservation biology and land management contributes to reliable and accurate data collection and the provision of high quality environmental consulting services catering to both government and private sectors.

Courtney specializes in formation and baseline monitoring of wildlife corridors through the assessment of faunal health and abundance indices. She is an expert fauna handler of small native mammals and an innovative team player with natural leadership abilities who strives for impact in all her endeavours.

Career Summary

Jun 2021 - Present

Junior Ecologist

Alphitonia Pty Ltd

- Provide environmental consult and faunal harm minimisation tactics and strategies for projects.
- Provide written certification of tree removal as per conditions of consent within development applications.
- Research, prepare and contribute to various environmental assessments and reports including Biodiversity Management Sub-Plans, ecological assessments and letters of certification.
- Undertake site investigation, faunal surveys, faunal monitoring and faunal handling and relocation.

2017 - Present

Fauna Surveyor and Trapping Internship

Gaia Research Environmental Consultants

- Successfully completed landscape scale faunal surveys investigating population demographics and health of small mammals using both live and camera trapping techniques as part of the Berry Wildlife Corridor Project.
- Purpose built and engineered camera traps for use among multiple target species reducing the level of individual faunal stress and handling required when compared to traditional survey methods.
- Thesis completed March 2018: *The use of camera and live trapping to investigate the population demographics and health of small mammals in fragmented landscape.*

6.13 FLOOD EMERGENCY RESPONSE SUB-PLAN

The Flood Emergency Response Sub-Plan has been prepared by Woolacotts Engineering for the Project.

It is not embedded in this document; it is supplied as an attached appendix so that it can be displayed/updated/revised in isolation if required.

Woolacotts.
CONSULTING ENGINEERS

School Infrastructure NSW

Centre of Excellence in Agricultural Education (CoE)

Flood Emergency Response Sub-Plan

20-307 | 25 February 2022 | SSDA Submission

Contents

Document control

Rev	Date	Revision details	Approved	Verified	Prepared
A	28.04.21	SSDA Submission	JAS	JC	AP
B	03.05.21	Revised Section 2.0 and 6.1		JC	AP
C	05.11.21	Revised Section 6.3			AP
D	21.02.22	Revised SSDA Submission		JH	AP
E	25.02.22	Revised SSDA Submission	JAS	JH	AP

List of Abbreviations & Acronyms

AEP	-	Annual Exceedance Probability
AHD	-	Australian Height Datum
ARI	-	Average Recurrence Interval
BoM	-	Bureau of Meteorology
ha	-	Hectares
PMF	-	Probable Maximum Flood
RL	-	Reduced Level
RMS	-	NSW Roads and Maritime Services
SES	-	State Emergency Service

1.0 Introduction

Woolacotts Consulting Engineers have been engaged by the Department of Education (DoE) to prepare an Integrated Water Management Report for the proposed Centre of Excellence in Agricultural Education (CoE).

The new proposed Centre of Excellence in Agricultural Education (CoE) is to be located within the Western Sydney University site off Vines Drive, Richmond ('The Site'). Londonderry Road is located to the west of The Site and Vines Drive is located to the north-east of The Site. The total lease area is approximately 11.37ha. Refer to Figure 1 below for the site location and extent.

The proposed high school includes a single-story complex of 6 buildings and ancillary structures located mainly over the eastern side of the site.

The purpose of this Flood Emergency Management Plan is to:

- Raise awareness of the existing flood behaviour for the site
- Allow for effective preparation for a flood emergency
- Provide CoE personnel and others with a clear understanding of how to respond before, during and after a flood event
- Ensure the safety of CoE personnel and others before, during and after a flood event

Figure 1 – Site location

The Flood Emergency Response Sub-Plan satisfies the SSDA condition B20 as outlined in Table 1 below.

Table 1 – Condition Satisfaction Table for SSDA Condition B20		
	Status	**Section**
(a) Be prepared by a suitably qualified and experienced person.	Satisfied	The Flood Emergency Response Sub-Plan has been prepared by a qualified civil engineer. Refer to Appendix C for the civil engineer's CV.
(b) Address the provision of the Flood Plain Risk Management Guidelines (EESG);	Satisfied	The Flood Emergency Response Sub-Plan has been prepared in accordance with NSW Floodplain Risk Management Guidelines and Hawkesbury Floodplain Risk Management Study and Plan 2012.
(c) (i). The flood emergency response for construction phases of the development.	Satisfied	Refer to Appendix D for Flood Emergency Management Plan During Construction
(c) (ii). Predicted flood levels	Satisfied	Refer to Section 3.0
(c) (iii). Flood warning time and flood notification	Satisfied	Refer to Section 4.0
(c) (iv). Assembly points and evacuation routes	Satisfied	Refer to Section 6.0
(c) (v). Evacuation and refuge protocols	Satisfied	Refer to Section 6.0
(c) (vi). Awareness training for employees and contractors, and users / visitors	Satisfied	Refer to Section 5.0

2.0 Development

The development involves the construction and operation of a new Centre of Excellence (CoE) in Agricultural Education on a leased land parcel within the Western Sydney University (Hawkesbury Campus) site, Richmond NSW.

The CoE will provide new agricultural / STEM teaching facilities with general learning and administration spaces to be utilised by rural, regional, metropolitan and international school students. The CoE will accommodate up to 325 students and up to 20 employees consisting of farm assistants, administration staff and teachers and up to five (5) itinerant staff members. The CoE will also include short-term on-site accommodation facilities for up to 62 visiting students and teaching professionals from regional and rural NSW.

The CoE will include five science laboratories, ten general learning spaces, practical activity teaching areas, seminar, botany room, administration block and accommodation facilities. It will also include

covered outdoor learning areas, dining / conference hall, canteen and kitchen, agricultural plots, significant landscaping spaces, car parking and provision of necessary infrastructure.

The development has been designed to be well integrated into the Western Sydney University site, having due regard for scale, bulk and orientation of existing buildings. The educational facilities will display linear open building forms in single story design with open spaces and lightweight construction techniques. The site is benefitted by Blue Mountains views to the west and the building and landscape plans have incorporated viewing opportunities into the design.

Refer to Figure 2 below for the proposed Site Plan.

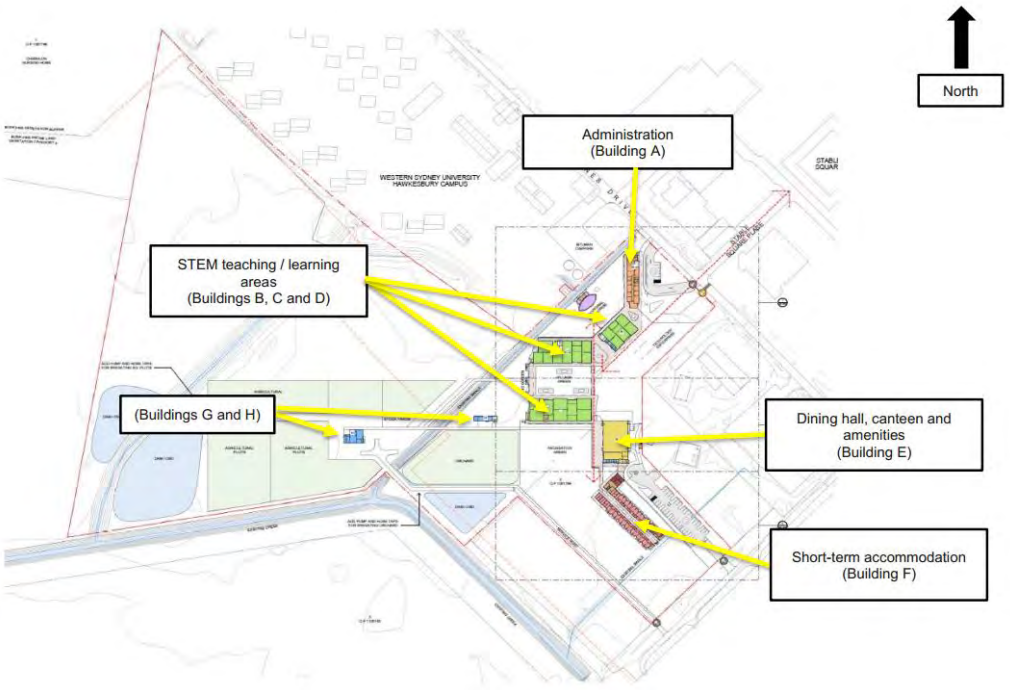


Figure 2 – Proposed Site Plan

3.0 Flood Behaviour

3.1 Flood Investigation

The proposed Centre of Excellence in Agricultural Education (CoE) is located within the Hawkesbury City Council Local Government Area (LGA).

Flood information relating to The Site has been obtained from the following documents:

- *Hawkesbury Floodplain Risk Management Study & Plan – Volume 3* by Bewsher Consulting Pty Ltd City, December 2012 (Bewsher Flood Study 2012)
- *Flood Impact Assessment Report* by Woolacotts Consulting Engineers dated 28th April 2021 (*Flood Impact Assessment Report*)

- *Hawkesbury Nepean Flood Plan – A Sub Plan of the State Emergency Management Plan (EMPLAN*) by NSW State Emergency Service, dated September 2015 *(Hawkesbury Nepean Flood Plan)*
- *Hawkesbury City Local Flood Plan – A Sub Plan of Hawkesbury City Local Disaster Plan (DISPLAN)* by NSW State Emergency Service, dated December 2010 *(Hawkesbury City Local Flood Plan)*

The above documents indicate that The Site is impacted by two sources of flooding, riverine flooding and local overland flooding.

Riverine flooding occurs when heavy rainfall causes the water levels in a river to rise and escape the main channel. Local overland flooding is run-off that travels over the land during heavy rainfall events, affected by urban features such as stormwater infrastructure, roads, fences, walls and other structures.

3.2 Flood Extents

Riverine Flooding

Flood mapping from the Bewsher Flood Study 2012 shows that The Site is only impacted by riverine flooding from the Probable Maximum Flood (PMF) event Refer to Figure 3 below for flood extents. *Note: The PMF is the largest flood that could conceivably occur at a particular location. The PMF defines the extent of the floodplain.*

The peak flood levels from riverine flooding for The Site are 17.5m AHD for the 1% AEP flood event and 26.4m AHD for the PMF event. Site levels generally vary from 23.5m AHD to 22.5m AHD.

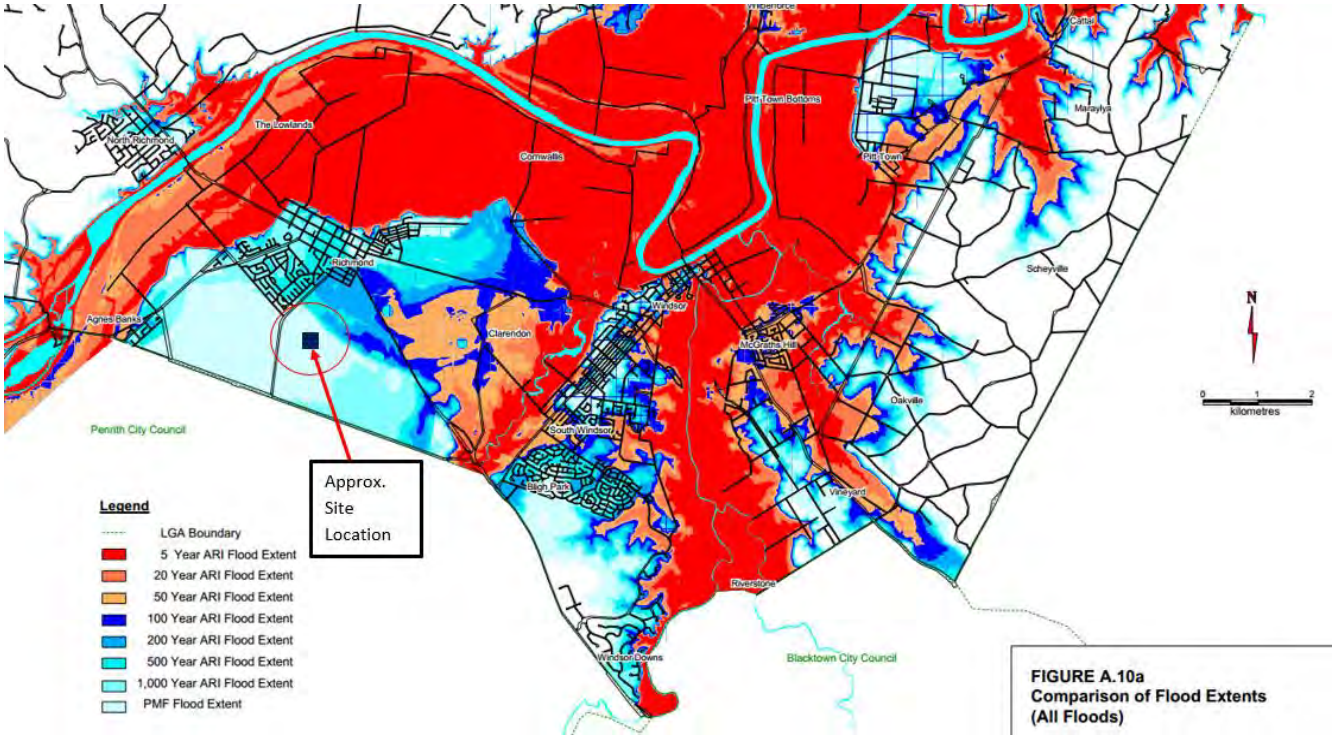


Figure 3 – Flood mapping extract from Bewsher Flood Study 2012

Overland Flooding

The *Flood Impact Assessment Report*, shows that The Site is impacted by overland flow flooding from the 1 in 100 year flood event. Refer to Figure 4 below for flood extents.

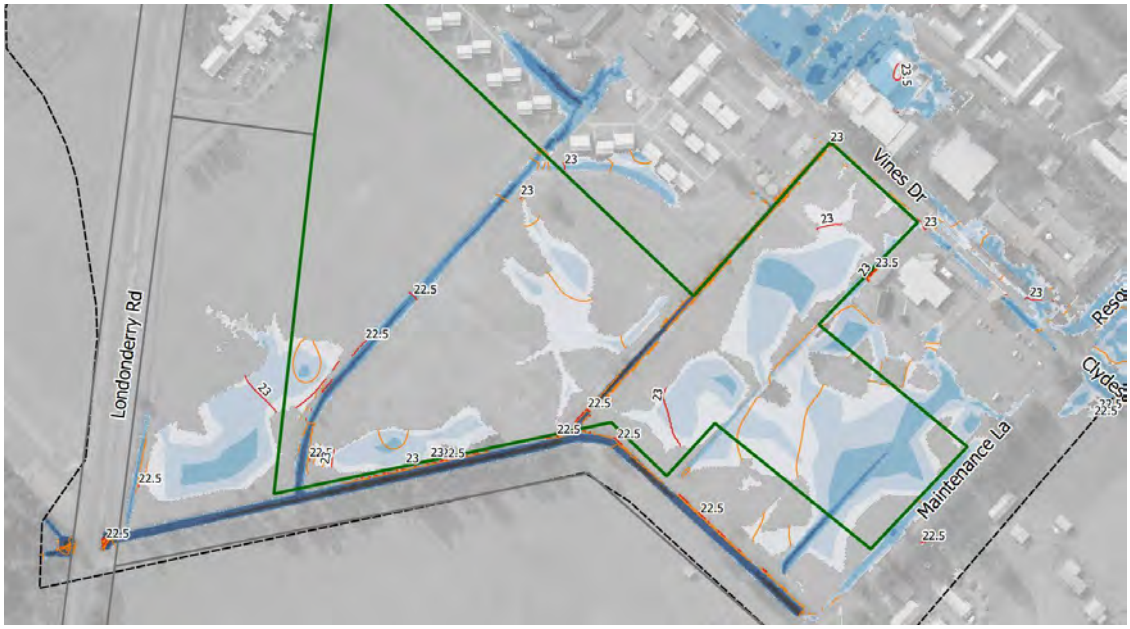


Figure 4 – 1% Pre-developed flood mapping extract from Flood Impact Assessment Report

The flood levels across the site vary from 23.0m AHD to 22.9m AHD during the 1% AEP storm event. Refer to the *Flood Impact Assessment Report* for further information.

4.0 Flood Warnings

4.1 Official Flood Warnings

The Bureau of Meteorology (BoM) and NSW State Emergency Service (SES) issue a range of official warnings and flood advice through their websites, local radio, television, social media etc. For the BoM, official warnings include:

- **Severe thunderstorm warnings** – Issued when severe thunderstorms are expected. The warnings will describe the area under threat and the associated hazard/s (e.g. flash flooding, high winds)
- **Severe weather warnings** – Issued when severe weather is expected to develop or move into an area. Severe weather includes high winds, heavy rain, abnormally high tides etc.
- **Flood Watch** – A warning that flood producing rain is expected to happen in the near future
- **Flood Warning** – A warning of flooding at a predicted height, time, and location

For the SES, official warnings include:

- **Flood Bulletins** – Provide information on what is expected to happen during a flood and the likely flood consequences. Flood bulletins are distributed to the media who will broadcast information.
- **Evacuation Warning** – Issued when flooding is likely to cut evacuation routes or inundate properties. Once the warning has been issued you should get prepared to evacuate.
- **Evacuation Order** – Issued when you are required to evacuate. The evacuation order advises people of what to do and where to go.
- **All Clear** – Issued when it is safe to return to the site.

Other ways you may be informed of possible flooding is via:

- A door knock by emergency services,
- Word of mouth, or
- The SES may issue an Emergency Alert. An Emergency Alert is a message that is sent to your land line or mobile phone as a voice or text message
- TV, radio and other media

4.2 Site Specific Warnings

In addition to the official warnings, it is strongly recommended that The Site adopt the following site-specific warning systems.

PA system

It is recommended that The Site adopt a public announcement (PA) system with an emergency tone that can be activated during a flood event. The PA system must have a backup power supply that is independent of the electrical grid in case of power failures.

It is also anticipated that this system will be utilised for other emergencies such as fires.

Warning Signs

Multiple flooding warning signs located throughout The Site to raise flood awareness for building personnel and provide clear direction of what to do during a flood event.

4.3 Important Contacts

The following list provides contact details for organisations/personnel who can be contacted during a flood emergency:

Police, Fire, Ambulance

In life threatening emergencies call 000

NSW State Emergency Service (SES)

The SES is responsible for the emergency management of floods, storms and tsunami in NSW. The SES can be contacted on 132 500 during a flood event.

Hawkesbury City Council (HCC)

HCC can be contacted for local flood information on 02 4560 4444

The Bureau of Meteorology (BOM)

The Bureau of Meteorology (BOM) is the agency responsible for issuing information about rainfall, river levels and flood. For the most up to date information on flood watches and warnings visit the BoM website at http://www.bom.gov.au/nsw/warnings/

NSW Roads and Maritime Services (RMS)

The RMS provides information on road closures due to flooding. The RMS can be contacted on 132 701 or visit the live traffic website.

The Flood Emergency Response Personnel

Includes site specific contact details for the building manager, chief flood warden, deputy flood warden, flood wardens, first aid officer, communications officer etc. Refer Appendix A for a summary list of important contacts. The school is required to fill out Appendix A.

5.0 Flood Response Preparation

5.1 Flood Preparation & Response Team

To ensure the safety of the occupants of CoE during a flood emergency, a Flood Preparation and Response Team is required. This team will consist of Western Sydney University, a Chief Flood Warden, Deputy Flood Warden, Flood Wardens and First Aid Officers. Refer to Figure 5 below for the organisational structure of this team.

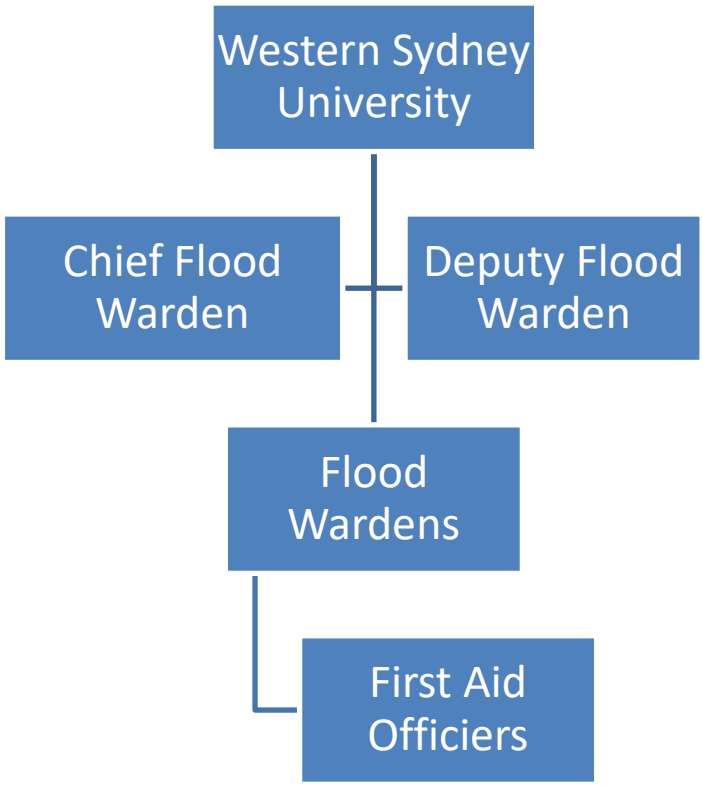


Figure 5 – Flood Preparation and Response Team

The Western Sydney University shall appoint the CoE principal as the Chief Flood Warden and also appoint a Deputy Flood Warden from CoE Staff. Once these wardens have been selected the Chief Flood Warden shall seek out assistance from other staff to join the team as Flood Wardens and First Aid Officers.

It is standard industry practice to have 2 fire wardens per 20 people (https://www.evacservices.com.au/fire-warden-training/). It is recommended that the same personnel who are fire wardens are also flood wardens.

SafeWork NSW recommends a minimum one first aid officer for every 50 workers. The first aid officers are to assist with minor injuries during the flood evacuation procedure or liaise with emergency services for more serious incidents.

Once the Flood Preparation and Response Team has been established, the Chief Flood Warden shall be responsible for managing the team.

5.2 Flood Preparation & Response Team Responsibilities

The role and responsibilities for the members of the Flood Preparation and Response Team is listed in Table 2 below:

Table 2 – Flood Preparation and Response Team Responsibilities	
ROLE	**RESPONSIBILITY**
Western Sydney University (WSU)	▪ Appoint the Principal as the Chief Flood Warden and appoint a Deputy Flood Warden ▪ Ensure that the Chief Flood Warden is enacting the Flood Emergency Response Plan ▪ Ensure all WSU personnel are made aware of The Site's flood risks
Chief Flood Warden	▪ Brief all flood wardens on the Flood Emergency Management Plan and any changes ▪ Monitor weather daily on Bureau of meteorology website ▪ Activate commencement of Flood Emergency Management Plan in event of flooding ▪ Liaise with emergency services if required ▪ Conduct Flood Emergency Response drills annually ▪ Ensure the Flood Preparation and Response team is adequately trained ▪ Review Flood Emergency Management Plan ▪ Conduct flood preparation review as per Table 2 – Flood Preparation Review
Deputy Flood Warden	▪ Undertake Chief Flood Warden's duties in the event that the Chief Flood Warden is away/unavailable ▪ Assist Chief Flood Warden in enacting Flood Emergency Management Plan ▪ Provide support to the Chief Flood Warden where required
Flood Wardens	▪ Ensure Chief Flood Warden is notified in the event of a flood emergency ▪ Receive text messages or emails from the Early Warning Network ▪ Assist Floor Flood Wardens in directing all building personnel of their floors to the nominated shelter in place locations and ensuring they remain clam ▪ Undertake the required training as instructed ▪ Ensure Flood Emergency Kit is up-to-date
First Aid Officer	▪ Implement first aid treatment as required ▪ Liaise with emergencies services as required

	▪ Auditing and maintaining the first aid kit and fire extinguishing equipment ▪ Assist building personnel with medical conditions and/or mobility restrictions ▪ Undertake the required training as instructed

5.3 Flood Emergency Kit

The NSW SES website provides a list of recommended items in a flood emergency kit, this includes: https://www.ses.nsw.gov.au/floodsafe/prepare-your-home/emergency-kit/

Emergency kit contents:

- Portable radio with spare batteries
- Megaphone
- Torch with spare batteries
- First aid kit (with supplies necessary for the school)
- Candles and waterproof matches
- Important papers including emergency contact numbers
- Copy of the school's Emergency Plans
- Ensure emergency kit is in a waterproof storage container

If evacuating the school, place in your emergency kit:

- A good supply of required medications
- The sign in book for visitors
- Any special requirements and supplies for the disabled, infirm and/or elderly
- Fresh food and drinking water

On a regular basis, check your emergency kit (remember to check use-by dates on batteries and gloves) and restock items if you need to. Also, keep a list of emergency numbers in the emergency kit.

5.4 Flood Signage

Flood signage shall be installed around The Site to inform building occupants and visitors of the risk of flooding and provide details on the flood emergency response plan. This signage shall be located in visible areas and include the flood emergency egress plans.

5.5 Flood Awareness Training

To provide flood awareness training for the Flood Preparation and Response Team and all CoE occupants. It is strongly recommended that flood emergency response drills occur a minimum twice annually. This will ensure flood wardens know how to respond in a flood emergency and building personnel are aware of the flood hazard. It is recommended that a drill be conducted first day of term. After the drill has been carried out, the flood emergency response procedure should be reviewed to identify any room for improvement and amended as necessary.

5.6 Flood monitoring

The Chief Flood Warden is to monitor storm activity/weather in the afternoon daily via the BoM website and/or radio. Storm warnings for next day events triggering flash flooding should be monitored carefully. It is up to the discretion of the Chief Flood Warden in consultation with the Western Sydney University to close the Building for the following day if deemed appropriate.

5.7 Flood Preparation Review

The Flood Emergency Management Plan and associated tasks need to be reviewed on a regular basis to ensure their effectiveness. Table 3 below lists the tasks, who is responsible for reviewing them and when the review should occur.

Table 3 – Flood Preparation Review		
TASK	**RESPONSIBILITY**	**DATE**
Review of flood emergency management plan	Chief Flood Warden	▪ Annually ▪ After a flood event ▪ If there are any changes that impact the ability of the plan to be implemented
Flood Awareness Training	Chief Flood Warden	▪ Every 6 months minimum ▪ After a flood event for debrief
Audit and test flood alarm system	Chief Flood Warden	▪ Every 6 months minimum ▪ After a flood event for debrief
Audit, maintain and test emergency electrical lighting	Electrical contractor under the supervision of Chief Flood Warden	▪ Annually ▪ After a flood event - if problems occurred
Audit and maintain flood emergency kit	Flood Wardens	▪ Every 6 months ▪ After a flood event for re-stocking
Audit and maintain first aid kit	First Aid Officer	▪ Every 6 months ▪ After a flood event for re-stocking
Audit and maintain fire fighting equipment	Floor Fire Warden	▪ Every 6 months ▪ After a fire event
Check for Flood Study updates	Chief Flood Warden	▪ Annually: Contact City of Hawkesbury City Council for any updates to the Flood Study

6.0 Flood Emergency Response Plan

6.1 Flood Response

The two main responses to a flood emergency include evacuation or Shelter in Place. Evacuation involves moving to an area that is outside the reach of floodwaters, while Shelter in Place refers to staying within the building until floodwaters have receded and it is safe to leave.

Shelter in place is only possible if the proposed “shelter” is located above the PMF level of 26.4m AHD. Given The Site is single storey with a proposed FFL (23.6m AHD) 2.8m below the PMF flood level, Shelter in Place is not considered a feasible option. Therefore, an evacuation response is required. We note that once a flood warning has been issued and the school has been evacuated (if there are personnel on site), WSU and SI NSW will typically close the school.

6.2 Emergency Muster Point

It is proposed to use the Dining Hall / Conference (Building E) and adjacent COLA as the flood Emergency Muster Point. Refer to Figure 6 below.

This location has been proposed for three reasons. Firstly, the muster point must be large enough to accommodate the total number of site personnel, which is 450 (325 students, 25 staff, 100 visitors (including 62 accommodation)). Secondly, the muster point must be open enough so that it is easy to communicate and account for all personnel. Thirdly, it will most likely be raining at the time that the flood emergency alarm will be activated, and it is preferable to have a covered area for people to congregate.

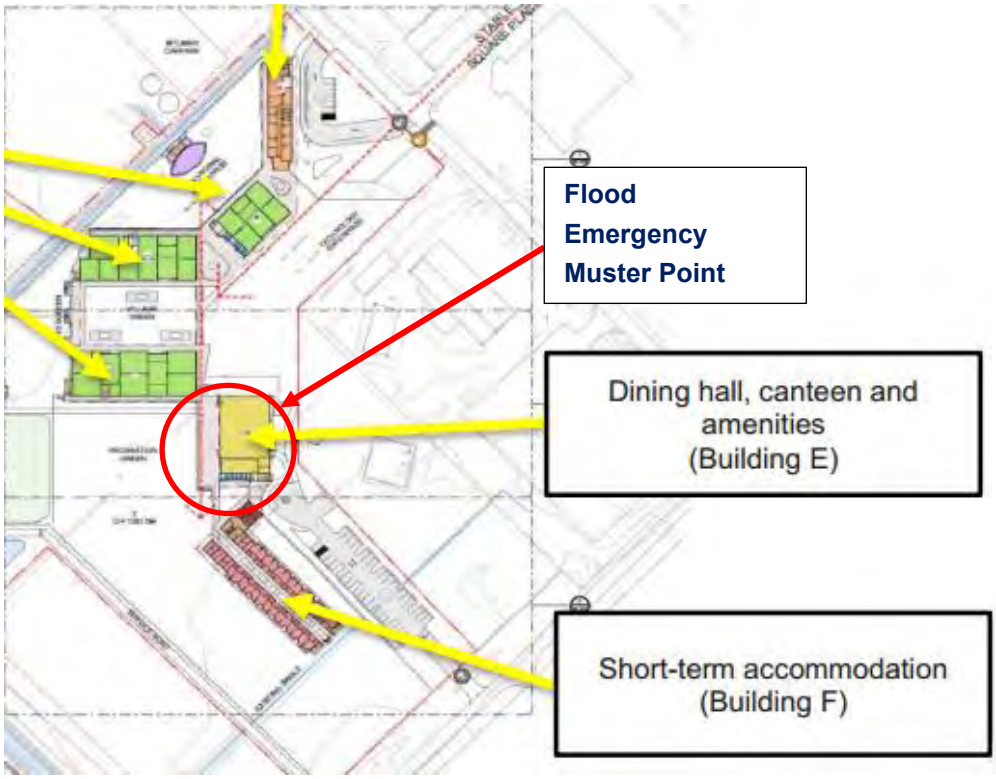


Figure 6 – Flood Emergency Muster Point

6.3 Flood Evacuation Strategy

The NSW SES is the appropriate representative for contacting regarding flood evacuation strategy due to their role in flood planning in NSW. This role includes:

- Determining how best respond to floods
- Describing the risks to the community
- Outlining the roles and responsibilities for the NSW SES and supporting agencies during a flood event
- Describing how the SES will manage flood events.

Woolacotts liaised with the SES Principal Advisor of the Hawkesbury Nepean Taskforce, Peter Cinque and Elizabeth Gardiner, Community Capability Officer of the SES Hawkesbury-Nepean Project, on Monday the 26th of April 2021. In this meeting, the SES provided the following advice:

Flood Information

- During a flood event from the Hawkesbury Nepean River, it takes approximately 1.5 to 3 days to reach flood depths requiring evacuation
- Floodwaters from the Hawkesbury Nepean River typically rise at 0.5m/hr up to a maximum of 0.7m – 0.8m/hr
- The SES provide flood warning updates every 3 hours
- It takes 12 to 15 hours to predict any flood height. The prediction is based on the forecasted rainfall
- It is approximated that the Richmond area will lose power when Hawkesbury Nepean River reaches a flood depth of 15m to 17m AHD
- Approximately 80% of personnel requiring evacuation shelter go to family and friends and 20% go to evacuation centres

Flood Evacuation Routes / Centres

- During a flood event from the Hawkesbury Nepean River, the two main evacuation routes out of Richmond Sector by vehicle (car, bus etc.) are Castlereagh Road (Primary Evacuation Route) and Londonderry Road (Secondary Evacuation Route). Refer to Appendix B for the Hawkesbury Nepean Flood Evacuation Route Map extracted from the *Hawkesbury Nepean Flood Plan.*
- Castlereagh Road (Primary Evacuation Route) is no longer usable when riverine floodwaters reach a depth of 20m AHD and Londonderry Road (Secondary Evacuation Route) is no usable when riverine floodwaters reach a depth of 18m AHD. Refer *Hawkesbury City Local Flood Plan* for further information.

- Londonderry Road may experience local overland flow flooding. However, the overland flow flooding along this road is classified as H1 during the 1% AEP flood event, meaning that it is still safe to drive through. This type of flooding is short term and recedes in approximately 30 to 60 minutes. Additionally, traffic management services monitor this evacuation route and signage, and warning signs will be provided along the route during a flood event.
- The railway line from Richmond Station is no longer usable when riverine floodwaters reach a depth of 12.5m to 13.5m AHD
- Once floodwaters exceed a depth of 20m, the last evacuation mode out of Richmond is by aircraft
- The flood evacuation centre for riverine flooding for the Richmond area (also known as the mass care facility) is located at Sydney Olympic Park. Sydney Olympic Park has its own train station

Site Specific Flood Evacuation Advice

- Once confirmation is received that riverine flooding is occurring, it is recommended that the school should close.
- It is recommended that the students who travelled via bus, use their normal morning and afternoon bus service to evacuate
- It is recommended that the students who travelled via bus, use their normal morning and afternoon bus service to evacuate
- The SES will organise buses, in coordination with Transport for NSW, where none are available
- The school will lose power when the Hawkesbury Nepean River reaches a flood depth of approximately 15m to 17m AHD. It is recommended evacuation occurs before the school loses power

6.4 Flood Evacuation Procedure during school hours

The following evacuation procedure should be adopted and implemented by the Department of Education for the school. It should also be incorporated into the Western Sydney University (WSU) Emergency Management Plan.

1. Flood Alert / Warning

If a flood warning is received from BoM or SES, the Chief Flood Warden shall monitor the situation and shall liaise with Western Sydney University's Chief Flood Warden.

2. Activate Flood Emergency Alarm

Once confirmation is received that riverine flooding is occurring, the Chief Flood Warden shall activate the Flood Emergency Alarm, which includes an emergency tone. Noting that activation of the alarm shall be occurring well before the Hawkesbury Nepean River is predicted to reach a flood depth of 12.5m to 13.5m AHD.

3. Evacuation to Emergency Muster Point

Once the Flood Emergency Alarm has been activated, all personnel on the CoE site are to make their way to the Emergency Muster Point (Dining Hall / Conference (Building E) and adjacent COLA) under the direction of the Flood Wardens. The Flood Wardens shall ensure everyone on the campus is accounted for and aware of the situation. The Flood Wardens shall ensure that nobody leaves The Site.

4. Confirm Occupancy Numbers

Once everyone is in the nominated Emergency Muster Point the Flood Wardens shall obtain the names of all the occupants within the muster point and ensure that everyone is accounted for.

5. SES Contact and confirm personnel numbers

While everyone is making their way to the Emergency Muster Post, the Chief Flood Warden along with Western Sydney University, shall contact the SES and inform them of the situation. The SES shall offer any assistance that is required. The Chief Flood Warden shall also inform the normal bus services of the situation.

Once personnel numbers have been confirmed by the Flood Wardens and the Chief Flood Warden is satisfied that everyone is accounted for, the Chief Flood Warden, with help from Western Sydney University, shall begin evacuation.

6. Evacuation from Emergency Muster Point

Personnel who travelled via bus

Site personnel who travelled by bus are to wait for their normal bus services as coordinated with the Flood Wardens. The buses are to use the nominated flood evacuation routes of either Castlereagh Road (Primary Evacuation Route) or Londonderry Road (Secondary Evacuation Route). Noting that at the time of evacuation the Hawkesbury Nepean River shall be well below the flood depth of 12.5m to 13.5m AHD at which point in time both roads are usable. The personnel who travelled via bus are to be taken to the flood evacuation centre at Sydney Olympic Park or to a location outside of the Hawkesbury Nepean River flood extents (whether that be their house, a friend's house, or the house of another family member).

Personnel who travelled via car

Site personnel who travelled by car are to use the nominated flood evacuation routes of either Castlereagh Road (Primary Evacuation Route) or Londonderry Road (Secondary Evacuation Route) as coordinated with the Flood Wardens. Noting that at the time of evacuation the Hawkesbury Nepean River shall be well below the flood depth of 12.5m to 13.5m AHD at which point in time both roads are usable. The personnel who travelled via car are to drive to the flood evacuation centre at Sydney Olympic Park or to a location outside of the Hawkesbury Nepean River flood extents (whether that be their house, a friend's house, or the house of another family member).

Personnel who travelled via train

Site personnel who travelled by train are to catch a bus service to the flood evacuation centre at Sydney Olympic Park as coordinated by the Flood Wardens (noting that the railway line from Richmond Station is no longer usable when riverine floodwaters reach a depth of 12.5m to 13.5m AHD). Sydney Olympic Park has its own train station where personnel can travel to a location outside of the Hawkesbury Nepean River flood extents (whether that be their house, a friend's house, or the house of another family member) or remain at the evacuation centre.

Personnel who travelled by other means

Site personnel who travelled by other means such as walking or cycling are to catch a bus service as coordinated with the Flood Wardens. The bus is to travel to the flood evacuation centre at Sydney Olympic Park or to a location outside of the Hawkesbury Nepean River flood extents (whether that be their house, a friend's house, or the house of another family member).

7. Closing the School

Once all personnel are evacuated from the site. The school shall be closed until notified by the SES that it is safe to reopen.

6.5 Flood Evacuation Procedure outside school hours

For personnel on site outside of school hours (such as those living on campus in the accommodation blocks) the flood evacuation procedure shall follow the one specified in Section 6.4 above.

Provided flood height predictions are given 12 to 15 hours before the Hawkesbury Nepean River is predicted to reach a flood depth of 12.5m to 13.5m AHD, night-time evacuation can potentially be postponed until the morning. **However, this must be confirmed with the SES when a flood warning is received.**

Once confirmation is received that riverine flooding is occurring, the School must be closed, and staff and students notified. The school is to remain closed until notified by the SES that it is safe to reopen.

Appendix A

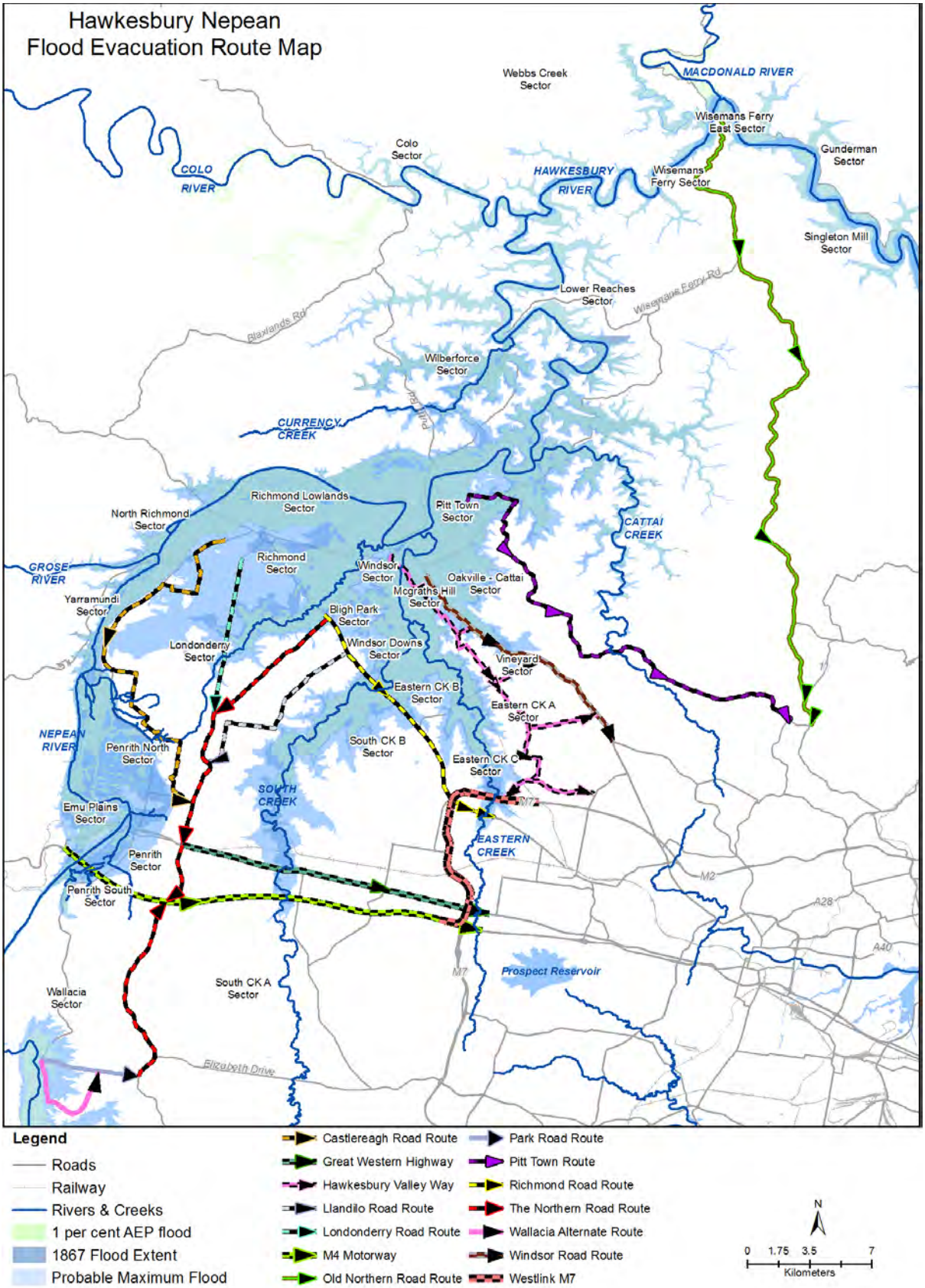
Important Phone Numbers

EMERGENCY NUMBERS	
Emergency Contact	**Number**
Police, Fire or Ambulance	000
NSW State Emergency Service	132 500
Hawkesbury City Council	02 4560 4444
NSW Roads and Maritime	132 701

SCHOOL STAFF NUMBERS (TO BE FILLED OUT BY SCHOOL)		
Role	**Contact Name**	**Number**
WSU Contact		
Chief Flood Warden		
Deputy Flood Warden		
Flood Warden 1		
Flood Warden 2		
Flood Warden 3		
First Aid Officer		

Appendix B

Flood Evacuation Routes



Map 1: Regional Evacuation Routes within the Hawkesbury-Nepean Valley

Appendix C

Civil Engineer CV

Alexander Phillips

Project role: Associate Structural & Civil Engineer

Alex joined Woolacotts in 2013. In the time since, he has gained experience in civil, structural and traffic engineering design for a range of sectors including residential, commercial, industrial, education, community infrastructure and justice and emergency.

Alex has gained proficiency with several computer modelling programs including DRAINS, RAFTS, HEC-RAS, MUSIC, SIDRA, SpaceGass, Microstran, RAPT and SLABS.

Relevant project experience

Mulgoa Rise Primary School - Role: Associate.

Structural engineering services from schematic design, detailed design development to contract documentation to a new primary school at Mulgoa Rise, a clear rectilinear greenfield site in a new residential subdivision area.

Hawkesbury Agricultural Learning Centre - Role: Associate.

Structural engineering services to the masterplan.

Alexandria Park Community School Redevelopment - Role: Engineer

Structural and civil engineering services to the redevelopment of the Alexandria Park Community School which accommodates up to 1,000 primary school students and 1,200 secondary school students in a comprehensive K-12 school.

Marist Kogarah, Art and Learning Centre - Role: Graduate Engineer

Undercroft basketball court with adjacent classroom and amenities facility, classroom / teaching facility above the basketball court.

Ashtonfield Public School - Role: Associate.

Upgrade works include innovative and flexible learning spaces for 11 classes and an upgrade to core facilities, including extensions to the library, hall and canteen.

Gledswood Hills Public School - Role: Engineer

Structural, civil and hydraulic engineering designs to new public school at Gledswood Hills built in two stages to meet growth in SW Sydney.

Cape Naturaliste College - Role: Engineer

Redevelopment to include a new single storey Year 7 learning block and additional car parking spaces and road realignment.

Yass High School - Role: Graduate Engineer

New two storey hospitality and training teaching facility. Reinforced concrete ground and first floor structures with timber roof structure.

Dapto Public School - Role: Associate.

Structural, civil, hydraulic and traffic engineering services to this upgrade project including 20 innovative learning spaces, associated practical activity spaces and an extension to the existing library and administrative facilities.

St Marys Primary School North Sydney - Role: Graduate Engineer

Alexander Phillips is an Associate Structural & Civil Engineer currently located in our Sydney office.

Education and qualifications

Bachelor of Civil Engineering (2012)

Bachelor of Business (2012)

Chartered Professional Engineer (CPEng) Civil & Structural

National Professional Engineering Register (NPER) Civil & Structural

Member of Engineers Australia (MIEAust) No. 4192513

Committee member of the Central Coast Engineers Australia Division

Design and documentation of the structural, civil and hydraulic engineering portions for the alterations and additions.

Trinity Grammar School, Summer Hill - Role: Graduate Engineer

Structral and civil design development and construction services to the new aquatic centre.

Oran Park High School - Role: Senior Engineer

New high school at Oran Park to accommodate up to 2,000 secondary students and 99 new teaching spaces within facilities that are technology rich and are configured to create a knowledge building environment.

Curl Curl North Public School - Role: Associate.

The retention of the two existing buildings, with new 1 and 2 storey buildings across the site providing 6,937sqm of usable space for 1,000 pupils.

Alexandria Park Community School Peer Review - Role: Associate.

Structural and civil peer review of design documentation for Alexandria Park Community School identifying any observed errors in documentation.

Penshurst Public School - Role: Associate.

Upgrade to cater for the future demand in the Hurstville LGA, replacing existing demountable classrooms with permanent facilities and improvement to the existing outdoor space

Canberra Girls Grammar School - Role: Engineer

Civil and traffic engineering services to the masterplan.

Holroyd High School - Role: Associate.

Structural engineering services to the library upgrade.

St Pius X College, Chatswood - Role: Senior Engineer

Structural, civil and hydraulic design and documentation of proposed new learning hub at St Pius X College.

Bossley Park High School - Role: Associate.

Structural and Hydraulic Design and documentation of a new Sporting Facilities Complex

East Hills Technology Girls High School - Role: Associate.

Structural engineering services.

Canning Vale Secondary College - Role: Engineer

Redevelopment works to incorporate new Year 7 learning areas, associated works included the relocation of existing transportable classroom units.

Appendix D

Flood Emergency Management Plan During Construction

School Infrastructure NSW

Centre of Excellence in Agricultural Education (CoE)

Flood Emergency Management Plan During Construction

20-307 | 17 February 2022 | SSDA

Contents

Document control

Rev No	Date	Revision details	Approved	Verified	Prepared
A	17.02.22	SSDA Submission	JC	JH	JH

List of Abbreviations & Acronyms

AEP	-	Annual Exceedance Probability
AHD	-	Australian Height Datum
ARI	-	Average Recurrence Interval
BoM	-	Bureau of Meteorology
ha	-	Hectares
PMF	-	Probable Maximum Flood
RL	-	Reduced Level
RMS	-	NSW Roads and Maritime Services
SES	-	State Emergency Service

1.0 Introduction

Woolacotts Consulting Engineers have been engaged by Richard Crookes Constructions Pty Ltd to prepare a Flood Emergency Response Plan during construction for the proposed Centre of Excellence in Agricultural Education (CoE).

The new proposed Centre of Excellence in Agricultural Education (CoE) is to be located within the Western Sydney University site off Vines Drive, Richmond ('The Site'). Londonderry Road is located to the west of The Site and Vines Drive is located to the north-east of The Site. The total lease area is approximately 11.37ha. Refer to Figure 1 below for the site location and extent.

The proposed high school includes a single-story complex of 6 buildings and ancillary structures located mainly over the eastern side of the site.

The purpose of this Flood Emergency Management Plan During Construction is to:

- Raise awareness of the existing flood behaviour for the site
- Allow for effective preparation for a flood emergency
- Provide all project personnel onsite with a clear understanding of how to respond before, during and after a flood event
- Ensure the safety of all project personnel before, during and after a flood event

Figure 1 – Site location

2.0 Proposed Development

The proposed development involves the construction and operation of a new Centre of Excellence (CoE) in Agricultural Education on a leased land parcel within the Western Sydney University (Hawkesbury Campus) site, Richmond NSW.

The CoE will provide new agricultural / STEM teaching facilities with general learning and administration spaces to be utilised by rural, regional, metropolitan and international school students. The CoE will accommodate up to 325 students and up to 20 employees consisting of farm assistants, administration staff and teachers and up to five (5) itinerant staff members. The CoE will also include short-term on-site accommodation facilities for up to 62 visiting students and teaching professionals from regional and rural NSW.

The CoE will include five science laboratories, ten general learning spaces, practical activity teaching areas, seminar, botany room, administration block and accommodation facilities. It will also include covered outdoor learning areas, dining / conference hall, canteen and kitchen, agricultural plots, significant landscaping spaces, car parking and provision of necessary infrastructure.

The proposed development has been designed to be well integrated into the Western Sydney University site, having due regard for scale, bulk and orientation of existing buildings. The educational facilities will display linear open building forms in single-story design with open spaces and lightweight construction techniques. The site is benefitted from Blue Mountains views to the west and the building and landscape plans have incorporated viewing opportunities into the design.

Refer to Figure 2 below for the proposed Site Plan.

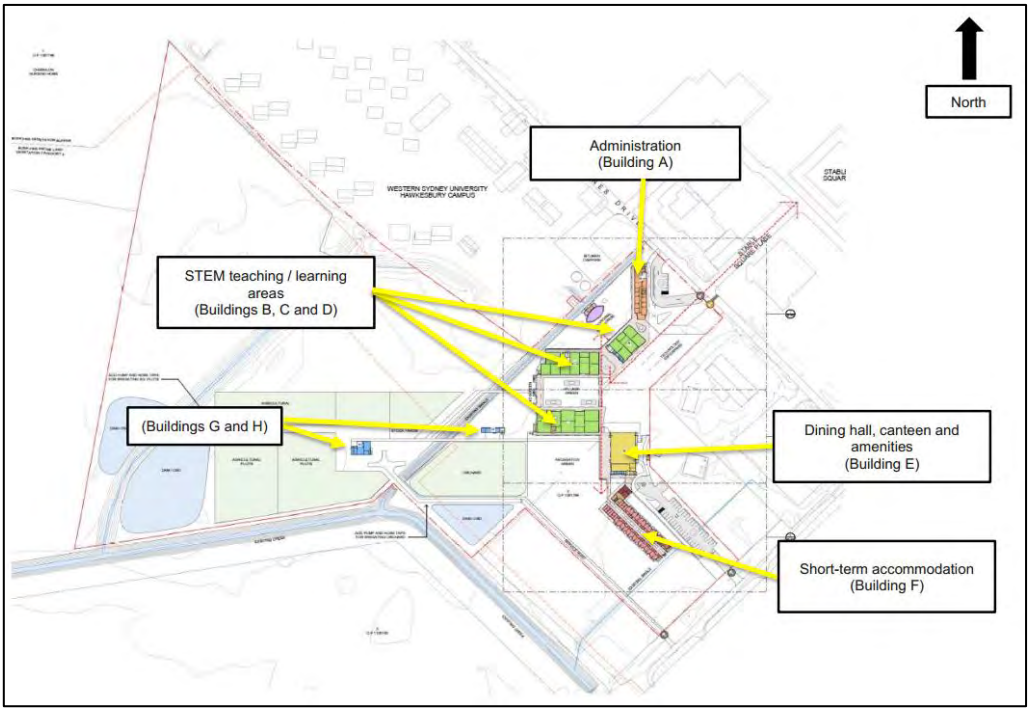


Figure 2 – Proposed Site Plan

3.0 Flood Behaviour

3.1 Flood Investigation

The proposed Centre of Excellence in Agricultural Education (CoE) is located within the Hawkesbury City Council Local Government Area (LGA).

Flood information relating to The Site has been obtained from the following documents:

- *Hawkesbury Floodplain Risk Management Study & Plan – Volume 3* by Bewsher Consulting Pty Ltd City, December 2012 (Bewsher Flood Study 2012)
- *Flood Impact Assessment Report* by Woolacotts Consulting Engineers dated 28th April 2021 (*Flood Impact Assessment Report*)
- *Hawkesbury Nepean Flood Plan – A Sub Plan of the State Emergency Management Plan (EMPLAN*) by NSW State Emergency Service, dated September 2015 *(Hawkesbury Nepean Flood Plan)*
- *Hawkesbury City Local Flood Plan – A Sub Plan of Hawkesbury City Local Disaster Plan (DISPLAN)* by NSW State Emergency Service, dated December 2010 *(Hawkesbury City Local Flood Plan)*

The above documents indicate that The Site is impacted by two sources of flooding, riverine flooding and local overland flooding.

Riverine flooding occurs when heavy rainfall causes the water levels in a river to rise and escape the main channel. Local overland flooding is runoff that travels over the land during heavy rainfall events, affected by urban features such as stormwater infrastructure, roads, fences, walls and other structures.

3.2 Flood Extents

Riverine Flooding

Flood mapping from the Bewsher Flood Study 2012 shows that The Site is only impacted by riverine flooding from the Probable Maximum Flood (PMF) event Refer to Figure 3 below for flood extents. *Note: The PMF is the largest flood that could conceivably occur at a particular location. The PMF defines the extent of the floodplain.*

The peak flood levels from riverine flooding for The Site are 17.5m AHD for the 1% AEP flood event and 26.4m AHD for the PMF event. Site levels generally vary from 23.5m AHD to 22.5m AHD.

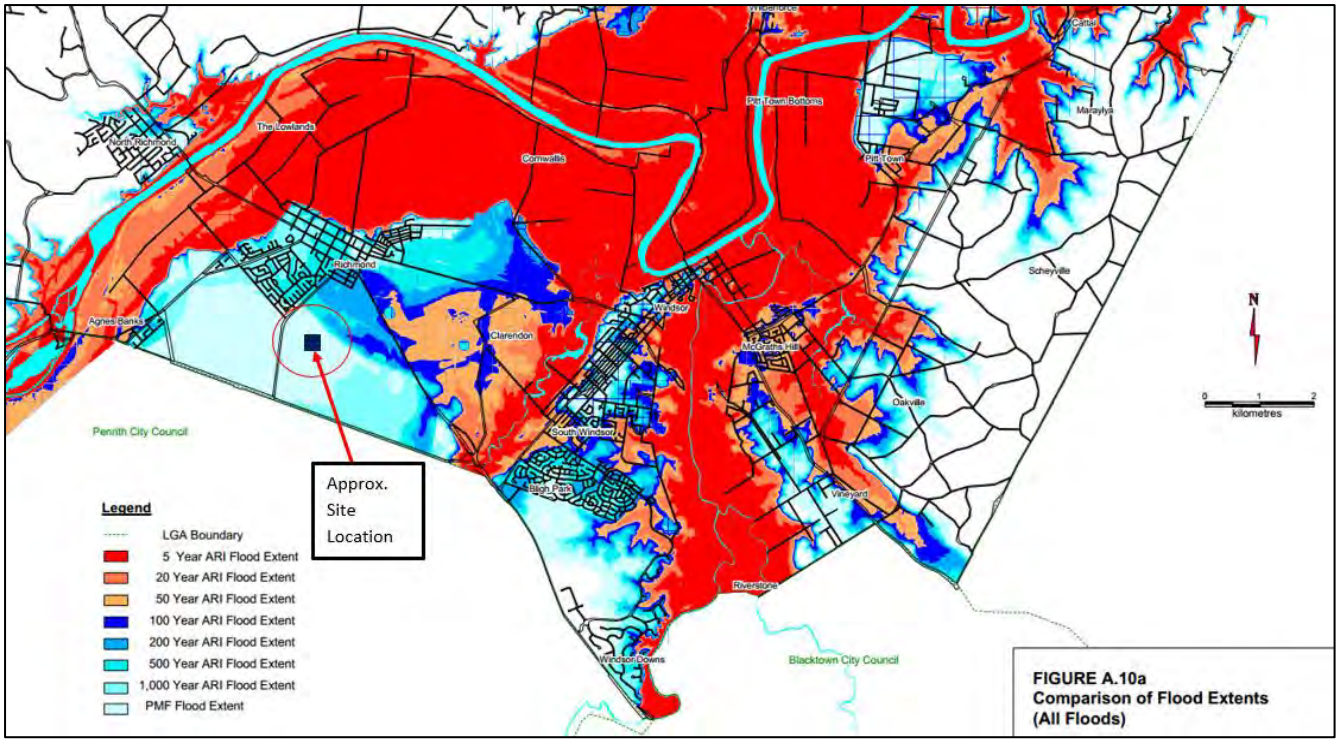


Figure 3 – Flood mapping extract from Bewsher Flood Study 2012

Overland Flooding

The *Flood Impact Assessment Report*, shows that The Site is impacted by overland flow flooding from the 1 in 100 year flood event. Refer to Figure 4 below for flood extents.

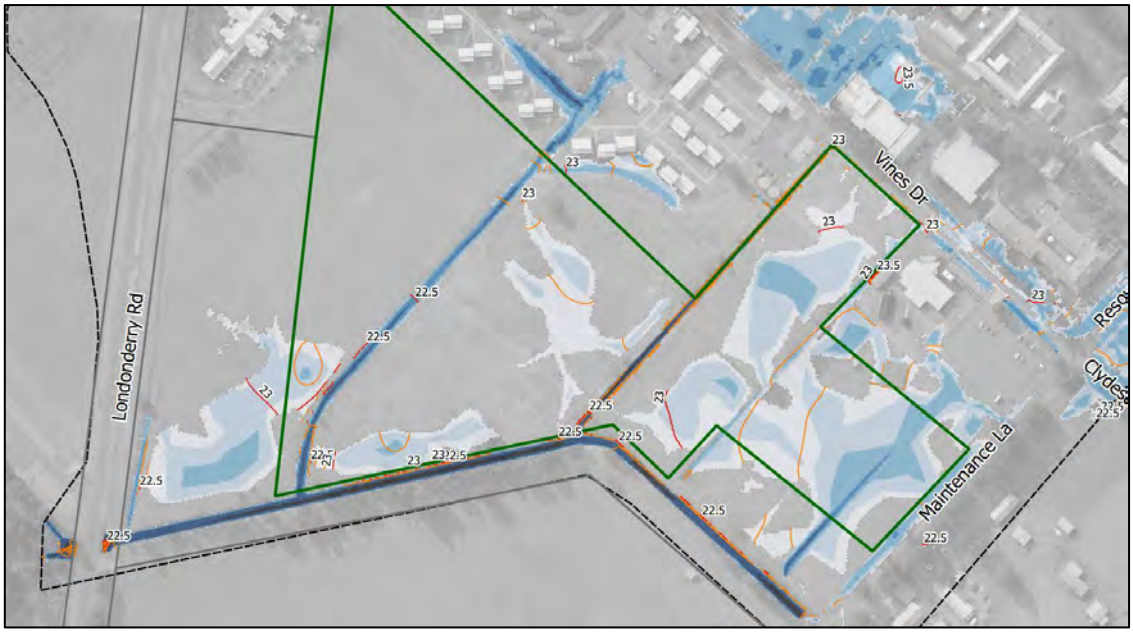


Figure 4 – 1% Pre-developed flood mapping extract from Flood Impact Assessment Report

The flood levels across the site vary from 23.0m AHD to 22.9m AHD during the 1% AEP storm event. Refer to the *Flood Impact Assessment Report* for further information.

4.0 Flood Warnings

4.1 Official Flood Warnings

The Bureau of Meteorology (BoM) and NSW State Emergency Service (SES) issue a range of official warnings and flood advice through their websites, local radio, television, social media etc. For the BoM, official warnings include:

- **Severe thunderstorm warnings** – Issued when severe thunderstorms are expected. The warnings will describe the area under threat and the associated hazard/s (e.g. flash flooding, high winds)
- **Severe weather warnings** – Issued when severe weather is expected to develop or move into an area. Severe weather includes high winds, heavy rain, abnormally high tides etc.
- **Flood Watch** – A warning that flood producing rain is expected to happen in the near future
- **Flood Warning** – A warning of flooding at a predicted height, time, and location

For the SES, official warnings include:

- **Flood Bulletins** – Provide information on what is expected to happen during a flood and the likely flood consequences. Flood bulletins are distributed to the media who will broadcast information.
- **Evacuation Warning** – Issued when flooding is likely to cut evacuation routes or inundate properties. Once the warning has been issued you should get prepared to evacuate.
- **Evacuation Order** – Issued when you are required to evacuate. The evacuation order advises people of what to do and where to go.
- **All Clear** – Issued when it is safe to return to the site.

Other ways you may be informed of possible flooding is via:

- A door knock by emergency services,
- Word of mouth, or
- The SES may issue an Emergency Alert. An Emergency Alert is a message that is sent to your landline or mobile phone as a voice or text message
- TV, radio and other media

4.2 Site Specific Warnings

In addition to the official warnings, it is strongly recommended that the project site adopt the following site-specific warning systems.

PA system

It is recommended that the project site adopt a public announcement (PA) system with an emergency tone that can be activated during a flood event. The PA system must have a backup power supply that is independent of the electrical grid in case of power failures.

It is also anticipated that this system will be utilised for other emergencies such as fires.

Warning Signs

Multiple flooding warning signs will be located throughout the project site to raise flood awareness for the project site personnel and provide clear direction of what to do during a flood event.

4.3 Important Contacts

The following list provides contact details for organisations/personnel who can be contacted during a flood emergency:

Police, Fire, Ambulance

In life-threatening emergencies call 000

NSW State Emergency Service (SES)

The SES is responsible for the emergency management of floods, storms and tsunami in NSW. The SES can be contacted on 132 500 during a flood event.

Hawkesbury City Council (HCC)

HCC can be contacted for local flood information on 02 4560 4444

The Bureau of Meteorology (BOM)

The Bureau of Meteorology (BOM) is the agency responsible for issuing information about rainfall, river levels and flood. For the most up to date information on flood watches and warnings visit the BoM website at http://www.bom.gov.au/nsw/warnings/

NSW Roads and Maritime Services (RMS)

The RMS provides information on road closures due to flooding. The RMS can be contacted on 132 701 or visit the live traffic website.

The Flood Emergency Response Personnel

Includes site-specific contact details for the project manager, chief flood warden, deputy flood warden, flood wardens, first aid officer, communications officer etc. Refer to Appendix A for a summary list of important contacts. The construction project management team is required to fill out Appendix A.

5.0 Flood Response Preparation

5.1 Flood Preparation & Response Team

To ensure the safety of the project site personnel during a flood emergency, a Flood Preparation and Response Team is required. This team will consist of a project manager, a Chief Flood Warden, Deputy Flood Warden, Flood Wardens and First Aid Officers. Refer to Figure 5 below for the organisational structure of this team.

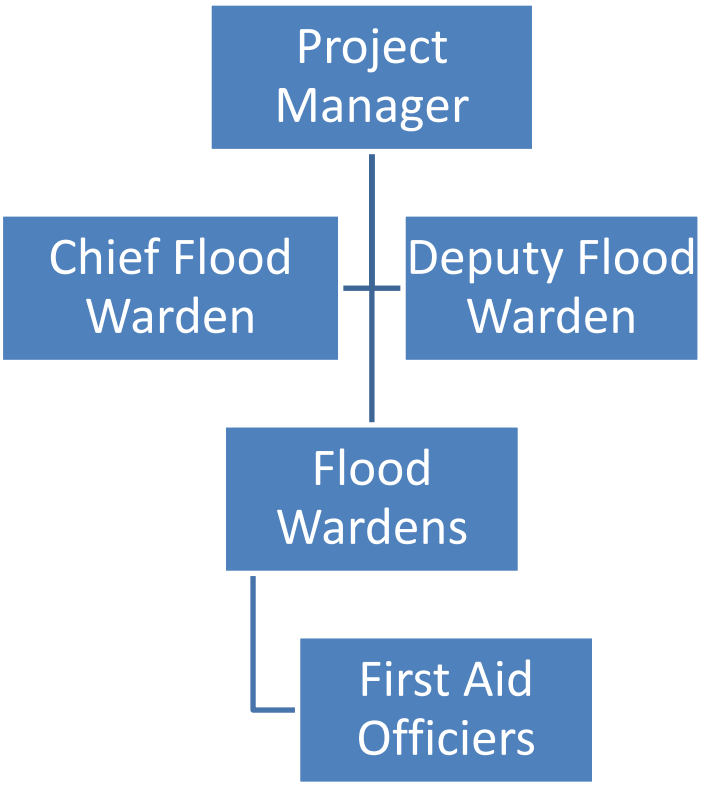


Figure 5 – Flood Preparation and Response Team

The project manager shall appoint the site manager as the Chief Flood Warden and also appoint a Deputy Flood Warden from the site management team. Once these wardens have been selected the Chief Flood Warden shall seek out assistance from other staff to join the team as Flood Wardens and First Aid Officers.

It is standard industry practice to have 2 fire wardens per 20 people (https://www.evacservices.com.au/fire-warden-training/). It is recommended that the same personnel who are fire wardens are also flood wardens.

SafeWork NSW recommends a minimum of one first aid officer for every 50 workers. The first aid officers are to assist with minor injuries during the flood evacuation procedure or liaise with emergency services for more serious incidents.

Once the Flood Preparation and Response Team has been established, the Chief Flood Warden shall be responsible for managing the team.

5.2 Flood Preparation & Response Team Responsibilities

The role and responsibilities for the members of the Flood Preparation and Response Team are listed in Table 1 below:

Table 1 – Flood Preparation and Response Team Responsibilities

ROLE	RESPONSIBILITY
Project Manager	▪ Appoint the site manager as the Chief Flood Warden and appoint a Deputy Flood Warden ▪ Ensure that the Chief Flood Warden is enacting the Flood Emergency Response Plan ▪ Ensure all project site personnel are made aware of The Site's flood risks
Chief Flood Warden	▪ Brief all flood wardens on the Flood Emergency Management Plan and any changes ▪ Monitor weather daily on Bureau of meteorology website ▪ Activate commencement of Flood Emergency Management Plan in event of flooding ▪ Liaise with emergency services if required ▪ Conduct Flood Emergency Response drills biannually. ▪ Ensure the Flood Preparation and Response team is adequately trained ▪ Review Flood Emergency Management Plan ▪ Conduct flood preparation review as per Table 2 – Flood Preparation Review
Deputy Flood Warden	▪ Undertake Chief Flood Warden's duties in the event that the Chief Flood Warden is away/unavailable ▪ Assist Chief Flood Warden in enacting Flood Emergency Management Plan ▪ Provide support to the Chief Flood Warden where required
Flood Wardens	▪ Ensure Chief Flood Warden is notified in the event of a flood emergency ▪ Receive text messages or emails from the Early Warning Network ▪ Assist Floor Flood Wardens in directing all building personnel of their floors to the nominated shelter in place locations and ensuring they remain clam ▪ Undertake the required training as instructed ▪ Ensure Flood Emergency Kit is up-to-date
First Aid Officer	▪ Implement first aid treatment as required ▪ Liaise with emergencies services as required

	▪ Auditing and maintaining the first aid kit and fire extinguishing equipment ▪ Assist building personnel with medical conditions and/or mobility restrictions ▪ Undertake the required training as instructed

5.3 Flood Emergency Kit

The NSW SES website provides a list of recommended items in a flood emergency kit, this includes: https://www.ses.nsw.gov.au/floodsafe/prepare-your-home/emergency-kit/

Emergency kit contents:

- Portable radio with spare batteries
- Megaphone
- Torch with spare batteries
- First aid kit (with supplies necessary for the construction project site)
- Candles and waterproof matches
- Important papers including emergency contact numbers
- Copy of the construction project site emergency plans
- Ensure emergency kit is in a waterproof storage container

If evacuating the project personnel, place in your emergency kit:

- A good supply of required medications
- The sign in book for visitors
- Fresh food and drinking water

On a regular basis, check your emergency kit (remember to check use-by dates on batteries and gloves) and restock items if you need to. Also, keep a list of emergency numbers in the emergency kit.

5.4 Flood Signage

Flood signage shall be installed around the construction site to inform construction workers and visitors of the risk of flooding and provide details on the flood emergency response plan. This signage shall be located in visible areas and include the flood emergency egress plans.

5.5 Flood Awareness Training

To provide flood awareness training for the Flood Preparation and Response Team and all employees, it is strongly recommended that flood emergency response drills be conducted on the first day of construction project commencement. The flood emergency response drills shall include practising evacuations, identifying flood emergency muster points, and location of first-aid arrangements. After the drill has been carried out, the flood emergency response procedure should be reviewed biannually to identify any room for improvement and amended as necessary. This will ensure flood wardens know how to respond in a flood emergency and all project personnel are aware of the flood hazard.

5.6 Site Inductions

All personnel entering the project site for the first time will be inducted into the project areas' flood emergency management requirements. This will include, but is not limited to:

- Evacuation procedures
- Location of the emergency access point and evacuation route
- Location of emergency muster point
- Existence and requirements of The Flood Emergency Response Plan
- Roles and responsibilities of the Flood Emergency Response Team
- Key contacts / wardens

5.7 Flood monitoring

The Chief Flood Warden is to monitor storm activity/weather in the afternoon daily via the BoM website and/or radio. Storm warnings for next day events triggering flash flooding should be monitored carefully. It is up to the discretion of the Chief Flood Warden in consultation with the project manager to close the construction site for the following day if deemed appropriate.

5.8 Flood Preparation Review

The Flood Emergency Management Plan and associated tasks need to be reviewed on a regular basis to ensure their effectiveness. Table 2 below lists the tasks, who is responsible for reviewing them and when the review should occur.

Table 2 – Flood Preparation Review		
TASK	**RESPONSIBILITY**	**DATE**
Review of flood emergency management plan	Chief Flood Warden	▪ Every 6 months minimum ▪ After a flood event ▪ If there are any changes that impact the ability of the plan to be implemented
Flood Awareness Training	Chief Flood Warden	▪ Every 6 months minimum ▪ After a flood event for debrief
Audit and test flood alarm system	Chief Flood Warden	▪ Every 6 months minimum ▪ After a flood event for debrief
Audit, maintain and test emergency electrical lighting	Electrical contractor under the supervision of Chief Flood Warden	▪ Every 6 months minimum ▪ After a flood event - if problems occurred
Audit and maintain flood emergency kit	Flood Wardens	▪ Every 6 months ▪ After a flood event for re-stocking
Audit and maintain first aid kit	First Aid Officer	▪ Every 6 months ▪ After a flood event for re-stocking
Audit and maintain fire fighting equipment	Floor Fire Warden	▪ Every 6 months ▪ After a fire event
Check for Flood Study updates	Chief Flood Warden	▪ Annually: Contact City of Hawkesbury City Council for any updates to the Flood Study

6.0 Flood Emergency Response Plan

6.1 Flood Response

The two main responses to a flood emergency include evacuation or Shelter in Place. Evacuation involves moving to an area that is outside the reach of floodwaters, while Shelter in Place refers to staying within the building until floodwaters have receded and it is safe to leave.

Shelter in place is only possible if the proposed “shelter” is located above the PMF level of 26.4m AHD. Given the existing site is 22.70m – 23.50m AHD and the proposed FFL for most buildings is 23.6m AHD which is 2.8m below the PMF flood level, Shelter in Place is not considered a feasible option. Therefore, an evacuation response is required. We note that once a flood warning has been issued and the project site personnel have been evacuated, the project manager will close the construction site.

6.2 Emergency Muster Point

Two flood emergency muster points will be proposed for the project site: one near the proposed Block A building at the initial stage of the construction and the other at the Dinning Hall / Conference (Building E) for the latter stage of the construction. Refer to Figure 6 below.

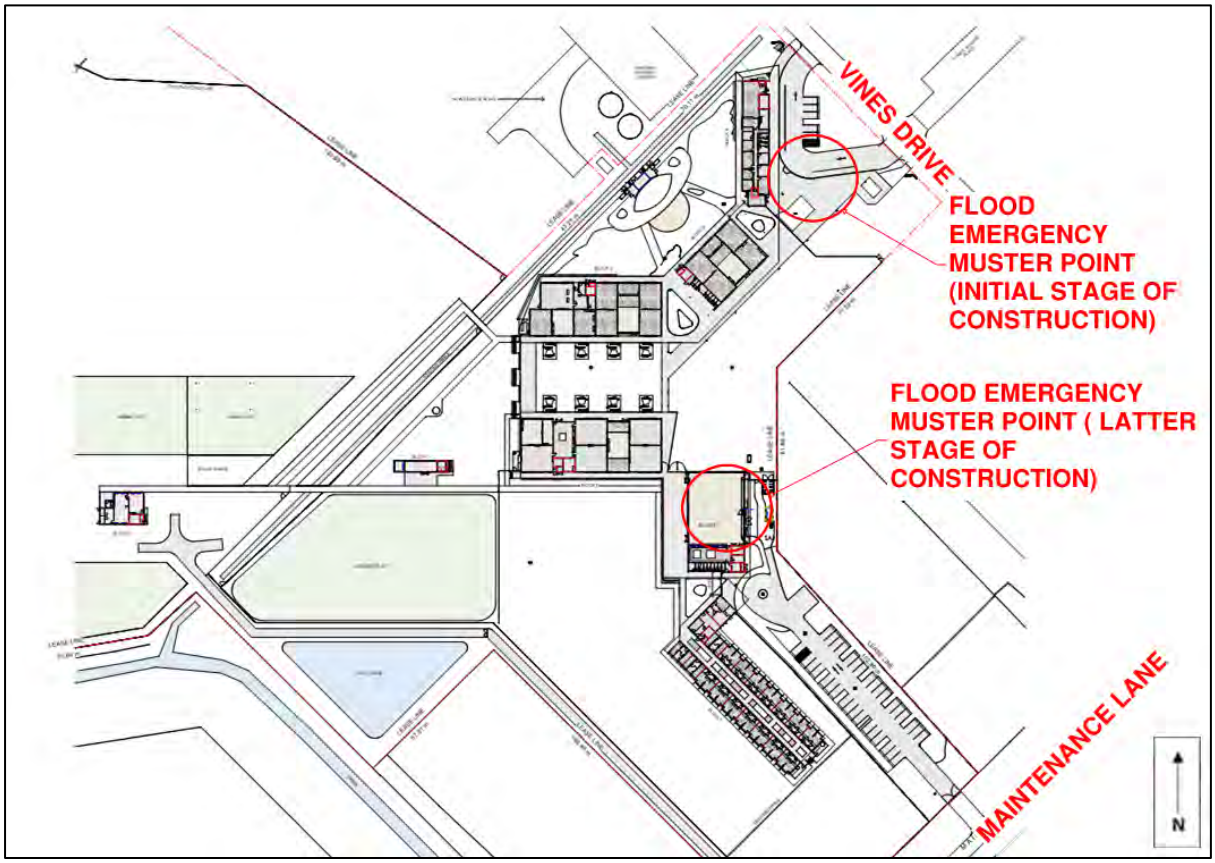


Figure 6 – Flood Emergency Muster Point

These locations have been proposed for three reasons. Firstly, the muster points must be large enough to accommodate the total number of site personnel, which is expected to be 60-80 contractors on site on any one day. Secondly, the muster point must be open enough so that it is easy to communicate and account for all personnel. Thirdly, the site office and temporary parking will most likely be located near Block A building at the initial stage of the project and it will most likely provide covered areas for people to congregate as it will be raining at the time that the flood emergency alarm will be activated. When completed, the Dinning Hall / Conference (Building E) will be used as a muster point for the ongoing construction activities as it will provide large covered areas for people to assemble.

The locations of muster points will be communicated to the site personnel through training and, or site inductions. All site personnel will be notified at the daily meeting on the day the change is to occur and via follow up-toolbox talks.

6.3 Flood Evacuation Strategy

The NSW SES is the appropriate representative for contact regarding flood evacuation strategy due to their role in flood planning in NSW. This role includes:

- Determining how best to respond to floods
- Describing the risks to the community
- Outlining the roles and responsibilities for the NSW SES and supporting agencies during a flood event
- Describing how the SES will manage flood events.

Woolacotts liaised with the SES Principal Advisor of the Hawkesbury Nepean Taskforce, Peter Cinque and Elizabeth Gardiner, Community Capability Officer of the SES Hawkesbury-Nepean Project, on Monday the 26th of April 2021. In this meeting, the SES provided the following advice:

Flood Information

- During a flood event from the Hawkesbury Nepean River, it takes approximately 1.5 to 3 days to reach flood depths requiring evacuation
- Floodwaters from the Hawkesbury Nepean River typically rise at 0.5m/hr up to a maximum of 0.7m – 0.8m/hr
- The SES provide flood warning updates every 3 hours
- It takes 12 to 15 hours to predict any flood height. The prediction is based on the forecasted rainfall
- It is approximated that the Richmond area will lose power when Hawkesbury Nepean River reaches a flood depth of 15m to 17m AHD
- Approximately 80% of personnel requiring evacuation shelter go to family and friends and 20% go to evacuation centres

Flood Evacuation Routes / Centres

- During a flood event from the Hawkesbury Nepean River, the two main evacuation routes out of Richmond Sector by vehicle (car, bus etc.) are Castlereagh Road (Primary Evacuation Route) and Londonderry Road (Secondary Evacuation Route). Refer to Appendix B for the Hawkesbury Nepean Flood Evacuation Route Map extracted from the *Hawkesbury Nepean Flood Plan.*
- Castlereagh Road (Primary Evacuation Route) is no longer usable when riverine floodwaters reach a depth of 20m AHD and Londonderry Road (Secondary Evacuation Route) is no usable when riverine floodwaters reach a depth of 18m AHD. Refer *Hawkesbury City Local Flood Plan* for further information.
- Londonderry Road may experience local overland flow flooding. However, the overland flow flooding along this road is classified as H1 during the 1% AEP flood event, meaning that it is still safe to drive through. This type of flooding is short term and recedes in approximately 30 to 60 minutes. Additionally, traffic management services monitor this evacuation route and signage, and warning signs will be provided along the route during a flood event.
- The railway line from Richmond Station is no longer usable when riverine floodwaters reach a depth of 12.5m to 13.5m AHD
- Once floodwaters exceed a depth of 20m, the last evacuation mode out of Richmond is by aircraft
- The flood evacuation centre for riverine flooding for the Richmond area (also known as the mass care facility) is located at Sydney Olympic Park. Sydney Olympic Park has its own train station

Site-Specific Flood Evacuation Advice

- Once confirmation is received that riverine flooding is occurring, it is recommended that the project site should close.
- It is recommended that the project personnel who travelled via bus, use their normal morning and afternoon bus service to evacuate
- The SES will organise buses, in coordination with Transport for NSW, where none are available
- The project site will lose power when the Hawkesbury Nepean River reaches a flood depth of approximately 15m to 17m AHD. It is recommended evacuation occurs before the project site loses power

6.4 Flood Evacuation Procedure during work hours

The following evacuation procedure should be adopted and implemented by the project management team.

1. Flood Alert / Warning

If a flood warning is received from BoM or SES, the Chief Flood Warden shall monitor the situation and shall liaise with the project manager.

2. Activate Flood Emergency Alarm

Once confirmation is received that riverine flooding is occurring, the Chief Flood Warden shall activate the Flood Emergency Alarm, which includes an emergency tone. Noting that activation of the alarm shall be occurring well before the Hawkesbury Nepean River is predicted to reach a flood depth of 12.5m to 13.5m AHD.

3. Evacuation to Emergency Muster Points

Once the Flood Emergency Alarm has been activated, all personnel on the project site are to make their way to the Emergency Muster Point under the direction of the Flood Wardens. The Flood Wardens shall ensure everyone on the construction site is accounted for and aware of the situation. The Flood Wardens shall ensure that nobody leaves The Site.

4. Confirm Occupancy Numbers

Once everyone is in the nominated Emergency Muster Point the Flood Wardens shall obtain the names of all the occupants within the muster point and ensure that everyone is accounted for.

5. SES Contact and confirm personnel numbers

While everyone is making their way to the Emergency Muster Post, the Chief Flood Warden shall contact the SES and inform them of the situation. The SES shall offer any assistance that is required. The Chief Flood Warden shall also inform the normal bus services of the situation.

Once personnel numbers have been confirmed by the Flood Wardens and the Chief Flood Warden is satisfied that everyone is accounted for, the Chief Flood Warden shall begin evacuation.

6. Evacuation from Emergency Muster Points

Personnel who travelled via bus

Site personnel who travelled by bus are to wait for their normal bus services as coordinated with the Flood Wardens. The buses are to use the nominated flood evacuation routes of either Castlereagh Road (Primary Evacuation Route) or Londonderry Road (Secondary Evacuation Route). Noting that at the time of evacuation the Hawkesbury Nepean River shall be well below the flood depth of 12.5m to 13.5m AHD at which point in time both roads are usable. The personnel who travelled via bus are to be taken to the flood evacuation centre at Sydney Olympic Park or to a location outside of the Hawkesbury Nepean River flood extents (whether that be their house, a friend's house, or the house of another family member).

Personnel who travelled via car

Site personnel who travelled by car are to use the nominated flood evacuation routes of either Castlereagh Road (Primary Evacuation Route) or Londonderry Road (Secondary Evacuation Route) as coordinated with the Flood Wardens. Noting that at the time of evacuation the Hawkesbury Nepean River shall be well below the flood depth of 12.5m to 13.5m AHD at which point in time both roads are usable. The personnel who travelled via car are to drive to the flood evacuation centre at Sydney Olympic Park or to a location outside of the Hawkesbury Nepean River flood extents (whether that be their house, a friend's house, or the house of another family member).

Personnel who travelled via train

Site personnel who travelled by train are to catch a bus service to the flood evacuation centre at Sydney Olympic Park as coordinated by the Flood Wardens (noting that the railway line from Richmond Station is no longer usable when riverine floodwaters reach a depth of 12.5m to 13.5m AHD). Sydney Olympic Park has its own train station where personnel can travel to a location outside of the Hawkesbury Nepean River flood extents (whether that be their house, a friend's house, or the house of another family member) or remain at the evacuation centre.

Personnel who travelled by other means

Site personnel who travelled by other means such as walking or cycling are to catch a bus service as coordinated with the Flood Wardens. The bus is to travel to the flood evacuation centre at Sydney Olympic Park or to a location outside of the Hawkesbury Nepean River flood extents (whether that be their house, a friend's house, or the house of another family member).

7. Closing the project site

Once all project personnel are evacuated from the construction site. The construction site shall be closed until notified by the SES that it is safe to restart the construction.

6.5 Flood Evacuation Procedure outside work hours

For personnel on site outside of work hours, the flood evacuation procedure shall follow the one specified in Section 6.4 above.

Provided flood height predictions are given 12 to 15 hours before the Hawkesbury Nepean River is predicted to reach a flood depth of 12.5m to 13.5m AHD, night-time evacuation can potentially be postponed until the morning. **However, this must be confirmed with the SES when a flood warning is received.**

Once confirmation is received that riverine flooding is occurring, the project site must be closed, and all personnel notified. The project site is to remain closed until notified by the SES that it is safe to reopen.

6.6 Post-flood Response

Following the flooding of the site and when SES notifies that it is safe to restart the construction works, the project management team shall determine whether or not it is safe for construction workers to return to the project site. A safety walkthrough shall be carried out by the project manager, site manager, contractor's construction manager, contractor's environmental manager, contractor's project manager, and electrician. They shall assess the likelihood of flood damage to access roads and determine whether floodwaters have receded.

The electrician shall check any inundated or water affected power boxes and electrical equipment. The construction site power is to remain off until the electrician confirms that it is deemed safe to turn on the project site power.

Once it is deemed safe to start works, the following will be undertaken:

- Any equipment, materials or debris moved by the floodwater should be returned to the correct area, or disposed of in accordance with the construction and demolition waste management plan if damaged beyond repair.
- Check stockpiles for erosion or losses
- Restore erosion and sediment control devices as per the Construction Soil and Water Management Plan.
- Temporary onsite structures or partly constructed structures should be checked for erosion or other water damage before entering them or continuing work.
- Check portable wastewater systems on site and schedule maintenance / servicing
- Determine whether any water held in excavations can be pumped to sediment basins for treatment prior to discharge.

Appendix A

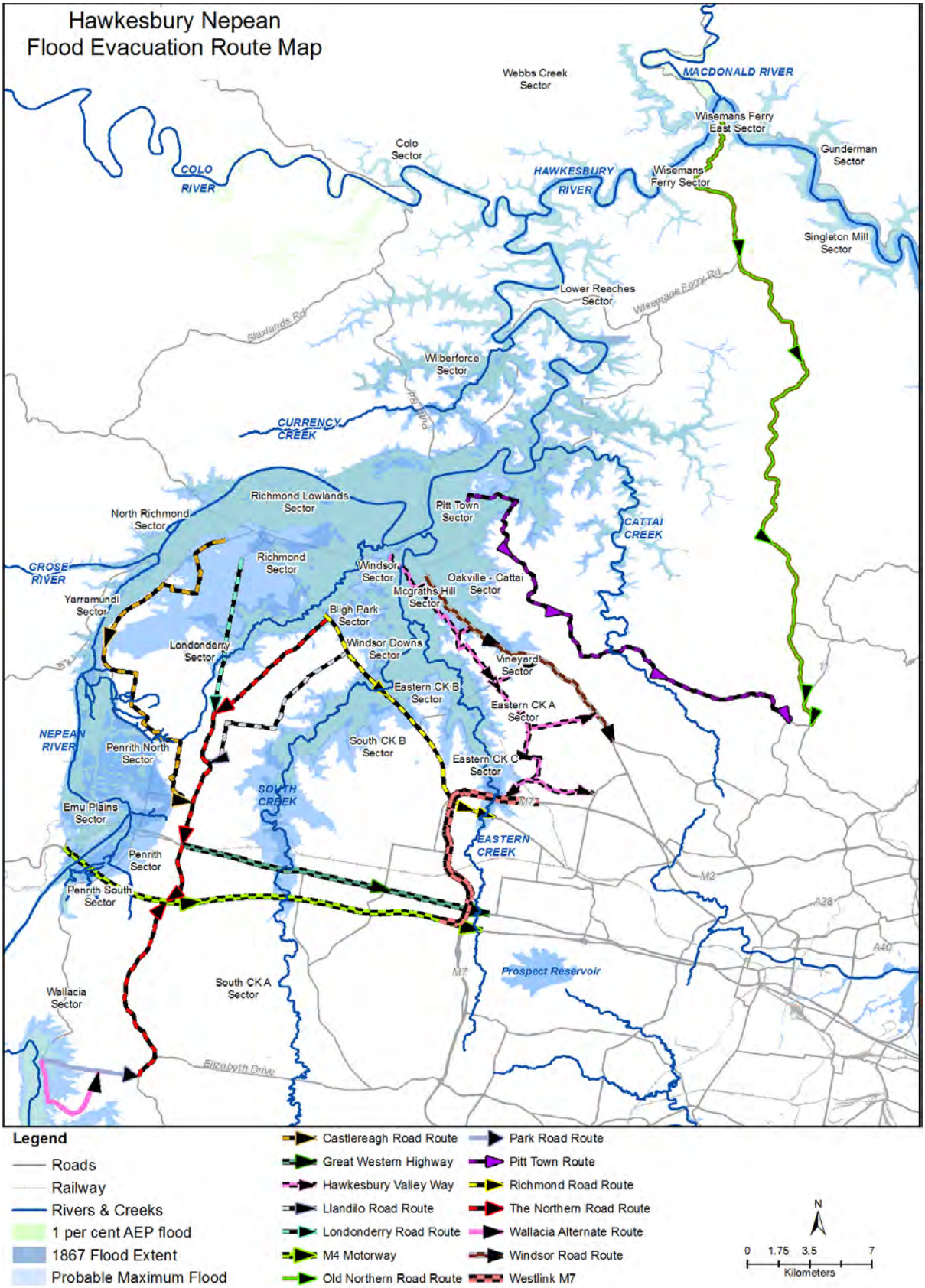
Important Phone Numbers

EMERGENCY NUMBERS	
Emergency Contact	**Number**
Police, Fire or Ambulance	000
NSW State Emergency Service	132 500
Hawkesbury City Council	02 4560 4444
NSW Roads and Maritime	132 701

FLOOD EMERGENCY RESPONSE TEAM (TO BE FILLED OUT BY PROJECT MANAGER)		
Role	**Contact Name**	**Number**
Project Manager		
Chief Flood Warden		
Deputy Flood Warden		
Flood Warden 1		
Flood Warden 2		
Flood Warden 3		
First Aid Officer		

Appendix B

Flood Evacuation Routes



Map 1: Regional Evacuation Routes within the Hawkesbury-Nepean Valley

6.14 DRIVER CODE OF CONDUCT

It is not embedded in this document; it is supplied as an attached appendix (**Appendix 6.8 Construction Traffic & Pedestrian Management Sub-Plan**) so that it can be displayed/updated/revised in isolation if required.

6.15 EXTERNAL LIGHTING

The design reports, detail compliance for the proposed works. Not embedded within this document

6.16 COMMUNITY CONSULTATION AND COMPLAINTS HANDLING

The CCS will be generated by SINSW as required post receival of the Condition of Consent.

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